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THE latest quotation of sugar in New York, July 1, was 3½ cents for Cuban centrifugals of 90 deg. test. Under present conditions of the sugar trade, the price is not likely to drop lower.

CALIFORNIA papers report an increasing demand for beet pulp for feeding live stock. If beet growers can utilize all the waste product of the factories, then it will materially aid the sugar beet industry in Europe and America in its rivalry with the sugar-cane industry. Hogs as well as cattle thrive on it, and fatten very quickly.

THE pineapple trade of Singapore has expanded greatly within the last few years. There are now ten European firms and nine Chinese firms engaged in the business, and the annual exports amount to 150,000 cases of two-dozen preserved pines, valued at $200,000. The pineapple is preserved whole and retains its delicious juiciness.

NO CULTIVATOR of the soil should fail to read the practical notes to farmers, commencing on page 312. They are written in just that happy-go-easy style that farmers like, interspersed with anecdotes which tend to fix in the memory the principal points of interest. The original articles, from which those are taken, are quite lengthy, and would be well worth publishing in book-form for general circulation, if carefully revised.

Alexander Hamilton said, "Men give me credit for genius. All the genius I have lies just in this: when I have a subject in hand I study it profoundly. Day and night it is before me. I explore it in all its bearings. My mind becomes pervaded with it. Then the effort which I make the people are pleased to call the fruit of genius; it is the fruit of labor and thought." The law of labor is equally binding on genius and mediocrity.

The richest family in the world is probably the Booth family. The immense properties of the Salvation Army all over the world are, with hardly with an exception, vested in the various members of General Booth's family. One reason for this arrangement is that the Army, not being an incorporated institution, cannot legally hold property. A more important reason still is that it brings the Army so much more under direct control. It has always been the policy of the General to have the reins of power held either by himself or by members of his family.

A European statistician puts the public debt of the European nations at $23,320,000,000, or about $64 per capita for the population. The heaviest per capita indebtedness, $160, is found in, the country least able to bear it, Portugal. Next comes France with $135 per head of its population. France has a perfect genius for enduring taxation, but the recent protests against the proposed income tax would indicate that the end of its patience is pretty nearly reached. England's per capita is about $106. Switzerland's is the smallest, $5. Hawaii's per capita, estimating the public debt at $3,000,000, and the population at 100,000, is $30 per capita.

Apples, that are known to keep well, should be selected when purchased in California for export. Some of the kinds sent to this market are almost worthless. Within a day or two after being landed, they commence to decay rapidly, and are unfit for eating or cooking. A new variety has been found in Denver, called the Colorado orange, which, it is claimed, will keep in good condition for six months after being gathered. The Newton pippins, which are shipped from New York to England in large quantities, keep well for several months, and on account of this good quality bring fancy prices. Apples, when done up singly in paper keep much better than when not wrapped.

THE poinciana regia, sometimes called the bird of paradise flower, is now in full bloom. Nearly every street in the city has some of these trees growing in lawns around the dwellings. There can be no more beautiful sight than a tree covered with these gorgeous flowers, and strangers arriving from abroad are amazed at the extraordinary sight. As a decorative plant, nothing can surpass it. It commences to bloom when eight or ten years old, and the flowers seem to increase in brilliancy as they do in numbers, till, when twenty or more years old, the trees are literally covered with a rich crimson cloak, and are perfectly gorgeous. This tree is said to be a native of the East Indies, and was introduced here by Dr. Wm. Hillebrand.

A RUSSIAN chemist has proposed the following new method of determining the percentage of beet sugar crystals in a *masse cuite*, and he claims that by it the average error is only 0.2 per cent. A normal weight of *masse cuite* is mixed with anhydrous glycerine, the washing continues until the glycerine filtrate is colorless and the crystals remaining on filter are perfectly white (the best results are obtained when this washing can be done *in vacuo*); the crystals are now dissolved in water; the prolongation determines the number of crystals. As a method of control, the second syrups from centrifugals can be polarized and the sum of these two polarizations should be that of the *masse cuite*. It is interesting to note that perfectly anhydrous glycerine may be obtained by distilling commercial glycerine at a temperature 150 deg. C., under which circumstances the product obtained does not dissolve sugar that will polarize.—*Sugar Beet.*

DURING the month of May the Anglo-Californian Bank, Ltd., invited subscriptions to an issue of debentures, to the value of £150,000, in the undertaking, the "Hawaiian Commercial and Sugar Company," of San Francisco, Cal., U. S. A. This company owns the Spreckelsville Plantation in Hawaii. The object of the issue is to redeem existing debentures, and it is secured by a first mortgage upon the undertaking of the company. The bonds will bear interest at the rate of 5½ per cent. per annum, are redeemable in gold at 105 per cent. in 1916, but may be redeemed at any time after 1901, upon six months' notice, at 106, or after 1906 at 105. The trustees are Sir W. Lawrence Young and Mr. Sidney Hoffnung Goldsmid. —*Sugar*.

THE Havana correspondent of the *Louisiana Planter* says: Cuba, which had succeeded by dint of constant labor and unconquerable energy in enhancing her production to 1,000,000 tons, is today totally ruined, with her fields devastated, her smaller towns and about seventy-five of her most valuable sugar factories already reduced to ashes. It has seldom, if ever, happened, even in the most savage civil war, that such an enormous destruction has taken place. If the cane and tobacco only had been destroyed it would be only one crop lost, and, though considerable, the evil might been repaired within one year or two, whereas twenty and perhaps thirty years, with hundreds of millions of dollars, will now be needed to rebuild the property that has been destroyed and retrieve the losses experienced in our commerce, industry and agriculture.

HAVE you ever noticed, when in company, how the advent of guests of different dispositions has affected the whole party? Were you ever present at a social gathering where the entrance of some genial, jolly, whole-souled fellow has brought at once a cheery ray of sunshine among the crowd, placing everybody at their ease, raising up the spirits of the depressed, causing a wave of undefinable pleasure to ripple around him wherever he went? Didn't you envy that bright disposition, which seemed to attract everybody by its personal magnetism? And, on the other hand, have you no recollection of being among a companionable crowd, when the arrival of some morose and surly individual has chilled everybody present—thrown a wet blanket, as it were, over the festivities, and made each one heartily wish the intruder had stayed away ?—*Ex.*

NEW PUBLICATIONS.—We have received from the United States Department of Agriculture a pamphlet describing Mexican and Japanese injurious insects, liable to be introduced into the United States—illustrated. Also, from the same, Revision of the Nematinee of North America, a subfamily of leaf-feeding Hymenoptera, by C. L. Marlatt, first assistant entomologist.

—Year Book of the United States Department of Agriculture, 1895. 1 vol., 8vo., 650 pages. This volume embraces the annual report of Secretary J. Sterling Morgan to the President. In addition are the reports of the chiefs of division of the department, giving the results of experiments with soils, plants, forests, insects, irrigation, the weather bureau, etc. Twelve pages are devoted to pineapple culture. The work is illustrated with 150 plates and engravings.

THE death of General William H. Dimond, senior partner of the firm of Williams, Dimond & Co. of San Francisco, removes one of the most prominent of the descendants of the American missionaries in Hawaii. The promptness with which he responded to President Lincoln's call for "three hundred thousands more" of volunteers to enter the service for the Union in 1861, showed that his love for the flag and honor of the land of his forefathers had not been lessened by the accident of birth in a foreign land. He was as true an American patriot as though he had been born under the shadow of Bunker Hill monument. The firm of which he was the head, since the death of Henry B. Williams, was one of the oldest in San Francisco, and has always been intimately identified in the trade with these islands. General Dimond leaves two daughters and three sons, the eldest of whom, W. W. Dimond, is in business in this city.

HANDSOME BOOKBINDING.—The Hawaiian Gazette bindery has recently executed an order, which merits special notice. It is the binding of nine volumes of the Magazine of American History (a richly illustrated work), in half morocco, gilt edges, and full gilt back, in style of workmanship that would do credit to any of the best establishments of New York or London. The bindery is in charge of Mr. G. L. Samson, a master workman in his line, as this and other work lately turned out by him, afford ample proof. Besides library books, the establishment is manufacturing sets of the largest account books. such as are used in banks and mercantile houses, in every respect equal to the best American or European make. The bindery is well equipped with the latest machinery made for book binding; and work of this class, ruled to any desired pattern, can be executed here much better and more satisfactory than when ordered from abroad. It affords pleasure to notice such an institution in Honolulu.

The London *Times* publishes a letter from a young English engineer in Cuba, in which occurs the following passage: "Affairs are every day going from bad to worse. The rebels, not content with burning the canes, are now destroying the buildings on the sugar plantations. Already they have burnt five on our line, representing an output of sugar of at least one-half our sugar traffic; and as the owners, as a rule, are in none too flourishing a condition financially, there is very little hope of their being able to replace the machinery destroyed. As most of the places are mortgaged up to their full value, and as by Cuban law the mortgage ceases and becomes null and void on the destruction of the property, but comes into force again should the building be reconstructed, this will operate as a still further reason for not rebuilding. The country people outside the towns are in a very bad fix. One day the troops shoot them for helping the rebels, and the next the rebels for helping the troops." It would appear, from the expression of opinion as to the rebuilding of factories, that there is a very strong probability of the Cuban sugar industry being permanently crippled.

Latest Sugar Market Notes.—This week's summary of the statistical position shows stocks in the United States and Cuba together of 345,311 tons, against 596,662 tons last year, a minus of 251,351 tons from last year. Stocks in Europe, 1,517,300 tons, against 1,490,781 tons last year. Total stocks of Europe and America, 1,862,611 tons, against 2,087,-443 tons last year at the same uneven dates. The deficiency of stock is now 224,832 tons.

Cuba shows the effect of the rainy season in reduced receipts for the week to 3337 tons. The visible now reaches 196,476 tons, against our estimate of 200,000 tons. As regard the next crop, the outlook remains unchanged, for no more sugar than this season unless the war is ended within a few months.

We estimate the total stocks in the world, if brought up to date, today 1,900,000 tons last year at this time. Many sugars have been thrown forward into the visible figures this year by early shipment to market which remained in the invisibles last year until a much later date, and will show in the comparative figures later on.—*Willett & Gray's Report, June 25.*

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HUMANE TREATMENT OF ANIMALS.

