

ON THE  
PROSPECTS  
OF THE  
BEET-SUGAR MANUFACTURE  
IN IRELAND :

A PAPER READ BEFORE THE  
DUBLIN STATISTICAL SOCIETY,  
ON THE 16TH JUNE, 1851.

BY  
W. NEILSON HANCOCK, LL.D.

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Mace

*On the Prospects of the Beet Sugar Manufacture in Ireland.* By W. Neilson Hancock, LL.D.

GENTLEMEN,

The latest of the many plans which have been proposed for the regeneration of Ireland, is the introduction of the manufacture of beet-sugar. The anticipated results of this project can be best stated in the language of its principal promoter. "Here is a manufacture," says Mr. Sullivan,\* "which would distribute, in merely supplying our own wants, about half a million sterling in wages amongst the most miserable part of our population, and the least skilled; and which would, at the same time, keep *eleven hundred thousand* pounds at home, to find employment in some other form, which now goes out of the country to support the labourers of other places. But the field is still larger. What is to prevent us supplying part of the sugar consumed in Great Britain?" "If we merely supplied half the quantity there required, the total value would be £3,400,000, a sum which would place the manufacture of sugar on a level with that of flax, and with that manufacture would go far to banish misery from the country."

Now in proportion to the importance of an enterprise is the duty of investigating whether or not it rests on a sound foundation. For, if the calculations from which success is anticipated be true, the sooner their truth is placed beyond question, the sooner will the benefits of its adoption accrue to the community. But if these calculations be false or mistaken, it is equally important that there should be no waste of industrial energy, no waste of national character, in pursuing with enthusiasm a delusive speculation.

It was the great importance attached to the beet-sugar manufacture by some advocates of its introduction, which led me to direct my attention to the economic conditions necessary to its success, and I propose in this paper to state the result of my investigations.

From a very little reflection you will at once perceive that in order to decide whether the manufacture is likely to be successful in Ireland or not, it is necessary to obtain answers to three entirely distinct and independent questions.

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\* Pamphlet on "*The Manufacture of Beet Root Sugar in Ireland*," by William K. Sullivan, Esq., Chemist to the Museum of Irish Industry, 1851.

First, What is the price of beet-root likely to be in Ireland for a series of years?

Secondly, What is the price of refined beet-sugar likely to be in Ireland for the same period?

Thirdly, Will it be profitable to manufacture from beet-root at the Irish prices, refined beet-sugar, to be sold at the price of that commodity in Ireland?

The first question, What is the price of beet-root likely to be in Ireland? is one by no means easy of solution. In this country the sugar beet has not been grown as a regular article of agricultural produce, so that we have no statistics of prices to refer to. Then, in France, where it is extensively grown, it appears that the price is extremely variable. The difference in the average price between the north-east and north-west of France is stated to be 4s. 6d. per ton, the average price being 13s. 11d. in the former district, and 18s. 5d. in the latter. When such is the difference in the averages, how much greater must be the differences in the actual prices. Whether this inequality arises from differences in the qualities of the roots, or from variations in the cost of carriage to manufactories, (always an important element in the prices of root crops) or from the relative productiveness of those districts in other crops, has not been fully investigated or explained by the advocates of the new manufacture.

~~Mr. Sullivan~~ states the average price throughout France to be 15s. 1½d. per ton. But you will at once perceive that with the extreme variations in the price of beet-root in France, it is impossible, without investigating the causes of that variation, to reason with any certainty to the probable price in this country. If the conditions of cultivation in this country should turn out to be the same as in the north-east of France, then our average price is more likely to be 13s. 11d. than 15s. 1½d. If these conditions resemble what takes place in the north-west of France, then our average price is more likely to be 18s. 5d. than 15s. 1½d. And slight as these differences may appear, we shall find them of the greatest importance when we come to consider the profit or loss of the manufacture.

~~Mr. Crosley~~, the resident manager of the Irish Beet Sugar Company, states\* that the company have contracted in this country for the supply of a considerable quantity of roots at 15s. 6d. per ton,† which you will perceive is commencing the manufacture with beet-root at a higher price than the average of France.

But even with this contract at 15s. 6d., it would be difficult to

\* In his letter to the editor of the Economist, as published in that paper. In the same letter, when republished in the Advocate, the statement is altered from 15s. 6d. to 15s. without any notice of the statement in the Economist being a misprint.

† I have ascertained that the price of the sugar-beet in Essex is this year from 18s. to 20s. per ton, and that a beet-sugar manufactory which had been established at Maldon had failed in a short time. I was recently assured, on good authority, that sugar-beet in the neighbourhood of Dublin would now bring from 16s. to 18s. per ton, for feeding cattle.

calculate on the price continuing at that amount for some years. The agriculture of Ireland is from various causes in a transition state. The free importation of grain and other agricultural produce has brought the farmers and landlords under the stimulus of competition: a great deal of drainage has been effected by private capital, and by public loans: a considerable quantity of land has been freed from the legal complications that doomed it to barrenness: a large amount of agricultural knowledge is being disseminated: and, above all, the pressure of the past few years has roused many of those connected with land to take the utmost advantage of the circumstances I have pointed out. It is impossible, therefore, from the experience of the past, to deduce conclusive calculations as to what the relative productiveness of particular crops will be for the future in Ireland. But on this relative productiveness the minimum price, at which the farmer can sell beet-root, will depend.

The price of wheat will depend for the future on the cost of production, not in the United Kingdom alone, but throughout the world, which must be incurred to raise the last produce required for market. To what extent wheat will be grown in Ireland will depend on the degree of productiveness as suited for that crop that our soil can be brought to. Similar causes will determine the production of oats, flax, cattle, pigs, and potatoes. The prices of all these articles will for the future be regulated by the competition of the world not only in these several kinds of produce, but also in those which can be used as substitutes for them. The prices of both oats and potatoes, for instance, will be limited by the price of Indian corn. Again, to take another instance, the prices of turnips, mangold wurzel, and of grass, will depend on the price of cattle, as these products are chiefly used as food for cattle. So that the extent of the growth of any of these crops will depend on the relative productiveness of Irish soil, not in that crop alone, but in every kind of agricultural produce.

It follows from these considerations, that the price at which beet-root can be sold in Ireland, so as to allow the cultivation to yield the same profit as other crops, is a matter over which the persons growing it have no control; and that, as this price depends upon such a multitude of causes, it cannot be determined by any indirect process of calculating their operation. The course for parties to take, who want to make really sound calculations on the subject, is to have extensive inquiries\* instituted into the relative prices of the different agricultural products here and in those countries where beet-root is now grown. From a comparison of the prices of turnips, mangold wurzel, and potatoes, in Russia, Prussia, France,

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\* When I wrote this paper, I had commenced these inquiries and hoped to have obtained some valuable information during the vacation. From the pressure of business and from the expense which such inquiries would involve, I have been forced to postpone them for the present.

