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and the Commonwealth Government
1901 - 1926

GEORGE CURRIE
AND
JOHN GRAHAM

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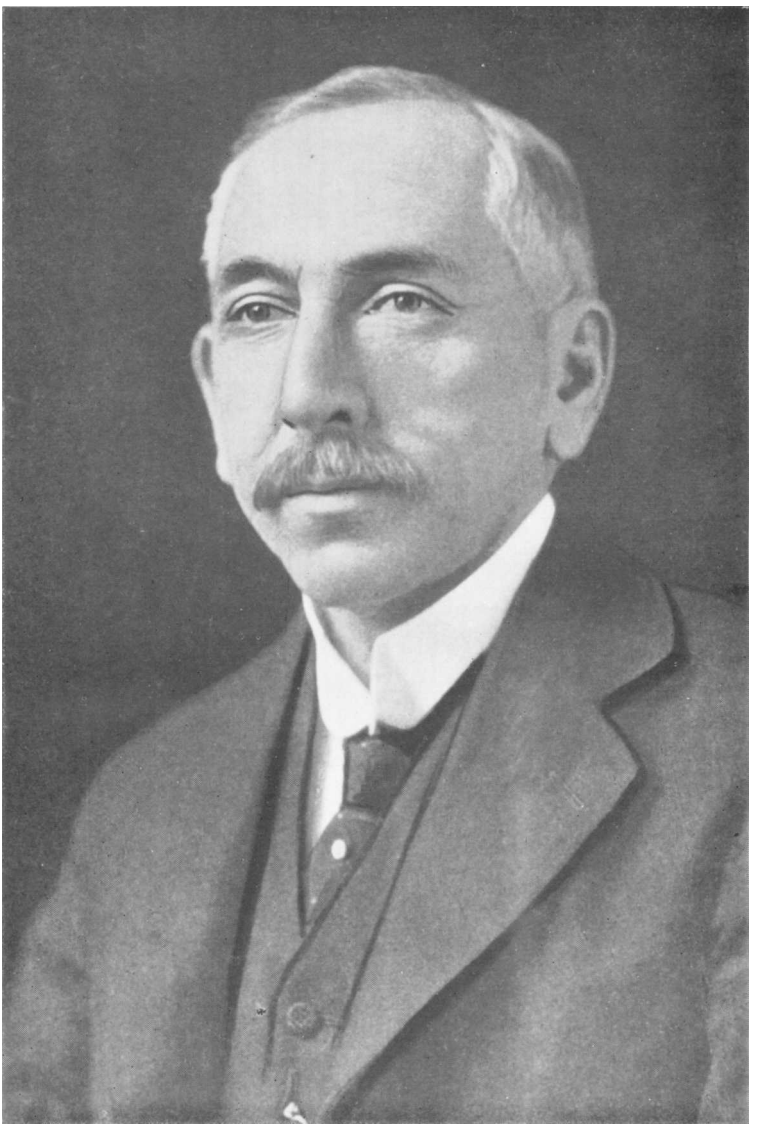

W. M. HUGHES

THE ORIGINS OF CSIRO

Science and the Commonwealth Government 1901-1926

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FOREWORD

MARCH 16TH, 1966, marked the jubilee of Commonwealth sponsored scientific research in Australia. In 1916 the Commonwealth Government set up an Advisory Council of Science and Industry. This was the culmination of an interest in scientific research which went back to the very beginning of federation and had been expressed by active attempts to bring science to the aid of agriculture.

The Prime Minister, Mr W. M. Hughes, saw clearly that the help of science was needed to develop his country in the future. Following the precedent of the British Government a year earlier, he persuaded his Government to set up a scientific research organization.

In a characteristic speech, in which he first announced Commonwealth interest in the matter, he said that science should act as a beacon to industry and guide its feet through mazes of experiments. It would 'cure the diseases of the body economic and be its striking and producing power'.

This book is an account of the developments which led up to the formation of the Advisory Council by the Hughes Government in 1916. It carries the story on to 1926, when a later Prime Minister, Mr S. M. Bruce, introduced the Bill to found the Council for Scientific and Industrial Research. In those days there were vivid contrasts in the views of scientists, politicians and men of affairs as to how science could most effectively influence the nation's future.

In a speech which preceded the introduction of the 1926 Bill, Mr Bruce said—'The Government regards this question as probably one of the greatest importance that we are faced with today. We are prepared to find the necessary financial assistance to carry it into effect'. His Government fulfilled this promise and a great scientific enterprise called the Council for Scientific and Industrial Research was launched. Its present day successor is CSIRO.

This book is not an account of scientific achievement. It is the story of a dramatic period in the history of Australia when scientists and men of vision convinced the political leaders of their day that scientific discovery could render valuable service to their developing country.

