

"I feel," exist under all physical conditions. (4) Consciousness is distinct from, if not wholly independent of physical conditions, with reason for its guide. (5) The modern doctrine of materialism did not account for the action of the will. (6) To exclude the primal force of the will, was to strike a blow at man's responsibility for his actions. The lecturer proceeded at considerable length, to examine the opinions of Herbert Spenser, Professor Tyndall, and other eminent authorities.

NINTH MEETING. 2nd September, 1880.

Rev. Dr. PURCHAS, President, in the chair.

Mr. R. C. Barstow gave a lecture on the "Exodus of Israel."

TENTH MEETING. 7th October, 1880.

Rev. Dr. PURCHAS, President, in the chair.

Mr. Neil Heath, F.G.S., gave a lecture entitled "A day on the Ice around Mont Blanc."

ELEVENTH MEETING. 25th October, 1880.

Rev. Dr. PURCHAS, President, in the Chair.

New Members.—Rev. S. Baker, Pierce Lanigan, W. McCulloch.

1. "On a new species of *Loranthus*," by T. F. Cheeseman, F.L.S. (*Transactions*, p. 296.)
2. "On the growth of Sugar Beet in New Zealand," by Dr. Curl. (*Transactions*, p. 142.)
3. "On the Neglected Forest Products of New Zealand," by T. Kirk, F.L.S. (*Transactions*, p. 130.)

TWELFTH MEETING. 15th November, 1880.

Rev. Dr. PURCHAS, President, in the Chair.

New Member.—Mrs. Stoddard.

1. "Remarks on Dr. Curl's Paper on the Growth of Sugar-Beet, in New Zealand," by R. R. Hunt.

In my opinion the thanks of the colony at large are due to Dr. Curl for his experiments, testing the percentage of sugar in beet-root grown in the colony. In all my conversations with shrewd business men about establishing a company to produce sugar from beet-root, the first question which met me was this, "Will beet-root grown in New Zealand produce sugar in it of a percentage to pay?" I could only answer, "That I could speak to its growing well, and to a very large size, but could not say anything of the percentage of sugar." Now this is the very point which Dr. Curl has proved, and which renders his paper of great practical value—viz., that New Zealand not only produces a percentage to pay, but exceeds it by 1 and 2 per cent., and if you will consider that 1 per cent. of saccharine matter is equal to $7\frac{1}{2}$ per cent. net profit, you will recognize the importance of Dr. Curl's experiments.

'Tis true that in 1875, Sir Julius Vogel caused seed to be distributed, and some beet was analysed, giving percentages 4·9, 5·8, 7·6, 8·4, which would not be encouraging were it not that on examining closely into the report of the soil these beets were grown in, it will be seen that it was not at all suited to beet, viz., swampy land and stiff clay with a hard subsoil, hence these tests go for nothing, or else they prove this, that even on inferior soils and with imperfect cultivation a fair percentage is produced.

Rangitikei, in the Wanganui district, where Dr. Curl's experiments were carried out, is exceptionally rich land, and the high percentage as found by him may be thus explained; though it should be borne in mind that being on the West Coast, and exposed to the sea air from the South Pacific Ocean, is much against his percentage, because beet readily imbibes saline matter from the air, and 1 per cent. of salt destroys 5 per cent. of sugar in the manufacture. However, this matter will be set at rest by experiments now going on in Waikato to test the percentage. Mr. George S. Graham, the son of an old Aucklander, lately sent out to his brothers, Messrs. S. S. and W. A. Graham, of Tamahere, Waikato, three samples of Belgian beet seed, which they have kindly distributed to Waikato farmers, with directions as to culture, manure, etc.; and when the beet has arrived at maturity; Mr. J. A. Pond has kindly offered to analyze it free of cost, so that next autumn should see us in possession of facts, which will guide business men in investing money in a Beet Sugar Company.

Waikato, I consider, is better adapted for beet than any other district which can be named in the colony. It is at present purely a cattle-farming district, and while they can get 25s. to 30s. per 100lbs. for their beef, farmers there will not grow crops; but to enable them to fatten cattle for the market early in spring, they find that they must grow turnips or mangolds to feed their cattle in winter, or else it is late in the autumn before their beasts are fat and fit for the market; and this is just where beet culture would help them, because they would not only have a sure ready-money market for their beet, but could also re-purchase the pulp of beet from the manufactory to feed and fatten their cattle during the winter.

Waikato grows splendid mangolds, and ought also to grow beet of like quality; and as it is in a huge basin high over which the sea air blows, being protected from it by a chain of hills forming the edge of the basin, hence there would be no trouble with salt in beet in Waikato.