Belgium, and Ireland, we could see what relation existed between the prices of beet-root and the prices of these other root crops. A comparison should also be instituted into the prices of wheat, oats, flax, barley, grass, and hay. With such data before us; with agricultural analyses of the quantities of produce, with chemical analyses of the properties of the produce, and with statements of the physical conditions as to temperature, moisture, climate, and soil, (to which ~~Mr. Sullivan~~ has so properly directed attention) we could arrive at a reasonably accurate approximation to the probable future price of beet-root. Without some such investigations, it is quite impossible to determine the price of beet-root for the purposes of the Beet Sugar Company. As this company proposes immediately to erect expensive buildings, they cannot wait to have the price of beet-root ascertained gradually, by actual trial of its growth in different parts of the country. If they profess to be guided by any prudence, they should make such inquiries as I have suggested, before they commence the outlay of their capital.

The risk which the company run from any natural rise in the price of beet-root in Ireland, from any of the causes I have suggested, above the price of beet-root on the continent, is well illustrated by the case of the Irish corn millers. In such a state of affairs, the company would find it impossible to import foreign beet-root, as the cost of carriage of one ton of roots compared with a cwt. of sugar would be so great, that supposing all their other calculations to be correct, they would be undersold by the foreign manufacturer. Just as the millers find that they can be undersold if they attempt to grind French flour.

As the investigations I have suggested have not been made, it becomes necessary to inquire what are the facts and reasonings adduced to show that beet-root will be grown and sold for a series of years by the farmers of Ireland at 15s. or 15s. 6d. per ton.

The first argument on this point ~~presented by Mr. Sullivan~~ is that rent and taxes form part of the cost of production of corn; and as rent and taxes are lower in the corn-exporting countries than in Ireland, it will be for these reasons alone impossible for us to compete with them in growing corn, and therefore we must grow something else, and why not try beet-root.

With respect to this argument it may be observed, in the first place, that if valid, its effect should be taken into consideration in comparing the cost of production of beet-root here and on the continent. But ~~Mr. Sullivan~~, although laying so much stress on it in the passage I have noticed, in a subsequent part of ~~his~~ pamphlet, when he comes to estimate the actual cost of production of beet-root and of wheat in Ireland, leaves rent and taxes out of consideration. "I have not," he says, "of course, taken rent, poor-rate, and other taxes into account, as these items are the same whatever be the nature of the crop." Now if rent and taxes are alone sufficient to prevent us competing with foreign countries in the growth of wheat, why not in the growth of beet, since, as

*H. author*

~~Mr. Sullivan~~ must admit, they are the same in foreign countries, whatever be the crop.

But let us examine the proposition that rent and taxes form part of the cost of production. To you, gentlemen,\* who are familiar with the teachings of political economists on the subject of rent, it is only necessary to observe that the whole of that theory is founded on the discovery that rent does not enter into the cost of production at all, that rent is an effect and not a cause of high prices. The Irish farmer cannot get a higher price for his grain or his beet-root, because he is under a contract to pay a high rent — on the contrary, if the prices of agricultural produce fall, he goes to his landlord and insists on a reduction of rent. Indeed there could scarcely be a proposition more at variance with the best established truths of political economy, than the proposition, that rent forms part of the cost of production.

The proposition that taxes form part of the cost of production is equally mistaken. A tax on an article of manufacture, like that on paper, or on sugar itself, may be considered as forming part of the cost of production of the article in use. But that taxes on income and taxes on expenditure affect the cost of production of commodities in general, is the proposition maintained by

*See also p. 10*  
~~Mr. Sullivan~~. He says:—"In cost of production we are not equal; rents are nearly double in Ireland what they are on an average in middle Europe, and the amount of taxation which falls on the poorer classes very much greater." The cost of production of a commodity is the amount of labour required in production, multiplied by its price or the rate of wages, and the amount of abstinence or use of capital multiplied by its price or the rate of profits. The only way in which taxes on consumable commodities can enter into the cost of production of other commodities, must be by raising some one of these four elements, the amount of labour, the amount of use of capital, the rate of wages, or the rate of profits. How can a tax on spirits or tobacco affect the quantity of labour or use of capital necessary to grow wheat or beet-root? How again can these taxes affect the rate of wages or rate of profits. There is no fallacy that has been more completely exposed, than that of supposing that wages or profits depend on the prices of the commodities consumed by the labourers and capitalists; and if they do not depend on these prices, they do not depend on any rise in these prices produced by taxation. So that it is manifest that taxes in general do not form part of the cost of production.

The next argument of ~~Mr. Sullivan~~ is an actual calculation of the cost of production of an acre of beet-root, as compared with the cost of production of an acre of wheat. But what reliance can

\* I should here mention that this paper was delivered as a lecture in Trnity College before it was read to the Statistical Society, and that I now publish passages in the lecture which were omitted for the sake of brevity in reading the paper before the Statistical Society, and before the Statistical Section of the British Association at Ipswich.

*The author of K. ...*

be placed on these calculations, when it appears that ~~Mr. Sullivan~~ does not know what "the cost of production" of a commodity is. For besides the mistake of including rent and taxes, he has in these calculations left profit entirely out of the cost of production.

*The  
are then*

Questions like that which ~~Mr. Sullivan~~ has attempted to solve, as to the conditions necessary to the growth of beet-root at a certain price, require agricultural, chemical, and economical analyses. The neglect of any one of these investigations is as fatal as the neglect of another; and nothing can be more short-sighted or absurd than for those engaged in one branch of science, to depreciate or undervalue inquiries in a distinct branch. ~~Mr. Sullivan~~ cautions the public against political economists unacquainted with the progress of science.\* But chemists unacquainted with political economy ought to be cautious of giving conclusive opinions on economic questions. If these sciences were studied in a proper spirit, it would be found that they mutually aid and help each other. In their application to agriculture and manufactures, chemistry and political economy should go hand in hand. The possibility of applying chemical principles with profit to any undertaking always depends on economic conditions which it is fatal to disregard.

At the present day, the progress of scientific agriculture is seriously retarded by the jealousy of political economy manifested by writers on agricultural questions; which I suppose can only be accounted for by the long prevalence of protection. As the agriculturists are afraid to admit the truth of the teachings of political economy respecting free trade, they seem to think the safest way is to be ignorant of the science. But there is no business that for its successful management stands more in need of a sound knowledge of political economy than agriculture, especially in the transition state in which it is in this country.