It is a record, too, of the political vicissitudes through which this grand conception passed before the leaders of the Government could bring it to practical fruition in the Acts of Parliament of 1920 and 1926.

That their faith and hope have been in a large measure fulfilled is due to their skill in designing an organization in which Australian scientists could give of their best in research. The Act of 1926 established a pattern of organization for a government research institution, masterly in conception and workable in practice. It is a model which other countries have admired and copied.

The Executive of CSIRO is grateful to Sir George Currie and to Mr John Graham for their accurate and very readable account of the period. The publication of this book is a fitting contribution to the celebration of the jubilee of national science in Australia.

Sir Frederick White, K.B.E., F.R.S.,
Chairman, CSIRO.

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THE BEGINNINGS 1901-1915

EVEN BEFORE the Federal Parliament of the Commonwealth of Australia had been established in 1901 some candidates seeking election had advocated the establishment of a Federal Department of Agriculture or a Federal Bureau of Agriculture. Such advocacy had come from, among others, Alfred Deakin, Isaac Isaacs, John Quick and W. H. Groom, member for Darling Downs, who was regarded as the father of the first Commonwealth Parliament. Groom, who was a fervent advocate of research in agriculture, died in 1901 early in the life of the first Parliament, and his son Littleton Groom, who was to be a distinguished Minister in later governments, followed him as member for the Darling Downs and followed him also in advocating Federal interest in scientific research aimed particularly at assisting agriculture. It was the son who championed the Bureau of Agriculture Bills of 1909 and 1913 which, as will be seen later, were progenitors of the Institute of Science and Industry Act of 1920.

Only six weeks after the first Federal Parliament assembled in 1901, Sir John Quick, the member for Bendigo, moved:

That in the opinion of this House a national department of agriculture and productive industries on the same lines as that of the United States of America ought to be organized and maintained in connection with the Government of the Commonwealth.

Eighteen years later Littleton Groom, during the debate on the Institute of Science and Industry Bill, recalled those signs of earlier Commonwealth interest in such matters when he said:

Sir John Quick moved that particular motion in the House in 1901 on June 28th and other Members advocated the same idea. They included the Honorable Member for Indi, now Mr Justice Isaacs. My own father advocated it on the platform before it came into the House and other Members expressed the same view. On 3 November 1904, the following motion was carried: 'That in the opinion of this House in order to promote the primary industries of Australia a Federal Department of Agriculture ought to be established at an early date'. That proposal

later on received the support of the Reid-McLean Government. The Deakin Government in 1907 prepared a Bill, and a special memorandum was drafted setting out its purposes. This memorandum was issued on 31 May 1907.[1] On 31 March 1908, at Gympie (in Queensland) the Right Honorable Andrew Fisher in his policy speech expressed the opinion that we needed an agricultural bureau for the investigation of various matters and the dissemination of information concerning them. The Bill came before the House in 1909 and again in 1913.

In the earlier period under discussion it was Groom, then Attorney-General in the Deakin Ministry, who presented by Command in 1908 his memorandum concerning the establishment of an Australian Bureau of Agriculture. This 7-page document set out (1) the objects of the Bureau, (2) the organization and work of the Departments of Agriculture in the States, (3) matters dealt with elsewhere by a Department of Agriculture with respect to which the Commonwealth has already legislated, (4) the scope of an Australian Bureau of Agriculture, and (5) the Constitutional powers of the Commonwealth to establish a Bureau of Agriculture.

Among the arguments advanced for establishing such a bureau was the one quoted in para. 7 of the document which, under the heading 'Prevention of Diseases and Pests' stated *inter alia:*

As most of the diseases and pests affecting stock and plants are found in several States it would appear that scientific research could more profitably be controlled by a central authority.

Following up his memorandum of 1908 Groom, now Minister for External Affairs in the 'fusion' government, presented to Parliament on 20 July 1909 a Bill for an Act relating to an Australian Bureau of Agriculture. Probably through pressure of other Bills this one was withdrawn, but was brought up again in precisely the same form and presented to the Senate by Senator E. D. Millen on 30 September of the same year. Parliament was prorogued before the Bill had reached its second reading so it lapsed.

Although the Bill had lapsed, Groom's interest in research in agriculture had not; later in 1909, instead of pursuing the matter through Parliament with a new Bill, his interest took another tack. As Minister for External Affairs he sent a letter to Lord Pentland, the Secretary of State for Scotland, inviting a group of noted Scottish agriculturalists to visit Australia to report on agricultural developments and opportunity.

The reputation of this Scottish Commission was well known to many because it had previously reported on agriculture in Denmark,

[1] The Australian Bureau of Agriculture. Memorandum on the Establishment of, by The Hon. L. E. Groom, M.P. This memorandum No. 184 was actually ordered to be printed 21 May 1908. For part text of memorandum see Appendix 11.