The United States Department of Agriculture has recently issued the following general order to inspectors: "It is the desire of this department that the influence of all employees should be used, so far as is warranted by the law, for the purpose of securing the humane treatment of animals in transportation in the stock yards. Depriving the animals of food and drink for unusual periods, and beating and worrying them, are practices calculated to make the animals feverish and their meat unwholesome, and should be discountenanced and prevented. You will, therefore, give such instructions to your subordinates as will insure careful treatment of any animals which they may be called upon to handle, and as it will also lead them to use their influence for the same end with all other persons with whom they come in contact.

"You will please make an investigation of the manner in which animals are transported and handled by the railroad companies and stock yards which come under your observation, and make further suggestions as may occur to you, with a view to improving the service and protecting animals from undue suffering or cruelty. Injured animals, which are evidently suffering severe pain, should be promptly reported to the humane societies, unless the owner or the stock yard company properly cares for them within a reasonable time."

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GERMAN EXPORT SUGAR BOUNTY.

We find in a Boston paper the following details of the new German bounty on beet sugar exported, which show that the bounty will be nearly double what it has been. Though small, it gives to German exporters an advantage over other European beet sugars:

"In sugar, operators are relieved of the fear that the new German export bounty will work any particular injury to the American refineries. The details of this bill, as it has been amended, are understood to compare with the bounties lately in force, as follows:

	New.	Old.
Raws, per 100 lbs	27¼ cents.	13½ cents.
99½ per cent., including granulated	38½ "	21½ "
Other refined	32½ "	17¾ "

The net bounty to the refiner consists of the difference between the export bounty on a given quantity of his raw material. and the bounty which he receives on the amount of refined sugar which can be produced from a given quantity of raw sugar. Under the old law, the net on granulated sugar in favor of the German refiners was about 6¼ cents per 100 pounds. Under the new law it will be about 8¼ cents, or an increase of 2 cents per 100 pounds; that is, one-fiftieth of a cent per pound—a margin so small that it will make very little difference to American refiners, with the popular prejudice against beet sugars. The new bounties go into effect August 1st, and German refiners are likely to have all they can do prior to that supplying the orders of home consumers, who will stock up in advance of the rise there."

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THE BEET SUGAR INDUSTRY IN AMERICA.

The statements published on page 324 of this monthly, regarding the plans of Col. Spreckels to engage extensively in the cultivation of beets and manufacture of beet sugar in California are no doubt correct. The success which has attended the Chino and Watsonville sugar factories renders safe any plans to extend the beet sugar interest in that State, though some localities may be better suited for it than others. There need be no fears that the prosperity of the beet sugar interest in that State will injure the sugar industry in Hawaii, because cane sugar will always be in demand, on account of its superiority, and will be used to mix with beet sugar in refining as is now being done in the large American refineries.

In connection with Col. Spreckels' enterprise, the following remarks made by Dr. Wiley of Washington, will be read with interest, as they are equally applicable to cane culture as to beets:

"The culture of sugar beet is intensive culture. It is a kind of agriculture which can be carried on with high-priced lands. where ordinary crops of cereals would not pay. It is already difficult in this country to grow wheat, maize or oats on land worth $100 an acre. The fixed charges on such land are high, $6 or $7, an acre, and these fixed charges, together with the high taxes which are paid, eat up the profits of cereal culture. Such lands, however, could be profitably cultivated in sugar beets, where the yield per acre is higher and the returns are paid to the farmer for intense culture and high fertilization. An instance of this is seen in Chino, where lands have rapidly increased in value under the stimulus of beet culture, and farmers get large returns from the growth of the sugar beet.

"The establishment of sugar beet culture becomes a true object lesson in agriculture. Every field, properly cultivated in beets, becomes an agricultural experiment station. The influence of beet culture is felt upon every other crop. The yield per acre of cereals, root crops and grasses is always found higher in a community after the introduction of beet culture. It is a blessing not only to the person who engages in it, but also to his neighbors.

"Slovenly agriculture is impossible with the sugar beet, and the curse of American agriculture is its slovenliness. If there is one thing our farmers need to learn more than another, it is how to farm. Another great argument in favor of an indigenous industry is the stimulus which it will give to American agriculture. The markets for our farm products are now overstocked and the prices of our farm products are phenominally low. As I have often pointed out, the nation which exports its agricultural products as a source of revenue must eventually become pauperized. It sends out of its boundaries blood and marrow. The only agricultural products which can safely be exported are sugar, oil and cotton. The establishment of an indigenous sugar industry would render it unnecessary to send agricultural products away from home in order to get money to buy our sugar. We would have a larger home market, a larger home consumption and less necessity for going outside to purchase. The mere fact that over $100,000,000 in gold would be kept at home annually, in the cost of sugar alone, is a matter of no mean importance. When you add to this the stimulus to agriculture and other industries which the establishment of an indigenous sugar industry would give, we see an advantage to American agriculture which is almost incalculable."

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SUGAR IN POLITICS.

[THE LOUISIANA PLANTER.]

One of the most satisfactory things to the sugar planters of Louisiana that has occurred in our political history is the impression that sugar, as possibly one of our greatest and most profitable industries, has finally made upon our political leaders. Some twenty years ago the sugar planters of Louisiana effected a permanent organization for their own improvement in all industrial matters, and also for the purpose of giving careful consideration to all national legislation concerning the sugar industry. In 1870 the duty on No. 12 sugar was 3 cents per pound, and above No. 12 and not above No. 15, 3½ cents a pound, and it was practically prohibitive on all grades above No. 15. Not content with this practical prohibition, some of the leading New York sugar refiners made earnest efforts to secure a gradual scale of duties, and succeeded, in 1870, in securing a sugar tariff of 1½ cents on sugars not above No. 7, 2 cents on sugars not above No. 10, 2¾ on sugars not above No. 13, and 3¾ on sugars not above No. 16. Under the previous sugar tariff the average duty on all imported sugars was very slightly over 3 cents per pound. Under the new tariff secured in 1870 the average duty collected was about 2 cents per pound. At that time the sugar planters of Louisiana had no organization, and the industry was just beginning to revive from the destructive efforts of the war and the great change that had taken place in the labor system. The war in Cuba at the same time became the basis of a large advance in sugars, and no effort was made to secure any more satisfactory legislation. Notwithstanding all this a majority of the sugar factors in business in 1870 failed in the business in the following four or five years, the result of the unprofitable character of the industry under the conditions then surrounding it, and the depressed prices resulting after the end of the war in Cuba and the diminished duty.

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The calamitous conditions that followed the Wilson bill in Louisiana, the financial suspension and ruin of hundreds of prominent sugar planters, the destruction of sugar planters' credit, the cessation of all improvements, and the generally distressed condition of the entire commercial community, largely, if not chiefly, the result of this injury to Louisiana's great staple, brought about in the minds of all Louisianians the keen appreciation of the close relation of the sugar industry to the general welfare of all the people of the State. This has led to an almost unanimous belief that the sugar industry is essential to the welfare of the State of Louisiana, and that every proper sacrifice should be made for its maintenance. Our public men had previously been rather loath to declare themselves in favor of a clearly-defined protection to the Louisiana sugar industry, and a willingness to concede similar protection to other industries affected in like manner by the capital and labor of foreign competitors.

While the suffering to the sugar industry has been intense and still continues, yet it is very satisfactory to think that out of this there has grown this better appreciation of the ualue of the sugar industry to the State and its needs in the way of protective legislation.

In the recent senatorial contest in the Louisiana State Legislature, each of the senatorial candidates—five from the the Democratic party and one from the Republican party—declared themselves unqualifiedly in favor of protection to the sugar industry and their willingness to give like protection to the industries of the other States similarly affected by foreign competition. Never before had anything like this been seen. In the State Democratic party platforms for many years it was practically impossible to get a single word inserted in recognition of the sugar industry. While the national Democratic platform—that of 1884—recognized the rights of labor in competition with foreign labor and the rights of vested capital, the Louisiana State Democratic platform studiously avoided any such reference. It was certainly a grand triumph to those associated with the sugar industry to find these leading and representative men from the various sections of the State aspiring for senatorial honors, and at the same time coinciding in their views as to the necessity for adequate protection for the Louisiana sugar industry.

Now comes one triumph more. In the national Republican convention, recently held in St. Louis, sugar was specially considered and was made the special subject of one paragraph in the party platform, and in the following words: "Sugar. We condemn the present administration for not keeping faith with the sugar producers of this country. The Republican party favor such protection as will lead to the production on American soil of all of the sugar which the American people use, and for which they pay other countries more than a hundred millions annually."

The sugar planters of Louisiana have thus secured at last in the platform of one of the great political parties of the nation a definite recognition of the claims of sugar producers of the United States. If similar recognition in the party platform could be obtained from the other great political party in its coming convention in Chicago, it would complete the triumphant recognition forced upon both the great political parties of the country by the sugar planters of the Union. That we can hardly hope for this is evidenced by the fact that in every closely-contested matter, wherein economic legislation was involved, the leading men of both political parties have for many years declared themselves absolutely in favor of free sugar. This has been done scores of times by the leading men of both parties, and, as has often been said, and justly, it has seemed as though the sugar producers of the country had few or no friends in either of the great political parties. That a change has now come in this respect; that the sugar industry has forced itself into recognition, is a matter for hearty congratulation on our part. That every senatorial aspirant in the State of Louisiana should have so recently recognized in full the claims of the sugar planters of Louisiana is a matter of congratulation to us in Louisiana; that the national Republican party in session in St. Louis should give national recognition to the sugar industry of the whole country by a special sugar plank in the national platform is also an extremely satisfactory step toward that final recognition that we hope the sugar industry will receive from all the great political parties.

The country is at last reaching a condition of political appreciation of the wonderful advantages to our whole country of sugar production, and the extraordinary advantages that the sugar industry affords for investments of vast capital, and the opportunity that exists in this country to supply our immense wants of sugar, we having a home market for more sugar than we could probably produce within a decade or more, by reasonable legislation.

For many years Germany has made the sugar industry a matter of special legislation, and has always endeavored to maintain and extend its own sugar industry in the sugar districts, all data given indicating that where the industry was developed the people at once became better off, happier, and the whole community throve.