As to the first question, then, What is the price of beet-root likely to be? the only basis we can take is the price in the contracts of the Beet Sugar Company, namely, 15s. 6d. per ton. The proper economic investigations, to ascertain whether that price is likely to be permanent, have not been made; so that for the present the future probable price must be considered as extremely uncertain—a point of importance in considering the profit of the manufacture.

We now approach the second question, What is the price of refined beet-sugar likely to be in Ireland for a series of years?

The present price of refined cane-sugar in bond is stated in the Economist to be from 29s. to 30s. per cwt. Beet-sugar is by the same authority stated to be 2s. per cwt. inferior to cane-sugar, which makes the present price of foreign beet-sugar in bond

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\* "I have quoted Mr. M'Culloch at the head of this essay, in order to show that even great authorities may be sometimes wrong, and that where an important branch of industry is concerned, people should learn to examine for themselves, and not depend for their opinions upon political economists unacquainted with the progress of science, that new power in modern manufactures, which is changing every element of the social system."—*The Manufacture of Beet Root Sugar in Ireland*, p. 6.

9, *Kantler*

from 27s. to 28s. per cwt. And ~~Mr. Sullivan~~ has taken the highest of these sums as the probable future price.\* The duty imposed on foreign refined sugar after July, 1851, is 20s. 8d. so that the price of refined sugar in the market is raised by taxation to 49s. 8d. and 50s. 8d. But this duty will be reduced between this and 1854 to 13s. 4d. so that the market price or long price of refined cane sugar will then be 42s. 4d. to 43s. 4d., and the market or long price of refined beet-sugar will then be 40s. 4d. to 41s. 4d. per cwt. Such will most probably be the market price of beet-sugar in 1854;† and the promoters of the sugar company profess their readiness to demonstrate that the manufacture can be carried on with profit at that price. But they have wholly neglected to institute any investigation into the vital question, whether that price is likely to be permanent, or to rise or fall.

To supply this deficiency, I propose to direct your attention to some economic considerations, which show that the price of refined sugar will probably, before 1854, and certainly after that time, fall below the sums I have referred to; in other words, that the long price of refined cane sugar will fall below 42s. 4d. to 43s. 4d., and the short price, or price in bond, will fall below 29s. to 30s. Consequently, the long price of refined beet-sugar must fall below 40s. 4d. to 41s. 4d., and the short price below 27s. to 28s.; and of course below the long price of 42s. to 43s. assumed by Mr. Crosley, and the short price of 28s. assumed by Mr. Sullivan.

The causes which will produce the fall in price I refer to, are three in number; the increased consumption of sugar, the removal of restrictions on sugar refiners, and the competition between the cane-sugar and beet-sugar refiners.

As to the increased consumption of refined sugar, it will take place from the mere fall in price to the consumer from 49s. 4d. to 42s. 4d. It is one of the most elementary propositions in political economy, that such a fall in price will lead to increased consumption. But this increased consumption will lead to a diminution in the cost of manufacture of refined sugar; and so the difference of price between raw and refined sugar, at present from 9s. to 10s. per cwt., will have a tendency to diminish. It may be supposed that this diminution will be counteracted by the rise in price of raw sugar, as an in-

*the Kantler*

\* In the first edition of his pamphlet, ~~Mr. Sullivan~~ assumed 28s. as the price of sugar, without stating whether raw or refined. In the second edition, however, he puts an end to all doubt as to the basis of his calculations by stating, (p. 49) "I have assumed 28s. as the price of 1 cwt. of refined sugar;" and again, "My calculations, which, I need scarcely say, are based upon the price of refined sugar." I mention this, because in a leading article in a Dublin paper, inserted a few days after this paper was read, it is stated that I "assumed the price of refined beet-sugar to be 28s. per cwt" and from this circumstance the editor did me the courtesy to conclude that I did not know the difference between raw and refined sugar.

† In the article to which I have just referred, I am represented as basing my calculations on the present price of home grown beet-sugar, whereas my calculations and the whole argument turn on the probable future price after 1854, when the protection given to beet-sugar in the United Kingdom will cease by the operation of law.

creased demand for agricultural products has a tendency to raise their price. But raw sugar is itself a manufactured article; the agricultural produce is the sugar cane. And considering the great extent of the surface of the globe in which the sugar cane is grown, the tendency to a rise in price will be extremely small, especially if we consider the probability of an increase of agricultural knowledge which the transition from a state of slavery to a state of freedom implies. And the proposition that an increased demand has a tendency to raise the price of agricultural produce, is true only on the hypothesis of agricultural knowledge remaining constant. Considering, then, how much of the price of refined sugar consists of cost of making, cost of transit, and cost of refining, and how little consists of the price of the sugar-cane, it is manifest that the tendency of an increased demand arising from increased consumption will necessarily be to lower the cost of production, and consequently the price of refined cane-sugar.

The second cause of a fall in price will be the removal of the restrictions on the sugar refiners.

The exact nature and extent of these restrictions are too complicated a question to enter into in this paper. But the following extract from an address\* to parliament from Messrs. J. Craven & Co. will give an idea of some of the restrictions which the refiners complain of.

“ Under the custom laws, British refined sugars, after being shipped for foreign ports, and touching foreign soil, are, upon their re-importation into this country, held to be foreign goods, and upon payment of the duty chargeable on foreign refined sugars, they become admissible for home consumption. In order to meet these requirements, we adopt the following course; the sugars are put on board a steamer, and conveyed to Jersey or Guernsey; and after being landed in either of those islands, they are re-shipped on board the same vessel and brought back to this country. The government then consents to receive the duties, the highest which are levied upon any description of foreign sugar, and by this roundabout process the home market is at length opened to us.

“ It is unnecessary for us to point out that the expense we are thus put to, viz. double freight, double landing charges, double dock dues, double insurance, &c. &c. is a mere wanton waste of money, in addition to the loss of time, and damage done to the goods by being tossed about and exposed to bad weather, during the various processes of transshipment. To lessen the expense and absurdity of all these proceedings, we have proposed to Lord John Russell that, in place of sending our goods to a foreign soil, we should be permitted to bring the foreign soil to our goods, by importing a cargo of foreign earth with which, being placed in a bonded warehouse, our goods could be brought in contact under the surveillance of the customs' authorities. This no doubt would be a very absurd pro-

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\* Published in the London Commercial Record, for 16th May, 1851.

ceeding; yet it would be wisdom itself, compared with the system which we are now compelled to adopt."

Can any one doubt that these restrictions increase the cost of production, and so raise the price of refined sugar? Can the Sugar-Beet Company expect the existence of such absurdities to be perpetual? And if not, must not their removal lower the price of refined sugar?