Ireland and Canada, but it is not possible to say whether the Minister sent the invitation from his personal knowledge of their earlier activities or whether some adviser suggested this step to him. In any case it is clear that Groom's special interest in agricultural development, which he inherited from his father and which he possibly regarded as a sacred trust from him, caused him to send the invitation in order to promote the ideas of his Bureau of Agriculture Bill which had so far failed to become law. He would reason no doubt that a group so eminent as the Scottish Commissioners and so knowledgeable in science could hardly fail to arouse great interest in the problems of agricultural development in Australia and would be most likely to strengthen his own case by any recommendations they might make on agricultural research.

The Scottish Commissioners, all twelve of them, were highly qualified men; most of them owned and operated farms, and most of them had considerable scientific knowledge. Six of the twelve had been on the mission to Denmark in 1904, six on the mission to Ireland in 1906 and eleven on the mission to Canada in 1908. The chairman, Sir T. Carlaw Martin, an economist and editor of a leading Scottish newspaper, had been on all three missions and, in addition, in 1903 had by invitation inquired into and reported on branches of commerce associated with agriculture in the United States of America.

The invitation was accepted and the Commissioners arrived at Fremantle, Western Australia, on 20 September 1910. They spent 118 days in Australia, visiting most parts of the country, meeting a great many leading men in other fields as well as agriculture, and above all seeing agricultural development for themselves. As they were practical men with such wide knowledge of agriculture in other lands, their statements and comments in Australia got the good hearing Groom had hoped for from public and Press alike. The significance of their visit for the purposes of this history is not only that they were invited by Groom, and that their progress and comments throughout different parts of Australia had received such wide publicity, but also that they produced a substantial report when they returned to Scotland, a report which was quoted frequently in Parliament during the debate on the 1913 Bureau of Agriculture Bill and later in the debate on the 1918-1920 Bills relating to an Institute of Science and Industry.[2]

In view of later events in which he played a leading role it is necessary to note at this point that the then acting Prime Minister, W. M. Hughes, commenting on this report in May 1911, said:

[2] The report of 303 pages entitled *Australia, its Land, Conditions and Prospects, the Observations and Experiences of the Scottish Agricultural Commission, 1901-1911*, was published by Blackwood, Edinburgh, in 1911 and sold at the modest price of 1/- a copy

The report of the Commission coincides with the opinion repeatedly expressed by the Commonwealth Government and it is in accordance with facts. Obviously joint control means ineffective, uneconomical and unsatisfactory performance. What is true of private concerns is also true of the State. While there are many matters which the States most satisfactorily carry out there are cases in which the Commonwealth can do better.[3]

One of the sections of the report to which Hughes was obviously referring at the time was reported in the press as follows:

The great amount of research and experimental work done by the States excited the surprised admiration of the Commission. It appeared to us, however, (says the report) that a considerable amount of overlapping was going on and that in general there was a want of co-ordination and co-operation; that the policy of allowing each State to attempt to attack the solution of each agricultural problem by itself was not the most economical. There are many problems which are common to the whole of Australia or to the greater part of it, and it would appear that time and money would be saved by placing some of the work of research in the hands of a Federal department. For example, every State is afflicted with various stock diseases. In Queensland it is 'tick fever' in another 'dry bible' and in another there is 'coast disease' and so on. A strong and well-equipped Federal department would seem more likely to cope with such diseases than the weaker and less well-equipped State departments. The prickly pear, again, is not a State monopoly, but may through time spread over most of the country, and here again is an argument for Federal control, which would not absorb or limit the energies of the State departments, but concern itself with a broader and a wider field.[4]

On 9 July 1913 a Bureau of Agriculture Bill exactly the same as the one of 1909 was introduced in the House of Representatives by the Prime Minister, Joseph Cook, and in the debates the report of the 'Scottish Commissioners'[5] was used freely by the Bill's supporters. In his second reading speech in September Cook spoke of the magnificent work of William Farrer who, on his farm at Lambrigg in New South Wales, had bred many improved varieties of wheat which gave spectacularly increased yields; a splendid example of the tremendous value of science to agriculture. Groom speaking to the Bill said:

We propose to establish a bureau whose primary object will be research and the scientific investigation of the diseases which affect our animal and plant life.

[3] *Argus* Melbourne 16 May 1911 p. 9.
[4] *Argus* Melbourne 11 June 1911 p. 4
[5] At a premiers' conference on 14 May 1918 W. A. Watt the acting Prime Minister said of this group 'The Scottish Commission which came here to discuss Agriculture and other problems was the best body of its kind ever to visit Australia'.

Speakers opposing the Bill in 1913 argued that the proposed bureau would overlap or even duplicate the work already being done by the State Departments of Agriculture and that it was doubtful if the Constitution permitted such a development.