In France, in like manner, the whole plan of legislation was changed in order to develop the sugar industry. In the collection of the excise taxes on domestic industries, as is largely practised in that country, the earlier form of taxation was a tax upon the sugar produced. Under this the sugar industry of the country found itself rapidly surpassed by Germany and Austria so far as skill and general effectiveness were concerned. Considering the whole subject matter, the French legislature finally decided to levy the excise tax upon the beets produced for manufacture into sugar. This at once led to the production of beets of superior quality, as the same tax prevailed on all grades. High grade beets being at once produced in large quantities, the French sugar industry took upon itself new life, and a tremendous improvement and enlargement of the sugar industry followed. Even now, however, the French seem scarcely able to compete successfully with the Germans, whose factories are generally larger and more effective, and are carried on at a less relative cost.

The recent increase of the German sugar bounties was brought about by the endeavor of some of the statesmen of Germany to actually destroy the competing sugar industry in various parts of the world where it was well organized, hoping thus to establish for Germany a practical monopoly of the sugar industry of the world. Germany seems sure to fail in this, and we may hope that at some future time they will see the ineffectiveness of their peculiar legislation. Even now Austro-Hungary is contemplating equivalent legislation in order that Austrian sugar may have equal facilities for reaching the markets of the world.

Certainly the political horizon of the sugar industry in the United States looks better for the future, and if the sugar planters of Louisiana are as effective in their work in the future as they have been in the past, it is to be hoped that they will be able able to maintain such political recognition of the sugar industry as will insure its maintenance, prosperity and expansion.

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PACKING FRUITS AND COFFEE FOR MARKET.

We have frequently referred to the necessity of having coffee well graded before being shipped to a foreign market for sale. The quality of Sandwich Island coffee is, no doubt, superior to the bulk of what is sold in the great markets of London, Hamburg and New York. But buyers, who care little for its reputation, always open and inspect the bags, and if the berries are not even in size and color, or if any poor or broken berries are found, it is classed, for trade purposes, as second quality. This matter of even-grading is being insisted on by dealers in all kinds of fruit and produce, as the price is greatly effected by it. To show the interest taken in it, we copy the following from a cotemporary :

"Everybody, from the Secretary of Agriculture down, is advising growers to send to market none but well and honestly packed dried fruit. Very poor fruit may be honestly packed, and in that condition will bring whatever it is worth. If there is a large supply of good fruit, the poor will be hard to sell at any price; but, if the good article is scarce, the poor will bring something. With the increasing fruit crops of the world and the better education of consumers, it is only in exceptional years that producers can hereafter expect anything for poor fruit.

"The important thing in the marketing of dried fruit is its proper grading, which means even, accurate grading—the proper packing of each grade by itself and the marking it for what it is. There are some very silly people who suppose that by packing good fruit on the top of the box and, perhaps, to make sure, also on the bottom, they can pack the interior with poor fruit and fool the buyer. Never was there a greater mistake. All buyers are wise, and when they examine boxed fruit it is their custom to take off the side of the box and thence burrow into the interior. If in a few boxes opened at random what they find there corresponds with the top and bottom layers, which they do not disturb, and the whole agrees with the sample, they take the fruit at the agreed price. If they do not, they either reject it or offer what they think the value of the poorest fruit they can find. Then the grower gets a poor price and says his commission man has cheated him. This very thing happens every day.

"Evenness both in color and in size is very important. Evenness in color is secured by evenness in ripening, prompt handling, good drying weather and bleaching, and of these the least important is the weather, which is pretty sure to be good enough anyhow. Light-colored dried fruit cannot be made from green fruit, nor is green fruit any better to eat after than before drying. Any buyer can pick out a dried green fruit as far as he can see the pile, and if he he sees many he will not buy, for he cannot sell.

"Evenness in size can only be secured by machine grading after drying. There is but one fruit grader that we know of that will do this work. Peaches and apricots are now graded exactly like prunes, and upon the same machine, using different screens with meshes varying in size. Usually there are four grades made of these fruits.

"First-class ripe fruit, even in color, machine-graded for size, well put up, is likely to sell this and all years at fair prices."

THE REPUBLICAN NOMINEE AND PLATFORM.

The nomination of William McKinley as candidate for President of the United States by the Republican party has been received with great enthusiasm by all Americans who desire to see their country extricated from the slough of bankruptcy and national disgrace, into which it is now plunging. His nomination means protection to American industries and the continuance of gold as the basis of national faith and credit. Let China, India and Japan cling to their silver coins, but America should stand by England, France and Germany on a solid, gold platform. McKinley's nomination is exceedingly popular with the masses in the United States, and the chief secret of it is, that he represents the principle of protection to American industries of every kind that need protection. Probably no nominee, since the days of Lincoln, has ever been so popular with the masses as McKinley will be. Such a man and such a policy are needed at this time to confront the bold legislation of European governments aimed at American industries—by prohibiting canned goods and live stock on technical grounds, and to secure the hundred million dollars to be paid out annually by her people for sugars. America has two strings to her bow in this international game. The following sections of the Republican platform will interest our readers:

SUGAR.—We condemn the present administration for not keeping faith with the sugar-producers of the country. The Republican party favors such protection as will lead to the production on American soil of all the sugar which the American people use, and for which they pay other countries more than $100,000,000 annually.

FOREIGN RELATIONS.—Our foreign policy should be at all times firm, vigorous and dignified, and all our interests in the western hemisphere carefully watched and guarded. The Hawaiian Islands should be controlled by the United States, and no foreign powers should be permitted to interfere with them; the Nicaraguan Canal should be built, owned and operated by the United States, and by the purchase of the Danish Islands we should secure a proper and much-needed naval station in the West Indies.

RAINFALL AND WATER-POWER ON THE ISLAND OF OAHU.

[BY WALTER MAXWELL, DIRECTOR OF THE HAWAIIAN EXPERIMENT STATION.]

Usually the term "water-power" is used to express the mechanical equivalent and value of a body or flow of water for industrial uses. There are situations, however, where natural conditions—and among these especially the character of the geological structure of the underground—prevent a regular surface flow by streams, even where the rainfall is ample, and in such cases (a notable one obtaining on this island) a value for the power-equivalent of the rainfall may be sought in directions of a non-mechanical character.

To approximate the available value of the water-power of a given area, it is necessary first to estimate the volume of the natural rainfall, and then to follow its several modes of discharge and waste.

After a careful examination of rainfall data, comparing the relative precipitations over the several areas of different altitude, we are induced to place the average rainfall of Oahu at 70 inches. The data available, however, are very inadequate for anything more than a distant approximation to the actual, and we are, in certain localities, having gauges placed at all altitudes, and of such a form that the rainfall will need to be measured only once a month in order to secure actual data. For the purpose of the following considerations we shall base our calculations upon an annual rainfall of 60 inches, which certainly keeps within the actual precipitation.

The surface area of Oahu is estimated by measurement at 600 square miles, which is equal to 2,408.693,760,000 square inches. Upon this area an annual rainfall of 60 inches would give 144,521,625,600,000 cubic inches of rain. If this latter sum will be resolved into gallons, we obtain the total of 625,634,742,857 gallons, which sum will be taken as a basis of the following considerations.

Having reached some approximation to the volume of annual rainfall upon Oahu, we may proceed to consider the amounts of water which escape by the several modes of discharge and waste. The three chief modes by which rainfall is discharged from the surface where it falls are: (1) Surface drainage, by ditches and streams. (2) Surface evaporation, direct and through vegetation. (3) Percolation through soil and rock strata, and discharge by springs at lower altitudes.

It is at once apparent that the amounts of water which shall be discharged in these several ways must be extremely various, and are controlled by such factors as the level or hilly surface of the land; the porous or close texture of the surface and under soil; the temperature of the air; and the violent or steady rate of precipitation of the rain. There are localities where the rainfall is so small that neither surface nor underground drainage occur; the whole of the precipitation being returned to the air by direct evaporation or the transpiration of plants. Again, there are localities where the surface and under strata are so open that surface drainage is equally as impossible, the whole of a large rainfall passing into the soil and, in part, being returned to the air, and, in greater part, being discharged by under strata. For example, on the Waiakea plantation, the rainfall is about 150 inches per annum; yet, there is not one running stream, the whole of that immense body of water being discharged into the sea through underground drainage, excepting what is returned to the air by the cane, trees, etc. On the other hand, there are land surfaces so impact and close that, where the slope is great and the rain comes in gluts, the greater portion of the water goes directly to streams or the sea by surface drainage.

In the light of these general considerations we may now look at the island of Oahu. First, there are the low lands, which reach from the sea gradually up to the forest-bearing altitudes. Their bareness, relative to the forest altitudes, is a result of a much smaller rainfall. Only trees like the algeroba, which subsist with very little water, thrive on these lower levels. Continued rain measurements tell us that the actual rainfall is comparatively small. The surface drainage from these lands—even under heavy rains—is but small compared with the whole if we except the surfaces of the city and roads. On the other hand, the return of moisture to the air by direct evaporation from these low lands is vast. It is true there are few trees to aid the evaporation, but there are high temperature and almost constant and uninterrupted solar light and heat acting upon the moisture of the soil. Moreover, experiments that have been conducted in the Hawaiian Experiment Station laboratory, bearing upon the moisture absorptive properties of different soils, furnish cause for belief that little of the rainfall can pass through to the under-strata, most of it being absorbed by the surface soil and returned to the air. These experiments have shown that the lands, baked by the sun, give up almost all their moisture.

Again, the same experiments have shown that the sun-dried soil will absorb 50 per cent. of its own weight of water. This means that an acre of soil, to a depth of 6 feet, will absorb 12,000 tons of rain water, which it will gradually return to the air by direct evaporation. If a crop of cane is growing upon the land, as at Ewa, then the moisture is pumped out of the soil quickly, and even at the end of two or three weeks the water left in the ground is not enough to keep the cane in growth. Ewa has to pump up the under-water brought from the mountains by strata drainage to keep the crop going. At the same time it is observed that the underground of the lower lands is abundantly porous to take down all water that is not absorbed by the surface soil. Many examples of this are seen on the windward side of the island, and notably at Waimanalo, where in many places the streams coming down the rock sides. as soon as they touch the land, disappear without any surface flow. Where a great number of cascades converge to one low point, a stream is formed.