I now come to the third cause of a fall in the price of refined sugar, the competition between the cane-sugar producers and the beet-sugar growers. There can be no doubt that great improvements have been made in the production of beet-sugar in France, and that still greater improvements may be made in the process. But when it is proposed that from Ireland alone we are to supply not only ourselves but the United Kingdom, is it not rather hasty to calculate on the production of cane-sugar remaining stationary during this process? Suppose all the accounts we have received of the extraordinary inventions of the beet manufacturers be true, why is human ingenuity to be confined to sugar-beet, and not extended to sugar-cane? Is the manufacture of sugar from cane brought to such a state of perfection, that further improvement is impossible? For if this be not the case, we must calculate on the effect of competition on the producers of cane-sugar. So that we ought to make an allowance for a reasonable amount of improvement in its production, and, therefore, for a reasonable fall in its price.

As to the probable effect of this cause, I consulted a very competent authority, and he writes to me thus:—"Should beet-sugar come to be manufactured very extensively in Europe, the cane, which is now, in consequence of the rudeness of the manufacturing process, affording only the same amount of produce as the beet, will by improved methods be made to yield at least double the quantity."\*

However, I do not rest my argument on the exact extent of improvement which the manufacture of cane-sugar may admit of, but on the fact that it is capable of some improvement, and that therefore some fall in price must be calculated on; so that any estimates on the assumption of there being no fall in price are necessarily fallacious.

The importance of estimating the effect of the removal of duties on prices, is well shown by the failure of the National Glass Company, started in this country on the repeal of the glass duties. I have been informed by a gentleman, who through benevolent motives was induced to support that undertaking, that the persons on whose calculations the company acted were entirely mistaken

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\* In the exhibition in London there was a machine for applying centrifugal force to the manufacture of cane-sugar, and another for applying the principle of a vacuum, which were expected to lead to a great saving of fuel and a great diminution in the cost of production. And since I read this paper, I have received accounts of other important improvements in the manufacture of cane-sugar.

as to the changes in prices. These fell far below any amount that had been anticipated. The failure of the National Glass Company should serve as a warning to prevent persons embarking in the beet-sugar speculation, without due enquiry as to the operation of similar causes.

However, the most important question remains to be considered; that is, the third I have stated. Supposing the price of beet-root not to rise above 15s. 6d. per ton, and the price of beet-sugar not to fall below 28s. per cwt., will it be profitable to manufacture at these prices?

I have already shown that, in the present state of our knowledge, it is quite uncertain whether the price of beet-root will be so low as 15s. 6d.; I have also shown that there is a certainty of the price of sugar falling below 28s. These circumstances show the great risk there is in the undertaking, and therefore that any prudent capitalist would require more than average profits to induce him to enter into it. Supposing, however, that more careful investigations on the plan I have suggested should prove that beet-root can be obtained for 15s. 6d.; and that none of the causes I have suggested will produce any effect on the price of beet-sugar, so that it will never fall below the high amount of 28s., will the manufacture be profitable?

The advocates of the new manufacture all allege that a profit can be realised at these prices. Thus, in a leading article in the *Advocate* newspaper,\* it is assumed that the cost of manufacture, including every item of outlay, will not exceed £8 per ton, or 8s. per hundred weight," leaving, at the prices I have given, 4s. 6d. for profit; "an estimate which the experience of the well-managed factories on the continent fully confirms." Again, in another article it is said, "that the whole calculations put forward by the advocates of the movement show that beet-sugar can be produced at even a much lower figure than 40s. to 42s. long price, or 26s. 8d. to 28s. 8d. short price, and still leave a handsome profit; and the accuracy of one of these calculations has not been even attempted to be impeached."

The calculations which are thus relied on are, so far as the public are concerned, two in number. One by Mr. Sullivan, and one by ~~M. Paul Hamoir, of the firm of Serret, Hamoir, Duquesne, and~~

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\* In the *Advocate* of 24th September, 1851, it is stated:—"In advocating the introduction of the manufacture of sugar from beet-root, so far as this journal is concerned, there was no object or purpose to serve further than a sincere desire to promote the welfare of the country, by supporting the introduction of an important manufacture, the raw material for which we can produce in so great perfection." In the same article, the most unworthy motives are attributed to all those who have opposed the project. Under these circumstances, it is only right to state that Mr. John Sproule, a gentleman well known to be intimately connected with the *Advocate* newspaper from its establishment, is, in the prospectus of the Irish Beet Sugar Company, dated 14th April, 1851, stated to be the superintendant of that company in Ireland, and his address is given, 87, Marlborough-street, Dublin, which is also given as the address of the Irish office of the company.

auth. of J. Campbell

Co. the largest manufacturers of beet-sugar in Valenciennes; the latter is dated April 18th, 1850.

According to ~~Mr. Sullivan~~, the price of 60,000 tons of beet-root, at 15s. per ton, would be ... .. £45,000

The cost of manufacture ... .. 27,000

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making a total outlay of ... .. £72,000

And the produce at 28s. would sell for ... .. 93,000

giving a balance of ... .. 21,000

According to the French calculation the price of 61,607 tons of beet-root, would be ... .. 38,400

The cost of manufacture would be ... .. 39,900

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making a total outlay of ... .. £78,000

And the produce would sell for ... .. 114,000

giving a balance of ... .. 36,000

The profit is nearly double that obtained on ~~Mr. Sullivan's~~ estimate, and he calls attention to this circumstance, as showing how moderate his estimate had been; and the ~~Advocate~~ represents ~~Mr. Sullivan~~ as having made an under-estimate, so as to guard against the possibility of overstating the case, even under the most unfavourable circumstances."

Although Mr. Sullivan quotes the French calculation as corroborative of his own, he adds:—" It is needless to observe that the price at which the sugar is estimated in these calculations is too high for the present price of sugar in these countries; still there is a sufficiently large margin to allow, even under unfavourable circumstances, considerable profit to the manufacturer."

Now I propose to test this statement by simply introducing into the French estimate the prices of 15s. 6d. per ton for beet-root, and 28s. per cwt. for sugar; instead of the French prices of 12s. 11d. for beet, and 39s. for sugar. This change is absolutely necessary before we can apply the French calculations to Ireland, or compare them truly with ~~Mr. Sullivan's~~, and it gives the following result:—

The price of 61,607 tons of beet, at 15s. 6d. per ton, would be £46,080

The cost of manufacture as before ... .. 39,900

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making a total outlay of ... .. £85,980

The produce at 28s. per cwt. short price, would bring 81,872

giving a balance for loss\* of ... .. £4,108

It follows, therefore, instead of the French estimate of £36,000 leaving

\* At the Essex price of 19s. per ton for beet, the French estimate would show a loss in England of about £17,000.

Sullivan's estimate

Paul  
Sullivan  
a man, perhaps

H. Paul  
Sullivan

a large margin for profit at the Irish prices, the result would, at the prices likely to prevail in Ireland, produce a loss of £4000; and yet this estimate is said to corroborate ~~Mr. Sullivan~~, and it is ostentatiously declared that the calculations cannot be impeached.