Although doubt about the Constitutional powers of the Commonwealth to legislate in this field was brought up in argument, the memorandum of 1908 by Groom had dealt fully with those powers, which he believed to be adequate to meet the situation. When his memorandum had been before Parliament, although some doubts were expressed by one member with legal training, there was in fact very little serious question by members, of the validity of his arguments.

As always, extreme views were expressed by some members. The member for Capricornia, W. G. Higgs, opposing the Bill of 1913, expressed his concern about duplicating the work of the State departments, and then for generous measure condemned the Bill as 'socialistic, even communistic'. At the other extreme the member for the Riverina, F. B. S. Falkiner, a strong supporter of the Bill, commented 'so far, the State institutions have done very little for agriculture'. George Swinburne, who had been a State Minister for Agriculture in Victoria, supported the Bill and suggested there should be no real difficulty about co-operation between the States and the Commonwealth provided the Commonwealth did the research work and the States ran the advisory work. This suggestion could not have endeared him to scientific officers in the State departments any more than the statement by Falkiner, since within the limits set by available funds and staff they had done a great deal of valuable work.

One member R. Patten of Hume, speaking in favour of the Bill quoted the fine record of the Agricultural Bureau in America and hazarded the opinion that great wealth had resulted from the application of science to agriculture through the work of that bureau. He said that every million dollars spent on research returned ten millions in extra production.

The Bill was read a third time on 18 December 1913 in the Lower House and passed on to the Senate on the same day. There it was read a first time, but since Parliament was prorogued that day the Bill lapsed again and fell into the limbo of things only part forgotten.

However, reports by two Commissions kept alive the idea that the Commonwealth might play a useful role in research. One of them was the Dominions Royal Commission of 1913 which made a general investigation of the trade and commerce of the Empire and reported thereon to the Imperial Government; the other the Interstate Commission which commented, in its report of October 1915, on the

desirability of the Federal Government interesting itself in scientific research to help solve some of the problems of industry.

There were ten commissioners in the Dominions Royal Commission, six of them from the United Kingdom, one from Canada, one from Australia, one from New Zealand and one from Newfoundland. Sir Edgar Vincent was the chairman and Sir Rider Haggard, the well-known author, a prominent member. The Australian member of the Commission was Donald Campbell, of South Australia.

Although that Commission had little effect upon the train of events relating to the development of scientific research in the Commonwealth certain features of the investigation hold some interest for this narrative. While travelling in Australia in 1913 members of the Commission spoke of the need for co-operation with the Old Country in research, and in evidence taken in London in January 1914 a special study was made of possible closer relationships between the Dominions and the Colonies within the Imperial Institute in London, especially research in agriculture and mining. Campbell, expressed considerable interest in the possibility of closer association with Great Britain in scientific research and, while evidence was being given by the Director of the Imperial Institute, Campbell said:

> The idea I want to put before you is, that it might be possible if the Dominions could focus all that work into one institution similar to your own and have these institutions—your own and the Dominions' institutions co-operating—working along the same lines of investigation, carrying out the same methods of work, and being in close touch with regard to information that had been gathered on the spot; do you not think that would very largely extend the usefulness of the Imperial Institute, as well as enhance the interest and spread a knowledge of its aims in the different Dominions? That practically comes, does it not, to some system of giving very much closer cooperation? The answer was; certainly something of that kind would be extremely useful.

As a result of discussions between the commissioners and the Imperial Institute a scheme for co-ordination of work in the Dominions and the work in the Imperial Institute was submitted by the managing committee of the Imperial Institute on 24 June 1914 to the Commission under the title 'Outlines of a scheme for co-ordination of the work of the Imperial Institute with that of bodies doing similar work in the self-governing Dominions'. Nothing came of the plan, possibly because war broke out soon after it was submitted, but it did show that the general idea of centralizing research within one institution in each of the Dominions in order to co-operate the better with Great Britain had some currency at the time.

Of somewhat greater significance however, was the report of the Australian Interstate Commission in October 1915.[6] This report was written in answer to a request by the Minister for Customs, Frank G. Tudor, 'That the Commission should furnish for the information of Parliament a report of new industries which, in its opinion could with advantage, be now established in the Commonwealth'. In the course of its report to Parliament the Commission said:

The systematic application of scientific research and scientific knowledge to the development of all forms of practical industry has long been an outstanding feature of the modern industrial world, and is fostered as a matter of prime importance by the Government of Germany and other progressive industrial countries. In Australia there has been hitherto no co-ordinated effort in this direction, but the discovery of new methods of utilizing raw materials obtainable here has been left in part to the voluntary effort of enthusiasts connected with the universities or technical colleges, and, in part, to the work of private individuals or companies, who believe that they see some particular opening for new undertaking by the study of some special scientific process. Thus, e.g. we found during the Tariff investigations that work upon these lines had been done in regard to the making of tanning extract to a new process for patent leather, to the treatment of earths yielding painters' dry colours, to the manufacture of white lead, and to a few similar items. It is known too, that in our technical colleges and universities much valuable work has been done such as that, e.g. of Messrs Baker and Smith on the essential oils, tannins, and other economic products of the eucalypts and pines of Australia. At Broken Hill also, the study of the treatments of refractory ores has resulted in a striking example of the success obtainable by scientific methods. At the University of Sydney a Chair of Organic Chemistry, Pure and Applied, was founded in 1913.

