

# CAN MAN BE MADE IMMORTAL?

## OPINIONS OF PROFESSOR BRAILSFORD ROBERTSON.

### EXPERIMENTS DESCRIBED TO SCIENCE CONGRESS.

PERTH, Wednesday.

An arresting public lecture on "The duration of life" was delivered to-day by Professor T. Brailsford Robertson, of Adelaide, at the Congress of the Australasian Association for the Advancement of Science. There were other lectures of much interest to scientists and the public alike.

Professor Brailsford Robertson, who was introduced by the Governor (Sir William Campion) as a recognised authority on organic chemistry, said there was a fundamental cause of death, which lay, not outside ourselves, but within ourselves. It had been shown many years ago by Weismann that forms of animal life existed which were potentially immortal. These were unicellular animals, such as amoeba, or the ciliated unicellular organisms known as infusoria. Recently it had been shown that just as in the case of the unicellular colonies, so in the more varied association of cells which constituted the body of a higher animal it was the fact of their association with one another in a limited volume which condemned entire society to mortality. If individual cells were removed from the society of which they formed part or that was from the body of an animal in which they were produced as they were like unicellular animals, potentially immortal.

Professor Leo Leob, of Washington University, St. Louis, the speaker continued, had found it possible to cultivate cartilage cells by transplanting them repeatedly into young animals, and in this way had succeeded in maintaining a series of transplants of cells, all originating from those forming the first graft. This tissue had now attained an age of six years, more than double the extreme duration, and three times the average duration of life of a rat, from which the tissue was derived. It was the compulsory association of different kinds of cells composing the animal body which compelled them to cease reproducing themselves, and ultimately rendered the maintenance of life impossible for them. Experiments had been conducted upon the action of extracts prepared from the pituitary gland upon the growth of mice, which had resulted in the prolongation of life. The origin of this effect was at present quite obscure. It would be difficult, however, to over-estimate the importance of the fact that we had found a means of artificially prolonging the life of animals through the administration of a substance to them in their diet, because it showed us that the phenomenon of life duration was controllable. Recently, other—and apparently more intelligible—means of securing this end had been discovered. By giving animals in their diet a superabundance of nitric acid, manufactured from animal tissues, the effect upon life duration was even more marked than the effect of pituitary extract. Having once established some measure of control, however slight, over the phenomenon of life duration, so fundamental to the nature of life itself, we could be sure that we should achieve in the future greater control and results of increasing quantitative importance. Where it would lead us we could not tell, but in experiments of this character science was seeking information which was fundamental to the whole of medical science, and to the life of societies, nations, and individuals.

### FEDERATION AND FINANCE.

Major L. F. Giblin (Government Statistician, of Tasmania) delivered an address to the social and statistical science section on the subject of Federation and finance. He said that the proposals of the Federal Government for the terminating of the per capita payments offered temporary assistance to certain States, to give them time to adjust their financial arrangements to the new conditions, but contained no acknowledgement of the permanent nature of the financial loss the States would suffer. The Commonwealth had only to an unimportant extent exercised its powers of taxation other than in customs and excise. The bulk of its revenue was derived from this source, and the contribution was assumed to be approximately equal per head of the population throughout the Commonwealth. The taxation was therefore roughly in proportion to the population, and the distribution to the States of surplus revenue was on the same basis. Except for the special grants for a limited term to Western Australia and Tasmania, the States were therefore sharing the financial burden of Federation in proportion to their population. The dogma of financial strength in proportion to population was in full force, with only minor qualifications. Obviously this dogma had no basis in fact. It was clear that the per capita system of taxation and distribution could not be equitably with such variations of wealth as were found in Australian States. The combination of Federal direct taxation with per capita distributions to the States made an adjust-

in factor of the greatest nicety. In Australia, said the lecturer, customs and excise taxation, which was roughly on a per capita basis, made 50 per cent. of the total Federal and State taxation. Judging from general practice, this proportion was excessive. From the point of view of equitable taxation, 40 per cent. at the outside would be a fair figure. The inference from this was that when Federal taxation was lightened it was not income tax that should be cut down, but customs and excise duties. Of direct taxation, such as income tax, in 1924-25, 58 per cent. was collected by the States. When local government taxation was brought into account, it appeared that far too much was collected on the basis of local ability to pay, and too little on the general ability of the whole Commonwealth to pay. A very considerable transfer of income tax collection could safely be made from the States to the Commonwealth, accompanied by a corresponding increase of per capita payments to the States. The limit to this transfer was set by the State with the lowest income tax. Victoria collected little more than £2,000,000 in income tax in 1924-25—almost equal to the per capita payments. These payments could therefore be doubled, and Federal income tax increased by a corresponding amount—about £7,500,000. That would leave Victoria with the same revenue and no income tax to collect. In other States income tax could be reduced to about one half, without loss of revenue. The net Commonwealth revenue would not be affected, and the range of automatic adjustments between the States would be doubled, so that where a State got an advantage of £100,000 under present conditions it would get an advantage of £200,000 after this transfer of income tax collection to the Commonwealth. Alternatively, to, or concurrently with, the general increase of the per capita payments, there might be a variation between one State and another in their amounts.