It follows to demonstration, from the French calculation ~~published by Mr. Sullivan~~, that if the largest manufacturers of beet-sugar in Valenciennes attempted to carry on their manufacture in Ireland, at exactly the same cost as they do in France, and with the same skill, but subject only to the conditions of buying their beet-root at the price the Sugar-Beet Company have contracted to pay for it, and selling at the price the company must sell at after 1854, instead of making £36,000 on a capital of £78,000, they must lose £4,000. In other words, to manufacture beet-root at 15s. 6d. per ton, into sugar to be sold at 28s. per cwt. must in the present state of the manufacture be a losing trade.\*

\* The French estimate, as given by ~~Mr. Sullivan~~, is as follows. —

“ To show that this statement is not exaggerated, I shall give the following estimate, obligingly furnished to me by M. Paul Hamoir, of the firm of Serret, Hamoir, Duquesne and Co., the largest manufacturers of beet-root sugar in Valenciennes (April 18, 1850):

## EXPENSE.

	Francs.	
Cost of 60,000,000 of kilogrammes (61,607 tons) of beet, at 16 francs (12s 11d) per 1,000 kilogrammes (one ton nearly) .....	960,000	(£38,400)
Cost of desiccation .....	300,000	(£12,300)
General expense of manufacture .....	690,000	(£27,600)
	<hr/>	<hr/>
	1,950,000	(£78,000)

## PRODUCE.

“ Estimating the per centage obtained at only four and a half, 60,000,000 kilogrammes would give:—

	Francs.	
2,700,000 kilogrammes (about 2,700 tons) of refined sugar, which, duty deducted, would be worth about 1 fr. (about 9½d.) the kilogramme (2lb 3½oz.) or about 39s. per cwt. .....	2,700,000	(£108,000)
Molasses, estimated at three per cent. 1,800,000 kilogrammes (1800 tons), at only 5 fr. (4s. 0½d.) the 100 kilogrammes (about 220 lbs.) .....	90,000	(£3,600)
Residue or pulp, at 1 fr. (9½d.) the 100 kilogrammes (220 lbs.) .....	60,000	(£2,400)
	<hr/>	<hr/>
	3,850,000	(£114,000)

“ This would leave a balance of £36,000, or *double that deducted from my estimate*. In calculating the produce of sugar at five per cent., sixty millions of kilogrammes of beet would give:—

3,000,000 of kilogrammes, at 1 fr. the kilogramme .....	3,000,000	(£120,000)
Molasses at 2½ per cent. produce 1,500,000 kilogrammes, at 5 fr. the 100 kilogrammes .....	75,000	(£3,000)
Residue or pulp, at 1 fr. the 100 kilogrammes .....	60,000	(£2,400)
	<hr/>	<hr/>
	3,135,000	(£125,400)

“ Which would leave a balance of £47,400! And for each additional one-half per cent. of increase, there would be an increase in the balance of £11,400. Thus:—

“ 5½ per cent would give .....	£58,800
6 .....	70,000
6½ .....	81,600 ”

To show that the manufacture can be carried on notwithstanding these results, it is alleged that Ireland is peculiarly adapted for the growth of beet-root, and that Irish beet-root furnishes a very large quantity of sugar. Into the questions raised by these statements I do not propose to enter; they belong to the domain of the agriculturalist and the chemist. But it will require very extraordinary agricultural and chemical properties in the Irish beet, to turn a loss of £4,000 into a profit of £36,000 on a capital of £78,000. After the samples we have had of ~~Mr. Sullivan's~~ estimates of cost of production, and calculation of the profits of manufacture, it will not do to rest on his authority alone even in his own science; and I may just suggest that, as to the chemical question, grave doubts are entertained whether the Irish beet contains as much crystallizable sugar as an equal weight of continental beet.

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21. 11. 1877*

Again, it is said new processes have been discovered, which it is proposed to introduce into Ireland. Patents have been taken out for these processes, and the company will have the exclusive use of them. Now these processes are either known on the continent, or they are not. If they are not known on the continent, why do not the patentees take out patents in foreign countries, and sell their interest where the difference of prices affords a much more favourable opportunity for introducing them than in this country? If these processes are known on the continent, their value can be

In introducing the Irish prices into this estimate, I divided 114,000 by 39 and multiplied it by 28. It would have been more accurate to apply this process to the value of the molasses and sugar, or perhaps of sugar only. The difference, however, would be less than £700 in the one case, and then £1700 in the other, so that the French estimate would still show a loss of upwards of £3,000, or of £2,000.

*another*

I have given the French estimate at length, as stated by ~~Mr. Sullivan~~, because in a letter to the editor of Saunders' News Letter, published on the 7th July last, he charges me with having "cunningly avoided taking the whole of the estimate." Those who read the estimate and my inferences, can judge whether I acted unfairly in taking the most prominent part of the estimate, and the part on which ~~Mr. Sullivan~~ relied as showing "a balance of £36,000, or double that deduced by his estimate." But I really took the part of the estimate most favourable to the new project. For ~~Mr. Sullivan~~ in now relying on the results of the French estimate, on the hypothesis of the produce being six per cent. of refined sugar, entirely overlooks the fact that the more productive in sugar the processes used in France were in June last, the more benefit did the French producers derive from the protection of 11s. per cwt. which they then enjoyed, and the less chance consequently have Irishmen of succeeding in the speculation without protection. Thus, if the produce in France be four per cent. the effect of the difference of prices in Ireland and France makes, as I have shown, a difference of about £40,000 in the profits in the two countries. But if the produce be 6 per cent. this difference will be increased on ~~Mr. Sullivan's~~ own figures from £40,000 to £47,500. † In other words, if Messrs. Serret, Hamou, Duquesne & Co. were getting four per cent. of refined sugar, and transferred their manufactory to Ireland, they would, in employing a capital of less than £100,000 in manufacturing 61,607 tons of beet root, lose, by changing their country, £40,000. And if they were getting six per cent. of refined sugar, they would, from the same cause, by a similar change, lose £47,500.

*the same  
the case*

*author's  
of French  
from*

† In his letter to the editor of the Saunders' News Letter

† At the French prices, he estimates the balance for profit of six per cent. at £70,000. In his letter, he estimates the same balance at the Irish prices at £22,508.

*Andrew G.*

estimated by the cost of production there, and the French estimate shows that they would not pay at our prices of beet and sugar. Besides the fact that the patentees are so anxious to sell their rights at once to a company, instead of granting licenses to private capitalists, shows a want of confidence in their own inventions.