But while the Commonwealth encourages industry by tariff taxation and by bounties, it has no recognized organ for the discovery of new methods of using local products or for diffusing a knowledge of scientific processes amongst our producers and manufacturers. No doubt the instrumentalities of the State Governments have done much to promote internal development on the lines indicated, but a Commonwealth department, operating upon the problems of secondary as well as of primary production, might well be constituted with a view to the systematic application of science to Australian industry. Such a bureau, so far from overlapping the existing activities of the State departments, of the universities and technical colleges, and of private investigators, would act as a clearing house of information for all of them.

[6] The Interstate Commission was established by Act of Parliament in 1912 under section 92 of the Constitution, and was concerned with the trade and commerce of the country. The Commission of three was appointed for seven years but after one period was not reappointed. The members were A. B. Piddington, a leading barrister (chairman), George Swinburne, one time Minister for Agriculture in Victoria and Sir Nicholas Lockyer former Comptroller-General of Customs.

Most of those who expressed an interest in developing scientific research under the aegis of the Commonwealth Government before the conference of 1916 were members of Parliament and members of commissions, and it appears strange that although scientific research was the subject under discussion there is little evidence that organized science had much influence on the earliest moves to establish research under Commonwealth auspices. This could of course be attributed in part to the fact that scientists in government employ and in the universities were State-oriented and partly to the fact that scientists in Australia were not yet vocal on the relation of science to government or to national development. When the British Association for the Advancement of Science met in Australia in 1914 there were, for instance, no direct suggestions from that meeting that governments should increase their support for science or that the Federal Government might take a greater interest in the part scientific research could play in national development.[7]

There was, however, a noteworthy exception to this apparent lack of interest by organized science in the possibility of scientific research being fostered by the Federal Government. In 1905 the British Science Guild had been founded in England 'to promote the application of scientific methods in social problems and public affairs' and a branch of the Guild had been formed in South Australia in 1909. It was this South Australian branch of the Guild which first suggested that an Institute for Scientific and Industrial Research should be established in Australia under Federal auspices.

In 1913 the branch set up a sub-committee to report on the best method of establishing an institute for scientific research in Australia. In that year, Dr T. Brailsford Robertson, Associate Professor of Physiological Chemistry and Pharmacology in the University of California, was visiting Adelaide and, since he was a research man familiar with American research institutions, the sub-committe asked him to draw up a scheme for Australia. This he did under the title 'Report on the scope and administration of an institute for scientific research in Australia'. His report of seventeen foolscap pages drew on his knowledge of research institutions in Europe as well as in America but primarily the institute he suggested was modelled on his experience of the United States. The report recommended an institute with seven departments:

1. Experimental vegetable physiology
2. Plant physiology
3. Fermentation

[7] It is noteworthy that David Orme Masson and David Rivett were hon. chairman and hon. secretary respectively of the local Australian Organizing Committee for the meeting. Later they were both to take leading parts in the development of research under Commonwealth auspices.

4. Functional diseases
5. The physics and chemistry of colloids
6. Physiology and psychiatry and their application to medicine and education
7. Ethnology and linguistics with special reference to the Australian and Polynesian natives.

This document dated 12 November 1913 was attached to a shorter 'report and recommendation' by the committee of the British Science Guild, South Australian branch, and referred by the branch itself to McMahon Glynn, the Minister for External Affairs, and the only Federal Minister at that time from South Australia.

When members of the committee forwarded their report they suggested that, if the Minister saw fit, they were ready to discuss the whole matter at a conference with him. No conference appears to have been called, and it is not known whether the report was passed on by the Minister to the Prime Minister or to any other Minister at that time. Certainly we can find no record of any action taken on it by the Government of that day.

Perhaps it would not have had any further consideration at all by the Federal authorities but for the fact that the joint secretaries of the branch sent a letter to the Prime Minister, W. M. Hughes, on 23 December 1915, the day after his dramatic announcement, at a University of Melbourne luncheon described later, that he was calling a conference to discuss research. This rather plaintive letter from the joint secretaries said in its last paragraph:

> In February, 1914, the enclosed reports (the branch report and the attached report by Brailsford Robertson) were handed to the then Minister, Mr Glynn, with an urgent appeal to the Government of that time to take the matter in hand. Beyond the consideration given nothing was done.