The advantages Waikato possesses over other places being—suitable land, cheap coal, abundance of fresh water, and a district requiring and likely to purchase the beet pulp, with good roads, railways, and water carriage for cheaply transporting the beet.

Profit on manufacturing beet sugar, although Dr. Curl's estimate of profit, 60 per cent., may at first sight seem extravagant, yet when one examines it closely, it is about right according to the best authorities. For example, he puts down the selling value at £36 per ton. Now, a merchant told me last week that he could import and sell wholesale the very best white crystal cane sugar at £43 per ton, duty $\frac{1}{2}$ d. per pound being paid by him; and this sugar is selling retail at £46 13s. 4d. per ton, or 5d. per pound. Deducting the $\frac{1}{2}$ d. per pound duty from the £43, reduces the wholesale selling price to £38 6s. 8d per ton, this leaves £2 6s. 8d. in Dr. Curl's favor; but this you may allow for some inferior grades of sugar which the beet factory would produce, and which would sell at a lower price.

As to cost of production. Dr. Curl sets it down at about £18 per ton, or about 2d. per lb. Here, again, the Doctor is not out of the way, because it is stated that in France sugar at 6 per cent. in the beet costs 2d. per lb.; 7 per cent., $1\frac{1}{2}$ d. per lb.; 8 per cent., $1\frac{1}{2}$ d.

per lb.; and though his New Zealand-grown beet shows over 8 per cent, he puts the cost of production down at 2d. instead of 1½d. per lb., and estimates 60 per cent. profit. E. B. Grant, an American, in his work on the subject, estimates the profit on 7 per cent. beet sugar sold at £39 13s. 4d. per ton, or 4½d. per lb., at 52 per cent. net profit. Professor Crookes, in his work, states that 8 per cent. beet sugar sold at £24 per ton, equals about 50 per cent. profit. Baruchson states that 6½ per cent. beet-root, sold at £24 per ton, will yield 24½ per cent. net profit; if the percentage be 7 per cent., the profit will be 32 per cent.; if 8 per cent., profit 48 per cent. The yield in Germany on an average of 2,500,000 tons of beet-root, is 8·4 per cent. sugar extracted.

Mr. George S. Graham saw in Belgium the books of a sugar company, which showed that for seven years they had averaged 15,372 tons beet used per annum, the percentage of sugar 9.36, and the profit actually paid in dividends 27·5-7 per cent. Though this shows less than all the foregoing estimates, yet included in that there may be trade losses, which are not taken into account in the former estimates.

As to the difference in the cost of labour in New Zealand and on the Continent, I do not think much of that, as our land is cheaper, and hence there is less interest or rent to pay, less taxation, and with approved appliances for cultivation it ought to be as cheap to produce beet here as in Europe, and here 20s. per ton might be paid for the roots instead of 16s., which seems to be the average price paid elsewhere.

Before going further in the matter, I intend waiting to see the result of the Waikato experiments, when I will return to the charge.

Last mail brought the news that Europe had in the past season produced the largest amount of beet sugar on record, viz., 1,600,000 tons, and that the cane sugar, with a Customs duty of ½d. per lb. less than the excise duty on the beet, has been driven out of the market.

I may state that Mr. J. C. Firth offered to give me a written guarantee to grow 1000 acres of beet per annum, and sell the raw sugar to a refinery, if I could get one started in Auckland capable of refining both cane- and beet-sugar. I am afraid that this will not be accomplished, as capitalists will watch with interest the result of the speculation now being tried in Fiji with cane-sugar by the Sydney Sugar Company, who are erecting a refinery there costing £100,000, and intend spending further sums on cane plantations, and the Victoria Sugar Company are about to follow suit, with even more capital. If these companies succeed, it will evidently be of little use starting a refinery in Auckland, but there is no reason why we should not have a beet-sugar company for Auckland refining its own sugar, and if the Government would offer the same bonus that they did a few years ago, viz., £10,000 for the first 100 tons of beet-sugar produced in New Zealand, and sold in the open market, I believe thoroughly that a company could be established so soon as the results of the Waikato experiments are known. That there is room for such a company you may imagine, with the imports of sugar at £525,000 per annum, and yearly increasing.

I have much pleasure in proposing a cordial vote of thanks to Dr. Curl, for his valuable paper. Seconded by Mr. J. C. Firth, and carried unanimously.

2. "On some Indications of Change in the Level of the Coast Line in the North part of the Northern Island," by S. Percy Smith. (*Transactions*, p. 398.)

3. "On Heredity," by E. A. Mackechnie.