Besides, if these processes are not known on the continent, how can these gentlemen account for such momentous discoveries being made in a country where the manufacture of beet-sugar has never been carried on, and never having been thought of in countries where the manufacture has been in full operation for half a century?

Supposing these discoveries to be unknown on the continent, the results they have to perform are rather excessive. The Irish public are called on to believe that, in an entirely new manufacture, the processes so far exceed the processes used at this time twelvemonths in the largest manufactory of Valenciennes, that they can turn a loss of five per cent. on any given application of capital into a profit of 60 per cent. and can secure this result under the circumstances of there being no security against a rise of price in the raw produce, and a certainty of a fall in the price of the manufactured article.

When such a plain case is made against the introduction of the beet-sugar manufacture into Ireland, some of you will naturally enquire, How has this project come to occupy so much public attention? This has I believe arisen from the fallacy of the arguments adduced in its favour not having been hitherto exposed. The following are the chief arguments relied on:—

1. The manufacture of beet-root has been successful on the continent; what is to prevent its being successful here?
2. The manufacture of beet-sugar has been increasing in France, notwithstanding the fair competition with cane-sugar.
3. There are large importations of refined sugar from Holland.
4. The importations of occasional cargoes from France show that the price of refined beet-sugar is lower there than the price of foreign refined sugar here.

The first argument from the success of the beet-sugar manufacture on the continent is very prominently put forward by Mr. Sullivan. He commences his pamphlet by asking "why the manufacture should not be introduced into Ireland, especially as it is a manufacture of an eminently agricultural character? Surely the experience of France ought to be a sufficient guarantee that the manufacture is not a speculative one, but a great staple trade."—"That the trade is profitable there can be no doubt, from the large capital embarked in it on the continent—a capital which is steadily increasing." Then, at the conclusion of his pamphlet, he relies on the same argument. "The future alone can test the value of the new; the old has been attended with success, and with the prestige of success which the manufacture\* under every circumstance has

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\* The same argument is relied on by the Irish Beet Sugar Company, in their pros-

had in France, Belgium, and Germany. It is to be hoped it will add that of Ireland, under the more favorable advantage which the new processes hold out."

Now supposing all other conditions, agricultural, chemical, and manufacturing, to be equal, the validity of this mode of reasoning depends, besides all these, on the economic conditions being somewhat similar in the countries compared. If these conditions are such as alone to make that which is profitable on the continent unprofitable here, then there cannot be a more mistaken inference, or one more calculated to mislead the public, than the inference deduced from a comparison of the two countries, without any statement of the effects of the diversity of economic conditions.

Now what are the facts with regard to France? Sugar is kept at an artificially high price of 39s. per cwt., as compared with 27s. and 28s. in this country. This price is maintained by a system of differential duties, affording a protection to beet-sugar of 9s. against foreign sugar imported in French vessels, and of 21s. 9d. if imported in foreign ships. It is unnecessary to go into particulars about this protection, for the point on which the profit of the manufacturer turns is not the amount of the duty, but the effect of the protection, whatever it is, on the price. We have the fact stated in the French estimate quoted by Mr. Sullivan, stated in the Economist, that the effect of this protection is to raise the price of sugar in France. The price of refined cane-sugar in bond in England is 29s. to 30s., and the price of the same article is in France, if the produce of French colonies, from 40s. to 42s. The price of refined beet-sugar is always about 2s. lower, so that that article could not bring more than from 27s. to 28s. here, and yet it can obtain from 38s. to 40s. in France.

To argue, therefore, from the case of France without noticing this circumstance, without estimating its effects, while, as I have shown in an earlier part of this paper, this difference and the difference in the prices of beet are alone sufficient to turn a profit of 60 per cent. into a loss of 5 per cent., is as fallacious a mode of reasoning as ever was resorted to.

But we now come to the case of Belgium. The duty on beet-sugar in Belgium is 15s. per cwt., the duty on refined cane-sugar is 24s. per cwt.; this gives a protection of 9s. per cwt., the same as in France.† I have not yet been able to ascertain the price of

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pectis ~~dated 14th April 1851~~. Thus it is there stated:—"almost every country on the continent of Europe has demonstrated that beet-root sugar can be produced in temperate climes so as successfully to compete with the produce of cane-sugar." Now the fact is, that in no country on the continent of Europe is beet-sugar exposed to the free competition of the cane-sugar from all other countries; so that no inference can be truly drawn from the production of beet-sugar on the continent, without making allowance for the effect of the protection universally prevailing on the prices of the different kinds of sugar.

† I had commenced a series of inquiries into the prices of sugars of different kinds throughout Europe, but was obliged to postpone the investigation by the pressure of important business.

refined beet-sugar in Belgium; but, as it enjoys the same protection, we may reasonably infer that the short price is artificially raised above the short price here, by nearly the same amount.

Then, coming to Germany, the only country of which I have got information is Prussia. There the duty on beet-sugar is 3s. per cwt. on refined cane-sugar 22s., giving a protection of 19s. per cwt.

I have not been able as yet to ascertain the exact effect of this protection on the prices of sugar in Prussia, but we may expect to find them higher than in France and Belgium.

The manufacture of beet-sugar was commenced in France under Napoleon, when his continental system and the retaliation of the British government put a stop to the import of cane-sugar into France. From that time to the present, beet-sugar has always had the protection of an artificial price in every country where it is grown. To argue from the example of what has been profitable under such circumstances, to what will be profitable in this country, when, after 1854, the scanty protection now enjoyed will be withdrawn, is only to mislead the public.

The second argument relied on by the supporters of the beet-sugar manufacture is, that in France the manufacture has been increasing notwithstanding the competition of cane-sugar on equal terms. The protection which beet-sugar enjoyed up till 1841, against French colonial sugar, has been withdrawn, and yet the manufacture has increased; and Mr. McCulloch's prediction as to its failure has been falsified.

Now the amount of protection which a manufacture enjoys depends on the effect of the laws upon the price of the product. If Brazil and Cuba had happened to be French colonies, or if the French colonies were large enough to produce a sufficient supply of sugar to render all importation of foreign sugar unnecessary, then the equalization of duties would have lowered the price of sugar, and most likely Mr. M'Culloch's prophecy would have been fulfilled. But the price of a commodity is regulated by the cost of production of that part of the necessary supply which is obtained at the greatest cost of production, and hence it came to pass that the regulations with regard to colonial sugar have had no effect on the price of sugar in France. That price is regulated by the cost of production of foreign refined sugar, which is raised as we have seen by differential duties of 9s. and 21s. 6d.; and these have an effect in raising the price of sugar in France 11s. to 12s. per cwt., above the price of the same article in England. It is idle to talk of the competition between beet-sugar and colonial sugar, when the colonies cannot produce enough to affect the price. The effect of the equalization of the duties was not to diminish the bounty on the growth of beet, but to give an equal bounty to the French colonists, at the expense of the general tax-payers in France. Within the last month, (June, 1851,) the French Assembly has resolved to reduce the differential duty on foreign sugars from 9s. to 4s. 6d. and we shall see what effect this will have on the profits of the manufacturers. But it is

a perfect delusion to speak of beet-sugar competing on equal terms with cane-sugar, when the law admits only enough of cane-sugar to have no effect in the price, and burdens with an enormous differential duty the sugar of all the great sugar-producing countries, whose supply really regulates the price throughout the world.