On 16 April 1916 G. F. Pearce, the acting Prime Minister, passed the letter of the joint secretaries and the copies of the report over to the newly formed Advisory Council for Science and Industry, which in turn passed them on at its meeting of 9 May to Professor David Orme Masson, Professor of Chemistry in the University of Melbourne for comment. He reported that the scheme differed radically from that of the proposed institute, especially as it contemplated a self-contained institute complete with laboratories and staff and not an organization of existing activities, and as it would limit its activities at first at any rate, to biochemistry, physiology, pathology in its application to agriculture and medicine, omitting other sciences, and mining and manufacture.

So far as can be determined that was the end of the matter, but

some of the people concerned in preparing and submitting the report retained a continuing interest in the Advisory Council of Science and Industry and the bodies which followed it. Professor Kerr Grant, of the University of Adelaide, who had been an active member of the Guild, was a member of the conference of 5 January 1916 which marked the beginning of official interest by the Commonwealth in fostering scientific research. Professor E. H. Rennie of the University of Adelaide, became a member of the first Advisory Council of Science and Industry in 1916, and Professor Brailsford Robertson himself was appointed Chief of the Division of Animal Nutrition established under the Act of 1926 which inaugurated the Council for Scientific and Industrial Research.

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HAGELTHORN AND HUGHES, 1915-1916

With the outbreak of war in 1914 and the restriction of trade that followed, coupled later with the huge losses of merchant ships and their cargoes sunk by German submarines, Great Britain was rudely awakened to the fact that she had been far too dependent on Germany for her supplies of manufactured articles, chemicals and raw materials. Optical glass, magnetos, drugs and pharmaceutical preparations, tungsten and zinc smelted from ores mined in the British Empire were among the many items processed in Germany and later imported by pre-war Britain. The British textile industry with an annual output valued at £250,000,000 was severely threatened because of an almost complete dependence on German aniline dyes, a British discovery that had been exploited by Germany.

The facts were stark. As a result of British complacency, Germany in the course of thirty or forty years had been allowed to assume world supremacy in the chemical industries. Before the outbreak of war four German firms engaged in the manufacture of dyes alone employed one thousand chemists, while at that time the whole of British industry employed only fifteen hundred chemists. Britain had now to find a solution to her own problems, not only to provide for immediate industrial and war requirements but, perhaps even more important, to prepare for the post-war era when she would again have to compete against her rivals on the world market. Science had to be organized and harnessed to industry for war and the peace to follow.

Scientific leaders had for many years warned the Government of Britain's precarious position in the chemical field, but it was not until May 1915 that the Government initiated remedial action. On the seventh of that month a deputation representing the leading British scientific societies and headed by Sir William Crookes, President of the Royal Society, waited upon the President of the Board of Education, J. A. Pease, and the President of the Board of Trade, Walter Runciman, to put a case for the greater use of science for national efficiency and progress. The deputation's plea was for:

Government assistance for scientific research for industrial purposes, the establishment of closer relations between the manufacturers and scientific workers and the establishment of a National Chemical Advisory Committee.

Both Pease and Runciman agreed with the deputation's arguments and aims, but they were able to tell the deputation that the Government was now alive to the problem, and Pease informed them that action was already well advanced for the organization of science on a far wider scale than they had suggested.[1]

A week later, on 13 May, when presenting the Board of Education's estimates in the House of Commons, Pease announced details of a scheme for the establishment of an advisory committee for scientific research. The scheme was to be an integral part of comprehensive educational reforms which were then under consideration by the Board. In his opening address to the House Pease said:

The war has brought home to us and to our notice that we have been far too dependent for very many processes and many materials upon the foreigner, and we have realized that it is essential if we are going to maintain our position in the world to make better use of our scientifically trained workers, that we must increase the number of these workers, that we must endeavour to see that industry is closely associated with our scientific workers. We must promote a proper system of encouragement of research workers, especially in our Universities. The fault in the past, no doubt, has been partly due to the remissness on the part of the Government in failing to create careers for scientific men. It has also, I think, been due partly to the Universities, which have not realized how important it is that pure science ought to be utilized with applied science, and brought into close contact with manufacturing interests. I think it was also partly due, too, to the fact that the ratepayers have been too niggardly in making provision in connection with their technical institutions and colleges.

Commenting on the speech, in the Melbourne *Argus* on 22 January 1916 Professor Orme Masson said:

The speech Mr Pease made is destined to live as probably the first example of full and intelligent appreciation by a responsible British Minister of the truths that have been patent to men of science for a generation. It is a simple but authoritative statement of essential facts, the recognition of which must be the first step to reform.

[1] The part played by Sir Frank Heath is of special interest to this history and Heath's part is described in the *British Dictionary of National Biography 1941-1950*, page 371: In the meantime the outbreak of war in 1914 had revealed the commanding position of Germany in the application of science to industry . . . Before the end of the year Heath was ready with suggestions for dealing with the situation. His memorandum was submitted to a secret committee under McCormick; and plans were completed for the creation of a permanent government organization for scientific and industrial research by the appointment of a standing Advisory Council responsible to a committee of the Privy Council.