### Tariff Board Reform.

Discussing "Tariff effects in Australia," Professor Mills, speaking before the social and statistical science section, said that protection was now received by a settled fiscal policy, accepted by all political parties. Primary producers had lately been restive under the burden of the tariff. They had organized to secure tariff reductions, and at the same time were claiming protection for primary products. In one of the Tariff Board's reports on agricultural implements its use of statistics was unsatisfactory. It attempted to prove that the burden of tariff to the farmer on agricultural implement per bushel of wheat was negligible. In doing that it used figures from three farms only, yielding 22, 24, and 10 bushels an acre respectively. For the 10 years, 1914 to 1924, the average wheat yield for the whole of Australia was 11.49 bushels an acre, so that the burden had been considerably understated. The figure arrived at—292d. a bushel—did not accurately represent the burden, and in any case a small burden per bushel was likely to be a serious matter for the marginal producer. That there was a certain danger to the community in the exercise of wide powers of administrative protection was not to be denied; but it was probably better, seeing that Parliament had advisedly granted those powers, that they should be exercised on the advice of the Tariff Board rather than merely on the advice of a department. Those considerations, on the whole, pointed to the desirability of having a board, but it was apparent that much improvement could be made in the methods adopted by the present board of conducting investigations into certain aspects of the tariff.

### DEBT OF THE COMMONWEALTH.

A paper on "Australia's external debt" was read by Mr. J. Smethurst. He said that at the end of June, 1926, the overseas debt of Australia was about £500,000,000. Of this £156,000,000 was classed as Federal debt, and the remainder, about £340,000,000, as State debt. The State external debt had doubled during the past 24 years, and the total debt of the States has trebled in the same time. Thus at the present rate the external State debt was doubling at the rate of four times in a century—which meant that in 100 years at this rate, it would amount to 16 times the present sum, or £5,440,000,000. The total State debt would, at the present pace, double every 16 years, over six times in 100 years, thus making the total debt of the States £5,000,000,000 in 50 years, and over £38,000,000,000 in 100 years. It could not reach those sums. These figures showed, however, how impossible it was that the present rate of borrowing could

be continued. During the past 20 years, from 1916 to 1925, the external State debt had increased by 50 per cent.—over 4½ per cent. per annum. The population was increasing at the rate of 2 per cent. per annum. Both were increasing at compound interest, so that by the time the population has doubled twice and reached 24,000,000, the debt per head would have doubled four times, and would be 16 times the present sum. Thus there was no hope of escape from the inevitable crisis by the increase of population. The need for stopping all new borrowing, even for interest payment, was obvious. At present the loan influx gives a large Federal revenue in customs duties. It was really the loan influx which maintained the Federal revenue. Another difficulty in the way of stopping London borrowing was that powerful interest in England were strongly opposed to any lessening of Australia's drawings from British lenders.

How could the catastrophe be avoided? It should be provided in the case of all future loans, whether internal or external, for new works, for conversions, for interest payments, or otherwise, that each such loan should be issued repayable as to both principal and interest within a reasonably short time, say 15 years at most for new money, by half-yearly or yearly instalments. A longer period would be necessary for loans to redeem those which would fall due from time to time. All money at present held as sinking funds should be used at once to redeem outstanding debentures or stock, and such securities redeemed should be destroyed immediately. It was advisable, and even imperative, to produce gold to the maximum in order to help to pay our external debt. The way to increase the output of gold, or butter, on anything else was to increase the reward to the producer—in other words, to reduce the cost or increase the selling price, and especially to assure the producer that the increased price would be assured over a long period. If an increased price for gold were assured in Australia for the next 20 years, the production would be stimulated in proportion to the increase. It might be multiplied fivefold.

Past experience in Australia showed that active gold mining was the most effective immigration agency of modern times. It was also a marvellous stimulus to all other forms of industry. The two substances, gold and merino wool, were the means of paying Australia's external debt, provided Australia tackled the task at once—before it was too late.

### THE FAILURE OF DAMPIER.

Professor Ernest Scott gave an address on the maritime exploration of Western Australia. The greater part of it was occupied with a study of the reasons for Dampier's failure to discover the eastern and southern coasts of Australia during his voyage in the *Roebuck* in 1699. The second part of the address related to the voyage of *Dentrecasteaux* in 1792, and was founded upon unpublished papers in the Archives Nationales, Paris. Those papers revealed that the insurrectionary spirit manifested during the French Revolution in Paris showed itself among the crews on board the two ships of this expedition. The principal officers were royalists, and refused to fly the tricolour. Others were supporters of the anti-monarchical party. Both *Dentrecasteaux* and his second in command, *Kermadec*, died in Australasian waters, and their successor, *d'Auribeau*, handed over the vessels to the Dutch in Java, rather than permit them to return to France in the service of the Republican Government.