All these considerations, however, tells us that we must go to the mountains, not only to estimate the rainfall, but also to form any approximate ideas of what becomes of it. The average of a number of rain gauges gives the rainfall near the sea level at about 35 inches. Readings that have been made for eighteen years at a level of 900 feet, and $2\frac{3}{4}$ miles up, show an annual rainfall of 116 inches. The rainfall, for the same level, differs, however, with the locality. Nuuanu Valley has a greater rainfall at 1,000 feet than is found in other places. These facts have to be borne in mind in the effort to approximate averages. Nevertheless, as a rule, the rainfall rises with the altitude, and at highest levels it, of a necessity (explained by several considerations), reaches more than double the average for the island. Then there is to be considered the extent in length, as well as in breadth, of the windward altitudes of the island, not to mention the Waianae elevations; from Makapuu Point to the drop of the mountain range at Kahuku the length is about twice that of the plain from Pearl City to Waialua.

That the great body of the rain falls upon the mountains, is a question that does not need discussion, and we may consider what becomes of the water? Here are to be chiefly kept in view the conditions which control evaporation, and transpiration of water by plants; because the great body of moisture not given back to the air must chiefly find its way by strata drainage to lower levels, the surface discharge being only a small part of that total, which is shown by the fact that it is only after occasional great rains that the most of the streams flow, whilst rain falls upon the mountains a majority of days in the year.

Evaporation and transpiration of water by trees and plants, are chiefly controlled by light, temperature and the humidity of the air. Deherain has shown "that transpiration is ten times greater in full sunlight than in darkness, and during dull, cloudy days without rain and with the same air temperature, the transpiration is one-half less than under the action of direct solar rays." The zone of high rainfall on the mountains has a lower temperature, the latter decreasing with the increase of altitude, the low temperature is the first cause of precipitation. The lower temperature not only causes the precipitation of rain, it also causes a veil of clouds, which is never quite absent, and during the greater part of most days in the year, overspread the rain zone, thus reducing the possible transpiration by a vast measure.

This cloudiness indicates a high humidity of the air, and concerning the action of humidity on transpiration we have absolute data: Risler found that plants growing in soil containing only 10 per cent. of water, with an air temperature of 80 degrees, wilted down directly when the humidity in the air was only 55 degrees. But with a humidity of 79 degrees the plants stood up fresh, showing that the greater moisture in the air stopped largely the loss of water from the plants. Evaporation is proportional to the temperature and humidity of the air. Then, with the lower temperature of the mountain altitude and the air so super-saturated with moisture that it is most frequently raining, it is seen that during a great part of the time the condensation not only balances the evaporation, during which time no moisture is being lost, but the coldness of the mountains takes the water from the winds as they are passing over, the great body of which must find its way through the rock crevices to the lower strata. Direct evaporation from the earth, even aggravated by the high winds, is reduced to a minimum by reason of the dense foliage which covers the ground. During the portion of days when the sun is unclouded it must be borne in mind, however, that transpiration is very rapid. The ground is saturated with moisture—a condition that allows all the water to pass direct to the lower strata whilst rain is falling; but when the air is clear it allows evaporation to proceed more rapidly, which has been proved by our own experiments. And when trees and plants are in active transpiration they dissipate huge quantities of water. Haberlandt has shown that an acre of oats during its growth drew from the ground 570 tons of water; of wheat, 489 tons; of rye, 334 tons. Further, Hohuel found, in experiments with very young trees during half a year—from June to November—that for each pound of dry weight of an elm tree 67,987 pounds of water were given off; of a pine tree on 3207 pounds; the algeroba probably gives off still less. Illustrations of argument could be given without number, but space will not allow. In view, however, of the main factors, viz., that the great body of rain falls during the cool season of the year, at the altitudes of lowest temperature, and upon surfaces of earth and rock enormously porous and absorptive; and, bearing also in mind that this rainfall occurs mostly under conditions of the sky and humidity of the air most unfavorable to evaporation, notwithstanding the cited examples of the enormous capacity of vegetation to draw moisture from the ground and give it to the air, it does not appear possible to evade the conclusion that the greater part of the water falling within the zone of highest precipitation enters the underground and is discharged at levels near and under the sea level.

Then, by means of such considerations as have been stated, viz., that whilst the lower lands have a small rainfall, a small amount of which is lost by surface drainage, a smaller amount of it by underground percolation, the vastly greater part returning directly to the air, and the mountain lands receiving the greatest body of the total rainfall, of which, probably, less than one-half escapes by surface drainage and evaporation, the remainder sinking to the underground, we have been led to venture an account of the discharge and waste of the water falling upon Oahu, excluding details of calculations, as follows :

	Means.	No. of Gallons
Surface drainage 10 per cent. to 20 per cent	15 per cent	93,855,211,428
Evaporation 40 per cent. to 50 per cent	45 „ „	282,535.634,285
Underground flow 35 per cent. to 45 per cent	40 „ „	240,243,897,144
Total rainfall		625,634.742,857

The greatest interest attaches to the underground discharge. How much of it can be approximately accounted for ? A given volume can be fairly closely approximated as the output of the artesian well system in use ; and a further volume more accurately estimated by actual "cubic-scond" measurements that have been made of certain springs and streams (nothing is better calculated to show the utter uselessness of casual observation than the comparison of the amount of water discharged even by a big stream with the total rainfall) :

		Gallons.
Total underground flow		249,243,897,144
(1) Estimated output of 209 wells	43,800,000,000	
(2) Measurement of springs	49,432,680,000	85,932,680,000
Balance		163,311,217,144

All of the water from the measured springs is flowing into the sea. It includes waters used for mechanical purposes (rice mills, etc.), but not any waste from rice fields or the kind. Although only 85,932,680,000 gallons are actually accounted for, there is a further large discharge taking place under our eyes from rice fields, banana plantations, and unmeasured visible springs. We are persuaded, however, that a great body of the underground discharge occurs further out, and under the sea level. either through the coral in shallow water, or, forced by the pressure of the mountain head, out beyond the reef. The locality of Pearl Harbor affords ample illustration of this.

Although the underground discharge is visibly occurring in localities distant from each other, the topography of the two chief surface watersheds indicates the direction of the main discharge, the surface of the lands showing what were the directions of the lava flows and the consequent strata structure of the underground. The great watershed converges to Pearl Harbor. The next important one includes the shorter dip of the lands, formed from the great range, towards Waialua, supplemented by the Waianae altitudes, but it is apparent that the great body of the underground discharge seeks the sea around Pearl Harbor.

According to the showing that has been arrived at it is seen that, in round numbers, some 200,000,000,000 gallons of water are leaving the island without rendering service. How can the power-equivalent of this water be estimated ? In the first place, one-fourth of the total amount may be taken off as the portion of discharge from and including Nuuanu avenue to Makapuu Point, and this may be set apart to meet the most exorbitant demands that the future expansion of the city, with its coming sewerage system, and extensive garden cultures, can make. This amount is not only more than can be required ; it is, we believe, more than the actual discharge of that region. Another one-fourth is deducted to cover the unmeasured wastes occurring along the windward and around the Kahuku sides of the island. The Waimea and Kawailoa streams and springs, which yield a large volume, are included in the total of measured waters. Some small portion of these wastes are conducted over rice fields, but rice, it may be said in passing, is a crop that makes a small actual use of the water given to it, as it wastes by seepage, and this seepage, moreover, is a most threatening foe to the public health of a city, as it gradually fills up land depressions and forms permanent swamps. We have then 100,000,000,000 gallons of water remaining which is discharging into the sea, probably three-fourths around Pearl Harbor, and one-fourth of it in the vicinity of Waialua. The question is repeated, "How can we express the power-equivalent of this huge balance of wasting water?" The great plantation at Ewa suggests one mode of expression. If we allow 5,000,000 gallons of water (this volume is equal to a flow of one cubic foot per second to about fifty acres, and is based on actual irrigation work) to one acre of cane, then the total volume is capable of irrigating 20,000 acres. At five tons of sugar per acre, this area is equal to 100,000 tons of sugar. But as the cane requires one and one-half years to mature, the power-equivalent is reduced to 75,000 tons. But setting aside all niceness of calculation, and allowing for all future demands of the city, of small cultures, etc., there appears to be a water-power going to waste annually upon this island, which may be represented safely by 50,000 tons of sugar. And there are available lands which are capable of putting into service this vast waste of water energy.

One observation made as a result of this investigation, whose showings may be far from the actual, is the apparent fitness of the water supply to the area of cultivatable lands. It appears that there is an abundance, ample for every sanitary need and expansion of the city, for the increase of small industries and for raising the sugar production of Oahu to, speaking safely, three times its present proportion.—*P. C. Advertiser.*

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PRACTICAL NOTES FOR FARMERS.

[CONDENSED FROM CORRESPONDENCE WRITTEN FOR THE MACKAY STANDARD, BY J D. HENNESSEY, LATE EDITOR OF THE AUSTRALIAN FIELD.]

I take my pen with pleasure to commence a series of practical papers on matters pertaining to agrarian pursuits.

I find that practical men of the land are everywhere on the eager lookout for useful information, so I intend to draw largely upon my own experience as a farmer and orchardist, as well as the experience of my friends, and also from up-to-date information, which seems to be worth anything in current English and American agricultural publications.

As this is the first furrow on a new field, it will have to be mostly introductory. It's no good digging a post-hole until you have marked off your line, and I want to have a sort of understanding with farming and dairying, and other friends before commencing. There's no man under the sun who knows all about any one subject—not even cows or pumpkins. We cannot open up agricultural or dairy schools all about this colony, as they have done during the past seven years all over the United Kingdom; but every man has something to learn, and a column like this, run by a fairly level-headed man, with a taste for study and a fair share of practical experience on the farm, in the dairy and around the orchard, is bound to do some good. The oldest man on the land has got something still to learn as well as the youngest.

