

It happens constantly that investigators have to send outside of New Zealand to find out what is in scientific journals which should be available here.

2. *To Mr. Sidey.*] I think the establishment of the Board of Science and Industry is the best thing. Local Advisory Committees would be sufficient, just as there are local branches of the New Zealand Institute. We wish to get an assured finance, and that is one reason why we ask for £100,000. We do not want members of Parliament to get up in the House and say, "We do not think this or that research ought to have been subsidized, and therefore we shall move for a reduction in the estimates." A statutory grant would be satisfactory. I should like either £100,000 or £20,000 a year for five years. The point has been asked, How is the sum arrived at? The answer is, partly by comparison with the British and Australian amounts, and partly because it seemed to us that, considering the importance of the New Zealand industries, it was not a large sum. The treatment of coal-slack is a matter that would come within the purview of the Board, and so would iron and shale deposits, wood-alcohol, and many other matters that have been brought before the Committee. We would be to some extent relieving the Government of an expenditure in undertaking such work. I should not like to see research work on chemical lines taken out of the hands of Dr. Maclaurin or Mr. Aston, who have done excellent work. We might give them assistance to help them in certain classes of work. The testing of woods suitable for pulping for paper would come within the functions of the Board, but I doubt if our timber-supply is sufficient to justify the establishment of a pulp industry. In the first instance it might be necessary to send samples outside the country. Prospecting-work would also come within the purview of the Board.

3. *To Mr. Craigie.*] In the past the tendency has been too much to say, "We will wait and see how research turns out in the Old Country." A large number of our problems can only be investigated here. We must, of course, keep in touch with all that is being done outside, but researches carried out for us elsewhere will be of little benefit to us until we appreciate the necessity of carrying out investigations for ourselves.

4. *To Dr. A. K. Newman.*] The £100,000 ought to be expended by the Board without interference from members of Parliament. It would be applied to definite purposes.

5. *To Mr. Luke.*] I am convinced that the setting-up of the Board, with Local Advisory Committees, will extend the best interests of science throughout the Dominion. I see no better way of doing it.

6. *To the Chairman.*] Various schemes have been put forward on the manufacture of industrial alcohol from waste products. Dr. Maclaurin has reported on the subject. I believe he is right in offering no hope, as far as he has reported. But there are other sources. One of these I only heard of on Saturday: I refer to the Dominion Pressed Yeast Company, of Christchurch. In making yeast they must make alcohol. This they have to turn into vinegar before they can get a sale for it at present. Another source is flax-refuse. When the flax-leaf goes through the stripper about half the weight goes away in the scrapings off the leaf. One mill has over 50 tons of that refuse per day, and no use is made of it at present. If you squeeze it in an hydraulic press you get 60 per cent. of juice. That juice, on fermentation, averages over 3 per cent. of alcohol. The question arises, Will it pay to distil that liquid with only 3 per cent. of alcohol? In Scandinavia it pays to distil the refuse liquor from wood-pulp, or cellulose, with only 0.9 per cent. of alcohol in it, therefore with 3 per cent. it ought to pay well. It is steam-heated. The original stuff with the juice in it is too wet to burn, but after it has been squeezed it will burn, and would provide the whole of the heat they need. It would not pay a small mill to set up a distillery, but the large mill could do so. The scrapings, or vegetation as the mill people call it, must be taken at once, because fermentation begins practically the moment it leaves the stripper. Of course, the ultimate proof is the large-scale test. The company I refer to is satisfied that on a small scale the thing is excellent. What difficulties will turn up when they put down a plant only experience will show. The gum and the dye in the flax-refuse I neglect. I suppose the value of brown dye consumed in New Zealand per annum would not be worth £100 per annum in peace-time. After you burn the flax the ash would be a fertilizer of high grade. It is richer in potash than any other ash we are likely to get in quantity. The amount of ash is about  $1\frac{1}{2}$  per cent., and of that about one-third is potash.

7. *To Mr. Sidey.*] In making alcohol from wood the only process which has been a success is that in connection with the paper-making industry. The conversion of sawdust has not yet resulted in any decided economic success, though two firms are said to be manufacturing at a profit in the United States of America. I am bound to say that I see little chance of producing alcohol cheaply, unless it is obtained as a by-product. The recommendation I should make straight off is that full inquiry be made in connection with all the processes attempted in the lumber industry for utilizing wood-waste, but, so far as I know, the only method that has been successful is that in connection with the manufacture of paper from wood-pulp, in which the alcohol is obtained as a by-product. They cannot use up the sawdust in that process. The sawdust-alcohol process was supposed to be a success twenty years ago, but probably on account of the need of very careful supervision it has not proved generally remunerative.

8. *To Mr. Luke.*] In my opinion, it would not be advisable to pursue the matter of producing benzol at the coal-mines. From a ton of coal you would get 12-18 gallons of tar, containing about 1 per cent. of benzol. If all the gasworks in New Zealand recovered their benzol and toluol the amount would be small. [Witness gave particulars of the results of the distillation of coal, quoting from the *Gas Journal* for April, 1918.] In distilling coal-refuse for the sake of the oil, unless we can find a sale for the gas and for the coke it is not likely to be a commercial proposition. The Coalite Company, of Great Britain, unsuccessfully attempted to produce fuel and oils by low-temperature distillation. The financial loss was enormous. I do not think that the crude coal-oil would fetch more than 6d. per gallon even in war-time.