The third argument is, that there is a large importation of refined sugar from Holland. The inference sought to be drawn from this is, that refined sugar is cheaper in Holland than in England. The confidence with which this argument has been repeated over and over again, shows the danger of relying on facts of this kind, without investigating the economic circumstances under which they take place.

Had those who rely on this argument made the slightest inquiry on the subject, they would have ascertained that there is a considerable bounty, amounting to several shillings per cwt. on the export of refined sugar from Holland, whilst our British refiners remain under the absurd restrictions I have in an earlier part of this paper referred to. This importation does not consequently prove the only inference that has been attempted to be drawn from it.

I now come to the last argument of the promoters of the new manufacture. Beet-sugar is, they say, at present imported from France,\* and however small the quantity imported, still this proves that the price of beet-sugar in France is lower than the price of foreign refined sugar here; for if not, how could it be imported?

Now in an important subject like this, why should those who profess to have no wish to mislead the public, resort to an inference to prove that which can be proved directly? Why ask us to infer what the price of sugar is in France, instead of stating plainly and distinctly what the price is?

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\* At the Statistical Society a gentleman stated, on the authority of a respectable sugar dealer in Dublin, that any quantity of refined beet-sugar could be imported from France, to sell here at 52s. per cwt. long price, paying a duty of 22s. 8d., giving a short price of 29s. 4d. I afterwards met the gentleman thus quoted as an authority. He said he could supply the sugar, asked me if I had ever seen beet-sugar, and offered to show me some that had come from France. For this purpose he took me into the office of one of the most respectable sugar brokers in this city, and showed me a loaf of refined white sugar, which he stated was French beet sugar. I asked the broker how did he know it was beet-sugar. He said he not only did *not* know that it was beet sugar, but that he was not selling it as beet-sugar, and that he *did not believe it was beet-sugar*; that the public had taken it into their heads that, because it came from France, it was beet-sugar. I then asked the broker did much sugar come from France to this country; and he stated that until 5th June, 1851, he never knew a cargo of sugar to come to Dublin from France; that two cargoes had come—one in the vessel called the *Leda* of Nantes, consigned to order, on 5th June, 1851; and one in the *Pilote*, on the 9th of June, 1851. And that he had brought the latter cargo, and believed it to be refined cane-sugar.

This short statement shows the importance of adhering on scientific questions to the well-known legal rule, of always requiring the best evidence to be produced. The best evidence of the price of sugar in France is a French price current, or the statement of a respectable Frenchman; and with the statement of M. Paul Hamoir, and the prices quoted by the *Economist* of 39s. per cwt. it is futile to attempt to make the public believe that the price is 29s. 4d. per cwt. by any secondary evidence, such as an inference from the importation of two cargoes of sugar from France.

In this case, however, the inference is resorted to, to prove that which is not the fact. We are asked to infer from a few importations, that beet-sugar can compete with cane-sugar; in other words, that the price of French beet-sugar is as low or lower than the price of foreign cane-sugar; whilst it is manifest on the slightest enquiry, (it is actually stated incidentally in ~~Mr. Sullivan's~~ pamphlet, and it has been stated by the Economist, that the price of sugar in France is from 11s. to 12s. per cwt. higher than the price in this country) the importation that takes place may be accounted for by bounties, drawbacks, or smuggling; but I shall not waste time in attempting to account for it. For when we have the fact of the high price of sugar in France, we know at once, without any further inquiry, that the inference which the promoters have attempted to draw from the importation of a few cargoes is entirely false and mistaken. When we know that the price of sugar is higher in France than here from observed facts, why ask us to believe the reverse from a delusive inference!

I have now shown that the chief arguments relied on to support this new manufacture are mistaken; that the proper economical investigations have not been made, either as to the future price of beet-root or the future price of sugar; that the prospects of the manufacture stand in this condition—contracts for beet-root have been taken at 15s 6d. per ton, a price higher than the average of France, with no security against the price rising above that amount. The sugar must be sold at 27s. to 28s. per cwt., being 11s to 12s. lower than the price in France, with a certainty of the price falling still lower. Yet the public are called on to believe that such are the inherent qualities of Irish beet-root, a new crop; and such is the value of the patented processes, which have never been tried; that the manufacture may be expected to be as profitable here as in any other part of the world.

There is only one additional point to be noticed about this manufacture. All my reasoning hitherto is applicable to it, whether undertaken by individuals or companies; but I cannot conclude this paper without stating my strong conviction that, even if profitable for individuals, the manufacture of beet-sugar is wholly unsuited for a public company.

The teachings of Adam Smith on the business which companies can and cannot manage successfully, are well known. I applied these principles in condemning the National Glass Company, and the Waste-land Improvement Company, when they were high in public favour. All my investigations have convinced me that Adam Smith's rules are perfectly correct, and that a business like sugar manufacture, which does not require a large capital, which is not a matter of routine, and does not present the prospect of extraordinary profit, is unsuited for a public company.

I may observe, too, that the success or failure of a public company is a question in which many are concerned. In the first place, the loss to the shareholders is often very serious, as we may see by

the case of the St George Steam Packet Company. In the second place, if the liability of the shareholders be limited, the public may lose very heavily by entering into contracts with a company. One of the most popular companies, and one of those most patronized, has since its failure taken advantage of the difficulty of recovering debts, to force parties to accept only a part of their just claims founded on contract.

But the success of a public company and its subsequent failure have a very injurious effect on our national character and our industrial enterprize. The success of such a company makes us a constant prey for similar speculations in future; their failure creates a want of confidence amongst ourselves in all new industrial projects.

For these reasons, it is manifest that no investigations are of more importance than those which are instituted for the purpose of testing the merits of a national undertaking, proposed to be carried out by a public company.

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#### POSTSCRIPT.