Now matters agricultural generally are on the move, and while it is not necessary that every farmer should know exactly how much soda there is in the ash of half-a-pint of beans or a quart of potatoes, there are many items of information coming to hand which, if carefully studied, will save money; and the old proverb, "a penny saved is a penny gained," holds good in both farming and dairying. Then, too, there's a lot of money lost through men doing the right thing in the wrong way. An incident came to my knowledge the other day where a man thought he had picked up a wonderful wrinkle about growing a certain kind of crop. It did remarkably well in one place and badly in another, so he sent a sample of the soil on which the best crop grew to the Agricultural Department to be analysed, and, after a fairly long wait, received an analysis of its constituents. There was silica and sodium and potash, and various other organic and inorganic constituents in it. And then he hit upon a luminous idea to test the accuracy of the Department's analysis. He sent the formula down to a city chemist and told him to make him up a quarter of a hundredweight according to the prescription. The man of chemicals wrote back to know whether the ingredients were to be mechanically or chemically mixed? But the agriculturist did not know, so the mixing was done mechanically, and the half barrow load of artificially-prepared soil cost him over twenty shillings. He thought there was a wonderful secret in the precious stuff, and almost put the chemist on his oath not to tell; but he just threw away his twenty odd shillings for the want of a little practical knowledge, such as I propose to furnish in this column from time to time.

There's an old saying in England among farmers:

> "A dripping June
> Puts all things in tune."

—and no doubt a good rainfall, as the warmer weather sets in, makes things hum in Australia as well as in the United Kingdom. It is the uncertainty of the rainfall which is the average farmer's trouble. The rain comes right enough, but it is being so capricious in its coming, which causes us so often to feel like the funny man in the comic song: "Ee dunno where 'ee are." Before agricultural interests are thoroughly and permanently prosperous in Australia we shall certainly have to do something—as the Yankees put it—to "regulate the rainfall," not from above, however, but from beneath the surface.

When these heavy downpours of rain follow droughts, the great waters are dissipated in three ways. Some of it flows into the ocean, some returns by evaporation to the atmosphere; but, in Australia, the bulk of it finds its way through porous surface soil, and millions of natural channels, to the vast reservoirs beneath our feet, where all over this big continent, Great Nature stores up the treasures of the rain. Mr. Read and Mr. Sydney Smith and others, have intimated that plans are being formulated for the construction of great artificial reservoirs to conserve such flood waters as have recently washed away railway embankments, and played the old gooseberry with the dams and weirs and other constructions of human invention; and the Sydney dailies have had some heavy leaders upon the duty of the State to conserve these flood waters. But it's no use gentlemen! When the big windows of heaven are opened and you get six inches of rain in twenty-four hours, farmers and irrigationists, and even members of Parliament, must take a back seat, or get hold of a boat or punt from somewhere! To talk about putting up a bank to conserve the waters of the Murray, or the Darling, or the Murrumbidgee, is a contract which is more than the whole seven Governments of Australia could carry through. The flood would come roaring down upon them, laughing in its might and just sweep away their bits of embankments and surge on in majestic riot. pretty much as before. Ordinary river water flowing along calmly, quietly and respectably, may be banked up and dealt with ; but this talk about the wholesale conservation of flood waters is nonsense.

It occurred to me, after my first notes were written, that someone would certainly want to know the difference between soil mechanically and soil chemically mixed, and the question has in due course come to hand. Everyone, of course, knows what it is to mix things mechanically ; the various constituents are by this method brought together, but not chemically incorporated. The sun is the great alchemist of the agriculturist, and in conjunction with the rain and the atmosphere, carries on wonderful chemical changes in the constitution of the inorganic and organic ingredients of the soil : the former derived from the disintegration of rocks, and the latter from plants and animals. Plants cannot live without nitrogen, which is chemically produced in the atmosphere of the soil.

It may not have occurred to some of my readers that there is so much difference between the atmosphere of the soil and that which exists above the surface. A little reflection, however, will make this plain. The difference is suggested by the rich smell which arises from the soil of a newly-plowed field. that has been well cultivated. and is in good heart. Cultivation and climatic influences cause the atmosphere of the soil to become highly charged with carbonic acid gas, which decomposes the minerals in the soil, and by the collection of nitrogen from the atmosphere, and storing it up, enriches it, and increases its fertility. It is a common thing, for instance, to put a crop of potatoes or oats down on new land, and by plowing in the haulms of the potatoes, or the whole of the green crop, puts it in heart for the next crop. Probably hundreds of industrious agriculturists who do this, know very little about the why or the wherefore of their methods ; by so doing, however, they are really hastening the chemical effect of the atmosphere upon their land ; for the nitrogen which the green crop extracted from the atmosphere has thus been transferred to the soil, where, on the thorough decay of the green leaves and stalks, the nitrogen becomes available for the sustenance and growth of any crop that follows it.

Quaint Thomas Tusser wrote a couplet easily remembered :—

"Good tilth brings seeds,
Ill tilth brings weeds."

Most agriculturists know that a good soil is almost everything. In Australia we look about to find it ready made for us by the hand of nature; but in many countries, and even in this land now, soil has to be made good by artificial means. Here a man talks about his land, and the very phrases he uses will tell how he regards it When he says that it is mellow, sweet, open, or in good heart, we know directly what is meant. Or if on the other hand we hear that it is cold, stiff, hungry, unkindly, or stubborn, we feel sorry for him.

Now soil has to be got right, the farmer must somehow or other put it in good heart or it will swallow up his money, his strength, and his very life. Weary days and anxious nights are the lot of those whose farms or orchards are on cold, stiff, hungry soils. Modern agricultural science is certainly teaching us how to tackle such land, and improve its tilth, but the task is one of difficulty, and often of disappointment. The farmer who means to succeed must get hold of the best soil he can, and then do his best to understand it. I believe that one-fourth of the agricultural failures have been due to the fact that men began to farm upon soil without first understanding just what it was adapted to grow, or whether it would grow anything besides gum trees.

I knew a man, a really good fellow, sober, industrious, and shrewd too, in his way. He made a bit of money running a store, and, having a taste for agriculture, decided to take up a small section and start an orchard. Well, in those days, there was money to be made out of fruit, and he was right enough so far; but he bought his land without practical knowledge or advice, and, although his argument was feasible enough on the face of it, it was altogether mistaken. He saw great blue and red gum trees growing on the land, and, therefore, concluded that as it would grow gum trees it would also grow apple and pear trees—but it wouldn't. I don't care to tell the whole of the story, its too sad, and may too vividly remind some of my readers, as well as myself, of similar mistakes within our own recollections. We have all of us had to pay for our experience; but that blessed orchard cost my friend every penny he possessed, and all by his having got hold of cold, stiff, hungry soil.

I have often been asked "What constitutes good soil?" The different ideas held by different men are interesting, and occasionally amusing. Some accurate knowledge of soils is of the first importance to any man going on to the land. Dr. W. Fream says that the best soil should have from 50 to 70 per cent. of sand in it (rather more than half), from 20 to 30 per cent. of clay, and from 5 to 10 per cent. each of pulverized limestone (calcareous material) and humus. Large areas of the black soils of the Australian highlands are deficient in sand, the use of which are to keep the soil warm and accessible to air and moisture; for, never let it be forgotten, that the atmosphere below the surface—the air in the soil—has everything to do with the welfare of the crop. Hence careless cultivation deprives the soil of the power to secrete the valuable gases with which its atmosphere is charged when in the highest state of fertility. Sand alone contains nothing for the plant in shape of essential food; its particles contain no mutual cohesion, so it offers no grip for the roots of the plant. Thus, after heavy winds, native trees without tap-roots may often be seen blown over when found growing in sandy soil, through its having no power to hold together.

Soil may be roughly analysed by an observant man with sufficient accuracy to give him valuable information as to its character. Let him carefully weigh say a half-pound of thoroughly dried soil which fairly represents a paddock; this should be put in a bucket with water and thoroughly stirred. By this means the whole of the clay and humus, and a large part of limestone, if present, may be removed by simply pouring the discolored water off into another vessel. This should be repeated until the sand is washed clean of the clay and organic substances. The sand must then be dried and weighed. If there is a quarter of a pound of it the soil contains 50 per cent. of sand, and may probably be classed as a light, sandy loam. Supposing, however, it gives seven or more ounces of dry sand, it is a sandy soil; or, to put it more accurately, if there is only ten per cent. of clay (ten parts out of one hundred) it is a sandy soil; ten to forty per cent. of clay, it is a sandy loam; from forty to seventy per cent. of clay, a loamy soil; seventy to eighty-five, a clay loam; eighty-five to ninety-five, a strong clay. The clay which is in the water that is poured off will soon precipitate itself, and it may in turn be dried and weighed, and, in this way, a rough analysis may be obtained of any soil which, although it will not give the quantity of potash, etc., in the clay, will be found very useful for the ordinary purposes of agriculture. The best soils for agricultural purposes, as we have said, contain from fifty to seventy per cent. of sand.

But the next important ingredient in good soil is clay. Now, one might write whole pages about the properties and characteristics of this very valuable commodity. From a chemical point of view there is no plant food whatever to be found in pure clay, although I have found the roots of trees and shrubs even among white china-clay, which certainly contained no plant food—they were, no doubt, roaming about in search of more congenial soil. Pure clay is as useless to support the life of a plant, as pure sand; but surface clay almost invariably contains such ingredients as iron, calcium, potassium, and magnesium, which have much to do with the nutrition of plants. The properties of clay are mostly the reverse to those of sand, it is firm, plastic, tenacious of moisture, and as a constituent of soil, possessing many very valuable properties. By retaining water it keeps the soil moist; it condenses the oxygen of the air; it retains the useful products of the decompositions of manures; and it is rich in alkaline salts, adapted to supply plants with food, for ordinary clay is composed of silica, alumina, lime, magnesia, potash, soda, iron, manganese and water. Rocks which contain clay to any appreciable extent have a characteristic earthly smell when breathed upon.

The next constituent of good soil is limestone, which is very commonly present in the soils of Australia. Chalk is an earthy, but nearly pure carbonate of lime, and when clay is mixed with it, it is known as chalk marl. When found in soil in a pulverized state, limestone furnishes plants with mineral manures, and greatly assists the decomposition of organic manures as that from the farm yard, and green stuff. The value of lime to land is illustrated by the common practice of farmers in the chalk districts of England, who top-dress their lands with large pieces of chalk, which crumble down during the winter rains and frost, into a fine white powder, which is then plowed and harrowed into the soil. The lime sweetens and enriches the land with many valuable properties. A mixture of clay and pulverized limestone is from 5 to 20 per cent. of the whole; if it exceeds 20 per cent. it would be called calcareous soil.