Before Pease could put his plan into action the Liberal government gave way in June to a coalition ministry, and Arthur Henderson became President of the Board of Education. The scheme was further developed under his guidance and was finally presented as a White Paper (Cd 8005) to both Houses of Parliament on 23 July 1915 under the title 'A Scheme for the Organization and Development of Scientific and Industrial Research.' The Government's aim was to establish a permanent organization for the advancement of industrial and scientific research, which would 'operate over the kingdom as a whole with as little regard as possible to the Tweed and the Irish Channel'. To formulate this objective administration was entrusted to two groups, the first a Committee of the Privy Council and the second an Advisory Council.[2]

The Committee of the Privy Council was to have overall control and be responsible for expenditure of monies, subject to conditions prescribed by the Treasury. The Advisory Council was to be responsible, through the Committee, for the institution of specific researches, establishment of new laboratories, assistance to existing scientific institutions devoted to the study of industrial problems and the issuing and awarding of research fellowships and studentships. It was composed of men of high scientific standing and headed by an Administrative Chairman.

The White Paper stressed the importance of close co-operation with existing scientific societies, universities, technical colleges and government departments. It was also envisaged that a great deal of the research work could be undertaken by the formation of sub-committees composed of suitable experts. Money for the scheme was to be provided by special appropriation in the Board of Education's estimates and the Board was to provide both the Committee and the Council with office accommodation and clerical staff.

By an Order-in-Council issued on 28 July 1915 both the Committee of Privy Council for Scientific and Industrial Research and the Advisory Council were formally established.

Fortunately for Australia and the other Dominions the British White Paper and a memorandum which followed later were to have a profound effect on their Governments' attitude to science.

[2] Members of Committee of Privy Council were: The Lord President of the Council, The Chancellor of the Exchequer, The Secretary for Scotland, The President of the Board of Education, The President of the Board of Trade, The Chief Secretary for Ireland, Viscount Haldane of Cloan, F.R.S., Arthur Herbert Dyke Acland and Joseph Albert Pease, M.P.

Members of Advisory Council were: Sir William Symington McCormick (Chairman), Lord Rayleigh, F.R.S., George Thomas Beilby, F.R.S., William Duddell, F.R.S., Professor Bertram Hopkinson, F.R.S., Professor John Alexander McClelland, F.R.S., Professor Raphael Meldola, F.R.S. and Richard Threlfall, F.R.S.

The Committee of the Privy Council and the Advisory Council for Scientific and Industrial Research continued to operate under the Board of Education until December 1916 when they were replaced by the Department of Scientific and Industrial Research headed by Sir Frank Heath. For full text of Cd 8005 see Appendix 1.

Britain had at first neither consulted the Dominion Governments nor informed them of her intention to establish a scheme for co-ordinated scientific research, and it was not until March 1916, and then only after representations by the State Governments of New South Wales and Victoria, that the Commonwealth Government was officially notified of Britain's plans and invited to initiate similar action. By this time however Australia had formulated her own scheme for national research, and had gained, as subsequent events proved, a short-lived march on her sister Dominions.

For the price of a halfpenny the Board of Education's White Paper (Cd 8005) could be bought at authorized booksellers and at His Majesty's Stationery Office in London, but although copies may have been privately dispatched to Australia at the time of issue only two are known to have reached official sources in Australia without delay.

One of these was received by standing arrangement at the Commonwealth Parliamentary Library, but evidence suggests that this copy was not brought to government attention and had no discernible influence on future scientific developments. However, the other copy was to have a big influence. It was sent by the Agent-General for Victoria, Sir Peter McBride, on 29 July 1915 through the Victorian Premier's Office, for the information of the Minister for Education, Livingston. The importance of the document was readily perceived by Livingston, but the issues were outside his domain as Minister concerned primarily with the administration of the State's educational system, so he referred the dispatch to his colleague the Minister for Public Works, Frederick Hagelthorn, whose intense interest in scientific affairs was well known both inside and outside parliamentary circles.

Hagelthorn, although a State Minister, was national in outlook, and the receipt of the White Paper coincided with a campaign he was conducting by means of public lectures on behalf of the Governments of New South Wales and Victoria on the need for greater national efficiency. Lecturers were drawn from the Universities of Melbourne and Sydney and Professor William Alexander Osborne, Professor of Physiology at University of Melbourne, was scheduled to deliver the final lecture of the campaign at the Victorian Railways Institute Concert Hall on 6 September.

Since Osborne was to be the last speaker in the series, Hagelthorn informed him of the contents of the White Paper and the launching of the science scheme by the British Government.