After this paper was in type, I obtained a copy of ~~Mr. William Digby Seymour's~~ pamphlet on *Beet-Sugar, Flax, Chicory, and Land Investment in the West of Ireland, &c.* and I have to acknowledge my obligations to ~~Mr. Seymour~~ for having directed my attention to the following opinion on the beet-sugar question, which has been given by the greatest of living chemists.\*

"The history of beet-root sugar affords us an excellent illustration of the effect of prices upon commercial productions. This branch of industry seems at length, as to its processes, to be perfected. The most beautiful white sugar is now manufactured from the beet-root, in the place of the treacle-like sugar, having the taste of the root, which was first obtained; and instead of 3 or 4 per cent., the proportion obtained by Achard, double or even treble that amount is now produced. And notwithstanding the perfection of the manufacture, it is probable that it will ere long be in most places entirely discontinued."

"The financial laws of continental states have selected sugar as an article to be taxed on importation; and the governments of the states forming the German Customs Union (Zollverein) received, as duty on 1,200,000 cwts. of sugar, imported in 1846, 10,500,000 florins, (£875,000), which made a part of the sum required for the expenditure of these states. In the same year, ninety-six manufac-

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\* *Familiar Lectures on Chemistry, &c.* by Justus Von Liebig, May 14, 1851, pp. 154-157.

urers of beet-root sugar in the union produced 334,320 cwts. of sugar, from 4,446,469 cwts. of beet-root, and this sugar was consumed within the union at the same price as the sugar imported from tropical countries. Had this beet-root sugar not been produced at home, an equal weight of sugar would have been imported. In that case, the state would have received 2,400,000 florins (£120,000) at the rate of  $8\frac{1}{2}$  florins per cwt.,\* which sum was paid to the manufacturers of beet-root sugar in the price of the sugar. Instead, therefore, of about 13 millions of florins, which the state would then have received, it received only  $10\frac{1}{2}$  millions; and it is plain that without the deficit of about  $2\frac{1}{2}$  millions, other taxes might have been diminished to that extent. The inhabitants of the union, therefore, paid  $2\frac{1}{2}$  millions of florins to the beet-root sugar manufacturers, and  $2\frac{1}{2}$  millions in other taxes. Each of the ninety-six manufacturers received, on an average, about 25,000 florins (£2,000) from the population, without the latter having derived any advantage whatever from the payment. The satisfaction of eating sugar grown on our own soil is therefore purchased by a not inconsiderable sacrifice. Were all the sugar now consumed in the union produced at home, the deficit in the revenue would amount to  $8\frac{1}{2}$  millions. Whether it would be possible, under these circumstances, to raise 17 millions of florins in the shape of taxes within the union,—namely,  $8\frac{1}{2}$  millions for the manufacturers of beet-root sugar, and a like sum for the other taxes, which could be spared were all the sugar imported,—is a question which we may here leave unanswered.

“Let us imagine that the states, in order to supply us with sugar, had to keep up, at an expense of  $8\frac{1}{2}$  millions of florins annually, raised in the form of taxes, a prodigious hot-house for the growth of the sugar-cane, and we shall soon see that the discovery of an island where the sugar-cane grows wild, and can be cultivated easily and at a trifling expense, would be hailed as a most fortunate event, especially if that island undertook to supply our whole demand for sugar at such prices as would enable us to save the whole outlay for our hot-house. Every man would profit, because the taxes could be, without any loss or disadvantage whatever, reduced to the extent of  $8\frac{1}{2}$  millions of florins.

“It may be urged, that the manufacture of beet-root sugar has a future; that if fully developed, it might acquire sufficient vigour to supply the annual expense incurred by the hot-house, and that it would then yield to the state, in a tax, as much as the manufacturers receive from the consumers. But this is hardly probable; *for the future belongs not to the beet-root sugar, but to the cane sugar.*

“On an acre of the best land, for which a yearly rent of fifty florins (about £4\_3s. 6d.) is paid, there is obtained in the environs of Mag-

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\* The manufacturers formerly paid a tax of one thaler (three shillings) on 20 cwt. of beet-root; now they pay two thalers, on the supposition that 20 parts of beet-root yield 1 part of sugar; but they obtain one part of sugar from 14 or 15 of beet-root.

deburg, on an average, 10 cwt. of sugar, costing in coals for its manufacture, besides the wages of labour, the price of 40 cwt. of coals. The beet-root contains 10 per cent. of sugar, and of this,  $7\frac{1}{2}$  per cent. are obtained. The possible improvement, therefore, can only refer to the obtaining of  $2\frac{1}{2}$  per cent. of sugar now lost.

“An acre of land in the colonies, the rent of which is less than one-tenth of the rent in Europe, yields annually from 315 to 350 cwt. of sugar-cane (25 to 30 tons per acre.—*Wray*), yielding 70 to 80 per cent. of juice, in which are contained 20 per cent. of sugar. The acre of land, therefore, produces in the home of the sugar-cane, 40 to 50 cwt. of sugar, while the pressed residue furnishes nearly the whole, or the whole of the fuel necessary for the extraction of the sugar.

“For equal periods of vegetation and equal surfaces, the absolute yield of sugar from the soil, in the case of the sugar-cane, is more than twice as great as in the case of the beet-root.

“The makers of beet-root are in advance of the colonists, in having better processes, that is, in saving labour; they have a climate better adapted to the working up of the juice; and they have, perhaps, in general more intelligence.

“But that the manufacture of beet-root sugar continues among us at all, is owing to accidental circumstances, the duration of which is quite uncertain. The planters of the colonies are already infinitely better informed than formerly; an entire revolution in their methods has begun; they will cease to be negligent and wasteful. It is quite inconceivable that they should continue, as hitherto, out of the 20 per cent. of the sugar in the cane juice to lose 12 and to gain only 8 per cent. The discovery of a simple means of preventing the fermentation of the juice in hot climates, and, as a consequence, an increased return of sugar, even to the extent of only 4 per cent. would suffice to render the manufacture of beet-root sugar in Europe impossible, economically speaking. It is for this reason that the latter has no future to look to.

“Money no longer makes the wealth of a nation, and if the valley of the Rhine possessed mines of diamonds as rich as those of Golconda, Visiapoor, or the Brazils, they would probably not be worth the working; at those places, the cost of extraction is 28s. to 30s. the carat. With us it amounts to three or four times as much—to more, in fact, than diamonds are worth in the market. The sand of the Rhine contains gold; its proportion of gold, however, being ten times less than that of the gold sands in Siberia, and thirty-seven times less than that of the gold sands of Chili (*Daubrée*); and in the Grand Duchy of Baden many persons are occupied in gold washing when wages are low; but as soon as they rise, this employment ceases. The manufacture of sugar from beet-root, in like manner, offers advantages which will soon exist no longer. Instead, therefore, of maintaining it at a great sacrifice, it would be more reasonable, more in accordance with true natural economy, to cultivate other and more valuable productions, and with them

purchase sugar. Not only would the state be a gainer, but every member of the community. This argument does not apply, perhaps, to France and Bohemia, where the prices of fuel and of colonial sugar are very different from those in Germany."