Humus may be generally described as decayed vegetable and animal matter, which by decomposition supplies an important source of plant food. Plant refuse and the decomposition of animal organisms, therefore, give us the last requisite for good soil—humus. Darwin has told us in a most interesting work, how the common earthworm plays a most significant *role* in the production of vegetable mould. The fine earth or casting, which worms eject from their burrows, are in themselves insignificant, but when we are told that there are about 50.000 busy earthworms in every acre of agricultural land, it is manifest that this humble creature has much to do with the formation of the humus and the actual tillage of the soil. Sir John Lawes, writing in the journal of the Royal Agricultural Society on the importance to the cultivator of the quantity of humus in the constitution of a soil being judiciously regulated, says: "Humus (in which term I include vegetable matter in a state of decay) is very insoluble in water, but sooner or later it assumes the form of nitric acid, which combines with lime and other alkaline substances in the soil and then becomes very soluble in water. These compounds rise and fall with the water in the soil, coming to the surface in dry weather, and passing into the drains in the absence of growing vegetation in wet weather. When a crop is in the full vigor of growth, the soil-water may contain no nitrates, the crop having taken them all up; but at all other times the soil-water contains more or less nitrates. Being soluble in water and entering into no combination with the soil, nitrates can not accumulate. Each year fresh nitrates are formed from the decomposition of the humus, the fertility of the land depending largely upon the amount of nitric acid liberated from the soil every year. What we call condition is so much added to the stock of organic matter, which in the course of a few years is decomposed, yielding nitric acid and mineral substances."

At one time soil was thought to be a mass of lifeless mineral matter, out of which plants had the power to select that which was best suited to their growth and development. But recent research has thrown a flood of light upon the nature of the mysterious chemical and other changes which take place in the recesses of the earth, and the old beliefs are proved to be no longer tenable. The gentleman who sent down his prescription to have some test soil made up by the chemist's pestal and mortar could scarcely have realized the difference between dead matter and live soil. For it is now demonstrated that sweet, healthy soil teems with minute living organisms, by whose activity the humus and ammonia existing in the organic matter of the soil are oxidized and their nitrogen converted into nitric acid, so that it can enter the plants in solution. Probably every reader knows that when soil is wasted by the drainage through it of heavy rains it is largely robbed of its fertility. But when we are told that a very wet season may wash sufficient nitrogen out of an acre of uncropped land, as would be equal to that contained in an average acre crop of wheat and barley, it makes us stop and think a bit; and when we see the discolored drainage water down in the dam, and smell and taste it, and remind ourselves that it is the nitrogen and ammonia which it has taken from the soil which gives it that peculiar taste and smell, we begin to wonder whether we cannot, by largely increasing the amount of evaporation, diminish the drainage. We want our land thoroughly drained, of course; but we don't want to have it impoverished by allowing the drainage water to wash the fertilizing nitrogen and ammonia out of it. But who thought of such things a few years ago?

In this hot country Dame Nature very wisely keeps the main water supply where it won't evaporate quickly. The water-bearing shale is met with at varying depths all over

Australia. In flood times these vast stores are replenished to overflow. The great bulk of the water which periodically falls from our Australian skies never reaches the sea at all, but stores itself in perfectly water-tight reservoirs beneath our feet, and, instead of talking of spending the public money on making costly and absolutely unnecessary reservoirs, the work of tapping our underground water supply should be continued, and, by simple and comparatively inexpensive irrigation, every man might then regulate his own rainfall. In most cases a well, a pump and a windmill, are all that will be needed for a start; and, instead of squandering millions of money in the formation of gigantic trusts and the paraphernalia of State irrigation schemes, we shall see agriculturists, as in Kansas and other American States, emulating each other in the construction of irrigation works for themselves.

In every place by the side of a river and every square mile of the interior should have its lucerne paddock and irrigation patches, and all that our farmers want is to be shown exactly how to do it, what it costs and how to make it pay. This is work which the Department of Agriculture might wisely take in hand. I would like to see, say five acres of irrigation patch, erected every hundred miles by the means of wells, pumps and windmills, as object lessons all over the colony. It would need a certain amount of skilled oversight to do it, but not much; and as for skilled labor, it is not needed at all—any intelligent farmer could do it himself at a cost of about £150, aided by his men. Moreover, there is positively no experiment about it; wells, pumps, reservoirs and windmills, all, or almost all, home-made, are spreading like a flood over the Western States of America. In Kansas, Nebraska and Texas, etc., they have made the very deserts, by these simple means, to rejoice and blossom as the rose; and what has been done in America may, and can, and ought to be done in Australia. *(To be concluded next month.)*

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THE Kafir races, says James Bryce, the author, have produced within this century three really remarkable men—men who, like Toussaint l'Ouverture in Hayti and Kamehameha I. in Hawaii, will go down in history as instances of the gifts that sometimes show themselves even among the most backward races.

COFFEE GROWING IN SOUTHERN INDIA.

Coffee-growing in India has proved even more successful than tea, and owes its prosperity in certain districts to thorough tillage of the soil before planting, and subsequent heavy manuring when the first flowers appear, and continued yearly aeration of the land by trenching. Even after the trees are in full bearing, this deep tillage is continued. and trenches over a foot in depth are dug between each row of coffee trees, and the earth thrown up close to the plants. One would imagine that deep tillage of the kind in a comparatively dry climate, would injure the young roots and retard the plants, if it did not destroy their fruitfulness entirely ; but this is not the case. On the contrary, the trees seem to resist the periodical drought of two or three months' duration much better than under the old system of dense shade and less cultivation.

Under the more modern system of culture, which ensures a thorough aeration of the soil, a crop of 2½ cwts. to the acre may be expected on ordinary soils in two and a half years, if not under shade.

The artificial manure in use is a compost of nitrate of soda, and oil seed refuse, applied at the rate of about a ton to the acre, so soon as the coffee begins to bear.

The coffee is sown in nurseries originally, and each plant set out afterwards in a smalll bamboo basket of highly manured soil, when about 9 inches high.

The rainfall in the districts referred to, is about 65 inches annually, fairly distributed, although continuous dry weather for two or three months annually, is often experienced.

The elevation of the land is from three to four thousand feet. The plants are set out at distances ranging from six to eight feet, and even then under this system of high cultivation, the bushes frequently interlace. The height is kept down by pruning to about five feet or less.

Labor is cheap, ranging from fourpence for men to threepence for women per day.

Shade trees are used as a protection from hail rather than as a sun shelter. On soils less highly cultivated, shade trees, as such, are essential.

Well-worked land, highly manured and trenched yearly between the rows of trees, will yield as much as half a ton of coffee to the acre when in full bearing. The profit on such returns is enormous at present prices, say 95 shillings per cwt., yielding about £2500 net from a hundred acres in full bearing.

These splendid results are due mainly to perfect aeration of the soil, and the liberal use of fertilizers, for in much richer soils where the old system of cultivation still obtains, not only is the yield much less, but the bushes usually suffer from disease, which is not the case where the land is highly cultivated.

To clear off moderate heavy forest and cultivate in the manner indicated, costs about a hundred rupees an acre for the first two years. In the third year when the coffee commences to bear and heavy manuring and trenching take place, the expenses rise to Rs. 120 per acre, but against this may be set the value of a crop of about 2½ cwt. to the acre—nearly double of the expenditure.

After three years the expenses are the same, but the return per acre is nearly doubled, being 4 cwts. In the fourth, the trees produce about 7 cwts. and about 10 cwts. in the fifth and following years.

The figures of the returns here given are very much above the average and many may doubt their correctness, for even 5 cwts. per acre annually would be considered exceedingly good and would give a handsome profit. * * * * *

It is not the first fifty rupees per acre spent on an estate that makes the handsome profit, it merely keeps the trees in a fair state of robustness. It is the second and third fifty which is spent to the best advantage. The intensive cultivation of coffee on stiff soils is found to pay more handsomely than extensive cultivation.

The strongest growth follows. Shade, with that extra cultivation for the first two years, is more of a hindrance to growth than otherwise, where the perfect tilth of the top soil to the depth of a foot, keeps the water, held by clay soils below, from evaporating with the heat of a tropical sun, gradually allowing it to diffuse into the broken soil. Cultivation keeps off leaf disease. The manure is put on in very varying quantities, but about 2 pounds of oil seed refuse and ¼ ounce of nitrates and superphosphate is a liberal dose per tree. Fish too is much used. Lime broad-cast before manuring is much used and is of extreme value, but must be followed up quickly with nitrogenous manure.

The profits last year on one hundred acres of coffee were £2700, and this year the prospect is better than it has ever been.—*Cor. Dem. Argosy.*

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SPRECKELS AND BEET SUGAR.

No city paper has noticed the facts published in the last number of Magee's Real Estate Circular of projects contemplated by Claus Spreckels to make California one of the greatest beet-growing countries in the world. In addition to the facts recited in the circular (quoted below) it is said on the best authority that beet sugar seeds have been widely sown in the San Joaquin valley under Mr. Spreckels' direction, the object being, if it does well, as almost beyond a doubt it will, to erect there one of the largest sugar factories in the world at a point not yet selected on the line of the San Joaquin Valley railroad. In all these facts there is solid room for congratulation. City and country real estate values alike depend on such projects as Mr. Spreckels has now under way. Mr. Spreckels is by no means a young man, but he is full of life and energy. The circular says: "To some of his personal friends and directors of the San Joaquin Valley railroad, who went one evening last month across the bay to see Mr. Spreckels off and bid him good-bye when he started on a short trip to Europe, Mr. Spreckels said that if his life was spared long enough to see the State making not only all our own beet sugar, but exporting 50,000,000 of dollars' worth more of it to the Atlantic States, he would die content, and," said he with emphasis, "we can easily do that in a few years." The East now exports between $75,000,000 and $100,000,000 worth of sugar. Mr. Spreckels told his friends that he had repeatedly been offered $10,000,000 by New York capitalists, with whom he has had previous dealings. They want the money invested in California in his full charge and unhampered direction.