### ORIGIN OF FAUNA.

An address on "Australian fauna" was delivered by Professor Launcelet Harrison, who said that the Australian fauna was supposed to have been derived from three main components in past time, an Apechthonian element which became established in the most ancient part of the continent—south-western Australia—in very early times; a Euronotian element, which most Australian zoologists believed to have been derived by way of the Antarctic continent (which was known to have possessed a temperate climate and flora throughout the Mesozoic and up to Miocene times)—the least altered part of which was still most prominent in south-eastern Australia and Tasmania; and a so-called Papuan element, which had poured in in more recent times from the north, and which characterized north-eastern Australia. Australia had been populated by radiation from these three components. Australia was supposed to have received fauna and flora from Africa, Madagascar, and India along the Lemurian Arc, and from Asia and the Philippines along the Micronesian and Melanesian Arcs. There was further supposed to have been a Polynesian Arc, a central Pacific land mass, which had probably almost completely disappeared by the end of the Pliocene.

### TRAINING FOR PHARMACY.

Mr. A. T. Sissons (Director of the Victoria College of Pharmacy), in an address urging attention to "The cultural side in education for pharmacy," did not recommend any drastic changes in the existing syllabus, but suggested that biological science should be added.

### THE GOLD STANDARD.

Professor D. B. Copeland, in an address on the present position of the Commonwealth Bank, said that the immediate task of the bank was to work out a satisfactory re-discount policy, and arrange for an elastic note issue that would give all the advantages of a gold standard

without gold movements. It might be expected that that task would occupy the attention of the new board, and that there was no thought at present of embarking upon an independent policy that required the exercise of open market functions. It was clear that the bank should accept the position of central bank under the gold exchange standard, and maintain exchange stability with the United Kingdom.

### STATE ENTERPRISE CRITICISED.

Professor J. B. Bridgen, of the University of Tasmania, addressed the social and statistical section on State enterprise in Australia. He said that the main types of State enterprise were those which were designed to promote private enterprise, and those intended to control it. Through these and the growing financial assistance it was receiving—from migration to marketing—agriculture was becoming the greatest State enterprise. Whereas in the United States and elsewhere land settlement, transport, and other facilities had been promoted at the risk of investors and of settlers, the Australian tendency was to concentrate the burden of risk on the State, and to perpetuate the burden of losses as part of the national debt. That form of State enterprise was open to criticism, in that it sapped individual initiative, removed the incentive for voluntary co-operation, and loaded posterity with the costs of an immediately lucrative optimism. The other class of State enterprise was a natural expansion of the first or derived from the real or supposed restriction of competition in private enterprise. The net result showed that State enterprises were not necessarily more nor less efficient than private enterprise from the point of view of the community, and that competitive enterprises were useful where competition had failed to control private undertakings. The urgent need, both as a control of expenditure and as check on the public itself, was a separate cost account for every undertaking carried on at the risk of the community, especially in development in which Australia was behaving as a company promoter selling shares to posterity.

### TEACHING OF HYGIENE.

In the sanitary science and hygiene section a discussion took place on the teaching of hygiene in the schools. Dr. Harvey Sutton (principal medical officer of schools for New South Wales) drew attention to facts, which he described as startling. Hygiene in schools, he said, should protect, correct, prevent, and create. "Safety first" teaching should be included, for as many boys of school age were killed annually in New South Wales by accidents as by infectious disease. One quarter of the schoolboys who died were killed by accident, and for every one killed 80 to 100 were injured. Curiously enough, four or five boys were killed for every girl. Males in general were shorter lived than females, and deserved special care on that account. The study of growth deserved more attention. Great variation took place in the incidence of infectious diseases. In one year 91,000 school children were absent for periods owing to those diseases; in another year the figures was only 7,000. District diseases could best be combated through the schools.

Dr. John Dale (Government Medical Officer of Health at Perth) argued that State schooling should be frankly utilitarian, and that the teaching of Nature's laws and Nature's forms was an absolute necessity.

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## UNIVERSITY RESEARCH STUDENTSHIPS.

### Mr. F. G. Holdaway Appointed.

The Council for Scientific and Industrial Research has advised the Council of the University of Adelaide that Mr. F. G. Holdaway, M.Sc. (assistant lecturer in the Department of Zoology) has been appointed to one of its travelling studentships in economic entomology. The appointment is conditional on arrangements being made by the authorities for a suitable field of research. The studentship is one of five granted for post graduate work abroad. The subjects are economic entomology, forest entomology, forest mycology, preservation of fruit (including transport), and problems connected with forest products. The holder of the studentship will be required to enter into an agreement to give the council an option to secure his services on his return to Australia for three years at not less than £400 a year, increasing by £50 to £500. The sum of £150 will be granted for travelling expenses.

### Commemoration Address.

Professor Brailsford Robertson has accepted the invitation of the Council of the University to deliver the commemoration address in December next. He has chosen for his subject "The external inheritance of man."

### Chair of Classics.

On the suggestion of Professor Darnley Naylor, the Council of the University has invited Professor T. G. Tucker, C.M.G., Litt.D. (Camb.), Hon. Litt.D. (Dublin), Emeritus Professor of Classical Philology of the University of Melbourne, to take charge of the department of classics during the absence of Professor Naylor in 1927. Professor Tucker has accepted the invitation.