While Mr. Spreckels is in Europe he will inspect the great sugar factories of France and Germany, and see if they have any improvements in machinery and methods which may be of use to him. Mr. Spreckels bought over 6000 more acres of land, within reach of his Watsonville beet sugar factory, about six weeks before he left. These lands were long used for wheat, barley or oat growing, but they are all right for beets or Mr. Spreckels would not have bought them. The assertion has been generally made that, now that wheat raising does not pay as it used to, the most of the land heretofore devoted to its culture would practically go out of cultivation and bring next to nothing. Much of this land will be used in beet culture. Beet culture has only begun, and its extension will withdraw from wheat raising immense tracts in the San Joaquin and Sacramento valleys, while reducing the wheat area, it will tend to better the price of that staple. Beets grown in France and Germany yield 8 to 10 per cent. of sugar only; here our lands yield 14 to 16 per cent., and without special fertilization. There, but for Government bounties, the business would not be made successful. When California gets to manufacturing $50,000,000 worth of beet sugar for annual export East, the shipment of refined sugar to Atlantic ports from Germany and France, on which there is a heavy import duty, will decline, if it does not entirely cease.—*San Francisco Bulletin.*

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DECLINE IN THE USE OF COFFEE IN ENGLAND.

The London *Grocer* states that the decline in the demand for coffee has been realized by all members of the trade, and in a severe degree by those gentlemen whose dealings are mainly in this commodity. It has been indicated by reports that have recently appeared that strenuous efforts are being made to bring about a revival of the trade by creating a better demand. But up to the present the efforts of the deputation of merchants and others interested, to induce the Chancellor of the Exchequer to remove or reduce the duty and to facilitate operations in bond, have not been rewarded by any marked degree of success. On the contrary, the pessimistic dealer persists in taking an even gloomier view of the situation.

"It is worth while, perhaps, to ask if there be not some reason for the change in public taste. The Chancellor of the Exchequer put it down to the inability of the ordinary Englishwoman to make a decent cup of coffee. There may also be something in the theory of a professional gentleman who writes to a London daily. This gentleman's observations and 'bitter personal experience,' extending over half a century, have led him to the conclusion that the true cause of the relatively increased preference for tea, with its deleterious constituent tannin, will ultimately be found to depend not on the incompetence of the English housewife in making coffee. but on the over-roasting of the berry by the trade coffee-roasters, with a view to impart a deep color and apparent, but fictitious, strength to the infusion when made. During this process, he says, an empyreumatic product is generated, which causes such highly roasted coffee to disagree with the stomach, and renders dyspeptic persons unable to indulge in it in consequence of the heartburn and flatulence it produces. He argues that if the public were candidly given to understand that highly roasted coffees, though imparting a deeper color to the decoction or infusion, are *de facto* less strong, with a corresponding loss of the true aroma, than the lightly roasted berry, coffee would ere long resume its place as one of the national beverages.

"The consummation is one devoutly to be wished. But the Chancellor of the Exchequer was near the just apportionment of blame when he saddled it upon the shoulders of the consumers—the people who 'try to make a cup of coffee,' and only succeed in spoiling one. If the public would but exercise the care and skill which are essential in making a cup of really good, fragrant coffee, the results achieved would amply repay them, and we should probably soon see a revival demand. The best way to achieve this end is to educate the public in the right method of preparing coffee for the table. Possibly wholesale houses would find it worth while to extend the system of issuing the little books of hints we have some times seen, devoting in them particular attention to the gentle art of making coffee for breakfast or after-dinner drinking."

If grocers in England would introduce the portable mill, sell coffee in the bean properly roasted, educate consumers to understand that the requisites of good coffee are to have it fresh roasted, fresh ground, fresh made, then we believe there would come an increased use. Coffee, however, is an expensive beverage as compared with tea, and this may, in part, account for the preference given to that article.

If the United Kingdom should take to drinking coffee with the freedom it is used in America, it would lead to high prices, unless the area of production should be largely extended. Coffee is a beverage fit for the gods, a stimulant grateful to the palate, and harmless except grossly abused.—*Am. Grocer.*

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BANANAS, THE FRUIT OF PARADISE.

[BY "EL PERITARA," IN POPULAR SCIENCE.]

Bananas were little known in northern lands two decades ago. There are even now many small towns in the United States and Canada in which only a few bunches will supply the demand for a month. There has been, nevertheless, a great growth in the habit of eating this fruit. It has been truly said that the banana has made over the appetite of races who a few years ago had never tasted it, a conquest quite as remarkable and far more rapid than that formerly made by the potato.

"Why not!" exclaimed the jolly Vallejo, when I read this to him: "That is as it should be. Surely the *guieno* is the best gift of Nature to man, for does it not promote leisurely meditation and peace? Don't my people plant a few *varas* with the *matas* of the bananas, and so escape the curse which befel mankind because of Adam's transgressions?"

"So it is. Your people *are* lazy!" the governor retorted. "So I cannot mend the roads you complain about. Your people will not work, for they have only to plant a little to-day, and then for years pluck and eat. If they were hungry, perhaps they might work a little."

"They have the centented mind with the continual feast," said the consul.

"It is right," replied Vallejo, laughingly, "for was it not with the banana that the evil one tempted our mother Eve? The sly rascal knew that the ease with which she could make it ready for the eating would tempt a housewife when nothing else could. Wasn't Adam led to his downfall, to the lasting regret of all who hate work, not by the blandishments of Eve—for she was already his spouse—but by the tempting appearance, by the charming fragrance, and the bewitching flavor of this fruit?" "That the banana was the true tree of knowledge is shown by its name," the consul remarked gravely. "*Musa sapientum* can surely mean nothing else than the 'fruit of wisdom.' And that it was the tree of paradise is further proven by the name which men of science have given it; *Musa paradisaica* can mean nothing else. Less evidence than this has served well enough to burn many a heretic at the stake in the good olden times."

"If such doubters do exist," he continued, "they may satisfy themselves as to the truth by simply cutting across a ripe banana and finding in it the sign of the cross. I doubt if better evidence was ever shown to prove that it is in very truth the forbidden fruit of the tree of knowledge which has been called the 'apple of Eden.'"

In the homes of dwellers in tropical America and other tropical countries always hang bunches of bananas, some of them ripe and sweet, more of them so green as to be fit only for boiling or for baking, in which state they are to these folk what potatoes are to inhabitants of northern lands, as they may well be, indeed, for the chemical make-up of one is very like that of the other, being:

	Bananas.	Potatoes.
Water	75.71	75.77
Carbonaceous or flesh-making material	20.13	20.70
Albuminoids or fat-making matter	1.71	1.79
Woody fiber	1.74	.75
Ash	.71	.97

For uncounted centuries bananas have been the chief food for millions of people, as they are this day of multitudes of dwellers in India, in Asia and in Africa, in tropical isles and in the three Americas. And everything eats the banana—chickens, cows and pigs, cats, dogs and cattle, mules, horses and babies, all kinds of live stock; in short, the very birds and beasts of the forest and the fishes in the streams, all eat the banana when they can get it. And it is good for them that this is so, for it is an exceedingly healthful food, which prevents constipation and resultant evils.

Platinos, which English folk misname plantains, are a kind of bananas for cooking. Most platinos are firm of flesh, thick of body, and not good to eat raw. Some of these varieties are big, yellow fellows, as thick as one's wrist and nearly as long as a man's forearm. Others are short and thick as to body and thin as to skin. When fried these taste like fried green apples; when stewed with a dash of lemon or of limejuice, their flavor is like that of stewed peaches; when roasted they are tender, juicy, slightly tart, yet sweet enough they are when baked in an oven with a dressing of butter. All these are yellow or red.

Soups, porridge and puddings, bread, cakes or biscuit may all be made of banana flour, which is said to be so easily digested that it may be safely fed to babes and invalids. Pies have been made of platinos with a slice of lemon, of lime or of pineapple, to give more tartness than the banana possesses. A syrup equal to that of the maple of the North is made of bananas, and the fruit stewed in syrup of the sugarcane makes a conserve found on many a table in the tropics. That variety commonly seen in the North is often stewed and stirred until it becomes like a thin apple sauce. Taken before dinner it dulls the keen edge of that unscrupulous appetite which comes of a day of canoeing, or of tramping through cool and pleasant forests that romancists have deceived us into believing are tangled, steaming jungles.

Those who best know the different members of the Musa family will have no difficulty in remembering several other uses to which they are put. The tender, unopened leaves make a soft, bland dressing for blisters of scalds or of burns, and the old leaves make fair thatching for temporary roofs. The dried leaves, torn into shreds, are used as a packing for merchandise, and the ashes of leaf and stock are used as soap for washing clothes and in many of the processes of dyeing.

The leaves of the "wax banana" are coated underneath by a white powder, which is a wax that has long been a valued commodity.

Banana leaves serve a few other useful purposes, for of them are made tough paper, from the thickness of thinnest tissue to thickest cardboard; clothing, hats and brushes, mats and hammocks. Millions of pounds of banana fiber, misnamed Manila "hemp," are each year brought to the United States or taken to Europe and spun into cordage from the fineness of silk up to the size of the twine with which myriads of farmers in the States bound millions of sheaves last harvest, to the bigness of mammoth cables: and many a dainty handkerchief and bit of fine lace has been woven from the fiber of banana leaves by the deft fingers of the women of South America and the far East.

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PROPAGATION OF THE SUGAR-CANE.

Director J. H. Wakker, of the experiment station for the study of sugar-cane, in East Java, has published an important communication relative to this matter, which is likely to stimulate further investigation in all cane-producing districts. It is well known that in practice cane is universally propagated from cuttings or their equivalents, and, furthermore, this mode of perpetuation has very naturally resulted in a loss of the power to produce good seeds. Wakker, by prosecuting extensive and exact researches, has found that the power of producing viable seeds is not wholly lost by this plant, but is capable of at least partial restoration by proper selection. Close inspection shows that although a great majority of all the flowers of the cultivated varieties of the cane are practically sterile, it is possible in some instances to find a few scattering blossoms which can be utilized for artificial pollination. At the experiment station in East Java there are between two and three hundred varieties of Saccharum under cultivation, but of these only a very few (in fact only one to any great extent) are employed in Javan agriculture. The principal variety, the so-called "Cheribon-cane," does not seed at all, and the same is true of some of the others, but diligent search was rewarded by the discovery that in some good varieties efficient pollen could be obtained, and in some others there were receptive stigmas. The pollination in an illustrative case, namely, that in which Cheribon-cane was used for the female plant, was guarded from foreign influence by the use of a paper covering around the inflorescence. In the year 1893, Wakker obtained from these crosses 669 seedlings of remarkable vigor. From all of his experiments in that year, he procured 490 which had to be subsequently rejected, but he retained 179 of high promise. Most of these possessed a higher percentage of sugar than the parent plants. and were free from disease.

It is difficult to overestimate the value of these researches. The range of bud-variation in the cane is very wide, but it has seemed to tropical cultivators an almost hopeless task to lead the product of sugar up to a much higher percentage than at present by means of selection among these varieties, whereas it has been felt that if seeds could in any way be had, the initiation of new and more productive variations might reasonably be hoped for. It is understood that no appreciable advance in the process of sugar extraction is to expected ; on the other hand, a path for the successful cultivation of new varieties is now fairly broken and may speedily give us far greater production per acre than has hitherto been thought possible.—*Scientific Intelligence.*

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MR. ANDREW CARNEGIE ON THE POLITICAL SITUATION IN THE UNITED STATES.

Just before sailing for Europe, Andrew Carnegie gave to a representative of the *Iron Age* a very full expression of what he deemed the one thing needful for the United States. Mr. Carnegie says :

"The one thing needful, and there is only one, is to settle the question at home and for the world abroad that we are to tread the path of honor and of good policy ; that is, that the dollar of the republic shall mean $1 in gold, worth its face in any part of the world.

"Subordinate all other issues to that. Sink parties ; no man should be either a Republican or a Democrat, but a patriot, and insist that this coming campaign shall settle for all time the question of a standard of value in this country.

"I attribute the great depressions and panics that have occurred in the last few years to the agitation for a reduction in the standard of value.

"All other causes combined have not affected the country to the extent that this has. It is fundamental; nothing is settled unless this is settled, and no genuine prosperity is possible. Capital at home, equally with capital abroad, has become alarmed. It has run into its hole, and will not come forth to embark in enterprises which create prosperity until it is settled that the American people borrowing $1 in gold will return $1, and not seek to defraud its creditor by returning a dollar worth only fifty cents.

"The tariff can wait; revenue cannot wait. The first duty of the coming Congress is to increase the import duties on luxuries of the rich—fine woolens, fine silks, fine linens, old wines, rare china, and the thousand such articles, not one of which the poor man uses. Another point is to change the *ad valorem* for a specific duty. The United States Government loses one-third of the duties which it assumes to levy. Honest men are driven out of business; it is fast coming into the hands of scoundrels who will swear to anything. Give me gold and I will give you prosperity is what can truly be said. Until this there can be none.

"With sound gold platforms from both parties, and with sound gold candidates, a change will come over the scene. Every condition but one favors prosperity, and that is the pernicious agitation for a lower standard of value. We have good crops, the world wants our products, and the country has been economical for some years; the only obstacle to the return of prosperity, genuine permanent prosperity, is this question of standard of value.

"Although it is true that the agitation for a change of standard is at the root of all the trouble, yet it is to be remembered that the fact that the Government revenues were not sufficient to pay its expenses operated on the imagination of many, and caused a run upon our gold which would not otherwise have occurred. Therefore, the first step, because it is the easiest, is to increase the revenue of the Government. That will have some good effect. It will be salve for the irritating sore, but it will not cure the poison in the blood."

ROBERT PORTER ON JAPAN COMMERCE.

Robert Porter, ex-United States Census Superintendent, who has been in Japan for some time investigating the industrial condition of that country in relation to American commerce, arrived last week. In the Orient he represented his own paper, the Cleveland *World*, the Philadelphia *Press*, and the *Times-Herald* of Chicago, and, besides these, the Manufacturers' Association of the United States, to all of which he will make reports of his investigations. When questioned in regard to the subject, he said:

"It has been commonly reported that I went to Japan to boom votes for the Republican party. Such is not the case. The question is not one of politics, but of a serious danger threatening this country. Neither the Wilson Tariff bill nor the McKinley bill affects very much the articles exported from Japan, with the exception of silk. We are not importing any cotton goods. The danger is not so much in the quantity of imports that we are receiving at the present time from Japan as the rapid increase of the importations and the stupendous possibilities of Japanese manufacture.

"To illustrate, it is only necessary to say that in 1885, ten years ago, the total exports of all textile fabrics from Japan was a little over $500,000. In 1895 they leaped to nearly $23,000,000—over forty-fold. Anybody who undertakes to reduce such a rapid progress as this to a certainty in the future must be a pretty reckless person. In other words, the man who ignores Japanese competition is either an ignoramus or is interested in the $300,000,000 represented in Japanese trade last year.

"The increase in textiles is not the only instance. Take matches. Ten years ago Japan only exported $60,000 worth, last year they exported $4,700,000, and in the coming year the exportation will be $5,000,000. This applies also to other articles. The price of these matches, free on board at Yokohama, is $8 for 600 gross, or 7200 boxes, which is at the rate of ten boxes for one cent. They will come here, if they have not already.

"They have hurt our silk industry by sending in the lighter grades of silk, such as pocket handkerchiefs. Within the past few years Japan has sent us 100,000,000 pocket handkerchiefs. These goods are made in the country districts and in little workshops by women who regard five cents a day as good pay. They have injured our carpet industry by cheap hemp rugs and matting. They exported nearly $7,000,000 of these things last year, nearly all of which came to America. In these industries I found children working by the thousands for one cent a day. They are making tooth-brushes for $1.80 for 144, and are branching out in other directions.

"You ask me has Japanese competition seriously injured America? I would say no. But I think the facts warrant me in saying that there is a great danger in the competition. It has no bearing on the Wilson Tariff bill. As a favored nation Japan, under our treaty, has the same privileges as all the rest. The Japanese want a high tariff here, so it will shut out English and German manufactures to give a larger opening for their own.

"The real question at issue is not the Tariff bill, but whether or not our civilization is prepared to face in competition a totally different civilization. We have decided, and I don't know of any political party which now questions that decision, to exclude Asiatics from this country, and hence we prohibit the Chinese. I fail to see why goods produced under Asiatic environment should be admitted while the labor is excluded.

"In Japan alone I found 1,000,000 weavers, and they are not half employed. Some of them are weaving as they did 2000 years ago. The danger will be greater when they get the best machinery. This is not pauper labor, for the Japanese are happy and contented, and willing to work for such returns. Factory girls work for seven days in the week. I found 1500 eating and sleeping at one of the mills, which ran for twenty-three hours a day, and happy in doing so. So it is a question of a different civilization, or, as the son of the Chief Justice of Japan said to me: 'You pay $2.50 for your meal and I pay 40 cents in the same hotel. I enjoy myself as much as you, and like what I eat better.'

"The merely commercial side of the question is this: We took last year $54,000,000 from Japan and it only took $9,000,000 from us, which is one-sided trade. Then they take this $54,000,000 and buy $56,000,000 in goods of England, and England only buys $8,000,000 worth from them. This is the complaint made, and there is no sentiment in the matter."

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GOOD ROADS.

This important subject is receiving more and more attention in all the States of the Union. Massachusetts and New Jersey have led in the construction of improved roads, and wherever they have been constructed the rise in price of real estate—particularly farm lands—has been so marked that the demand for better roads is constantly increasing.

The system adopted in Massachusetts, New Jersey and other States has been for the State to contribute a portion, the county a portion and the town a portion, thereby distributing the burden of taxation which has heretofore been the great obstacle in farming districts to getting better roads.

Strange to say, while the commercial and farming interests are the largest beneficiaries of improved highways, we are indebted to the bicyclists for calling public attention to and demonstrating the necessity for them. Thus pleasure cooperates with utility in promoting the public welfare.

The latest suggestion for advance in this line comes from the Governor and the Road Commissioner of New Jersey, who suggest that steel tracks are the coming road; that Macadam or Telford roads constructed with steel tracks for the wheels of ordinary vehicles to run on not only facilitate traction, but make them much more desirable, for the reason that wheel tracks on a Macadam road, as soon as they become depressed, act as gutters for water, which soon cuts them out, while steel tracks furnish a conduit for the water and, with suitable outlets, make a perfect drain.

The Road Commissioner of New Jersey states that a horse will pull five times as much on steel as on a Macadam, and twenty times as much as on an ordinary dirt road, and that the cost of pulling a ton of freight one mile is as follows: On sand, 40 cents; on hard earth, 20 cents; on Macadam road, 5 to 10 cents, according to perfection of road; on iron tram rails, 1 cent.

This enormous relative economy, coupled with superior durability and the fact that steel-track roads can be constructed for about the same cost that the ordinary Telford or Macadam could, would seem to point to a wide usefulness for steel-track roads that are suitable for ordinary vehicles; in other words, a gutter track sufficiently wide and with low flanges, so that carriage and bicycle wheels can readily get in and out of them.—*Am. Grocer.*

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A FRENCH physician of eminence gives the following advice to bicyclists: 1, No one should ride until after examination by a physician, and the examination should be made both before and after a run, as certain heart-lesions only become apparent after fatigue; 2, ride no faster than eight miles an hour, and 3, to guard against the impulse thaei st zes one on a good road to go faster. With a light machine, an amateur can easily double that distance; but it will be injurious. The demand on the muscles and the circulatory system will be too great, for at twelve miles the pulse rises to 150, and this unnatural rate long kept up must inevitably be harmful.

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THE LATEST DISCOVERY. The study of the stars is likely to be revolutionized by a new discovery. Before long, telescopes will be provided with lenses not of glass, but of oxygen gas. They can be made of almost unlimited size, so that the heavenly bodies may be inspected at comparatively short range. The moon will be brought within a few miles, so that every topographical feature of the side which it turns toward the earth may be explored and mapped. The problem of the so-called canals of Mars may be solved, and, if that planet has any inhabitants, the fact will be ascertained. In short, astronomical science will leap into a new era. Such are the claims made for an invention which is the achievement of Professor Elmer Gates of Washington, who says that he can build a lens fifty feet in diameter which will photograph the moon on such a scale and with such accuracy of detail that the surface of our satellite may be studied to an advantage never dreamed of hitherto.