In the course of his lecture therefore Osborne was able to announce, in what was probably the first public utterance about it in Australia, the plan Britain had put into effect to bring the benefits of science to her industries.

Opening his address, Osborne spoke of the reasons for the existing neglect of science. While admitting these were complex, he attributed them in the main to the unresolved conflict of science and religion, the inadequate education of British statesmen for appreciation of the value of science, and a general distrust of the expert in the British mind.

Speaking of the appreciation and application of science in Germany, of which he had first-hand knowledge, having spent two years and a half in that country before the war, Osborne went on to give details of the British science scheme and concluded by saying:

We are witnessing, I veritably believe, a mighty awakening in England as to the value of science in all its aspects of citizenship—the effects on production, on defence, on health and on morality. If we cannot be in the van of this great movement, let us not at least be found blundering in the rear.

Lectures could reach only a limited audience, so to give his message wider circulation, Hagelthorn had the lectures published as a pamphlet. In an introduction Hagelthorn set out his own idealistic hopes for industry, science and education—ideals that were never confined by State boundaries and were paramount throughout his parliamentary career. These same ideals were to cause him to try to establish scientific research on a national basis in Australia. Hagelthorn's introduction read in part:

We have a strong desire that our Australian men and women shall take their places, and foremost places too, in carrying on some of the world's most important work, and that they shall be content with nothing less. It is gratifying to us to see 'Made in Australia' stamped on articles we use in our daily life, but it would be much more gratifying to know that other countries would also appreciate that hallmark of our progress. But we will never attain that result until we increase our efficiency as individuals, and as a nation. To carry out any effective work in the direction indicated requires a complete and real co-ordination and indeed, the further development of all parts of our educational system, until it satisfies conclusively the industrial and other needs of our people. And in the forefront must be a better organization and development of our methods of production, both in regard to the primary and secondary products. The securing of a people's greater national efficiency is a national movement. It is not a movement for one party or one section of the people. It is a movement which stands far above any party feelings, and we will not be really successful until we have the combined efforts of a whole people.

Our agricultural development, and the development of our primary and secondary products, must proceed apace. The university professor, the captain of industry, the man of commerce, the labor leader, the

employer and the employee, all must join hands in the one case, if we are to secure a really efficient and really happy Commonwealth.

The thanks and appreciation of the Government, I am sure, are due to the Universities of Sydney and Melbourne for their active cooperation with us in this movement, for never in our history have we more urgently needed the help and guidance of our Universities to assist us to secure a greater measure of national efficiency.

In conclusion, may I say that this publication is issued in the hope that this campaign to secure greater national efficiency will mark the beginning of a new industrial era and the initiation of a new epoch in our national life.[3]

On completion of the lecture series Hagelthorn consulted Professor Osborne and Dr S. S. Cameron, Director of Agriculture for Victoria, a personal friend, on the possible application of the British scientific scheme to Australia. As a result of these discussions Hagelthorn conferred with Livingston as the recipient of the original dispatch, seeking to enlist his support for an approach to the British authorities. Support was readily forthcoming from Livingston and in mid-September Hagelthorn wrote to the Victorian Premier, Sir Alexander Peacock, proposing in somewhat cautious terms that the State Governor, Sir Arthur Stanley, be authorized to submit a dispatch to the British Government suggesting the extension of the British scheme for the organization and development of scientific and industrial research to the Dominions, so that Victoria might also benefit. He stressed that if such a scheme was necessary for Britain it was equally so for Australia, and that the prosperity of Victoria depended largely on the scientific development of her primary and secondary industries.

Before acquiescing in this suggestion the Premier had the matter discussed by Cabinet on 20 September 1915, and called upon both Hagelthorn and Livingston to explain details of the British scheme and its possible application to Victoria. Hagelthorn appears to have acted as spokesman in the ensuing discussion. After elaborating on Britain's recognition of the need for applying science to industry he stressed the necessity for all other parts of the British Empire to give the matter serious consideration. To exemplify the benefits that might accrue Hagelthorn quoted the sheep-breeding experiments being conducted as a co-operative research project by the Victorian Department of Agriculture and Cambridge University with the object of producing a 'general purpose' sheep suitable for both mutton and fine-wool production. The Cabinet gave immediate approval, and that afternoon Hagelthorn wrote, under cover of the Premier's signature, to Sir John Madden, Chancellor of the University of Melbourne, enclosing copies of the British White Paper and his (Hagel-

[3] *National Efficiency* issued under the authority of the Hon. F. W. Hagelthorn, Minister for Public Works. Victorian Railways Printing Branch, Sept. 1915.

thorn's) letter to the Premier. The Chancellor was asked to bring both the letter and its contents to the immediate attention of the University Council. It was emphasized that it was not thought necessary to enter into specific details of the scheme, and that the only question for the present was whether the Governor could be informed of the Council's concurrence with the Government's intended approach.

Why Hagelthorn asked for university sanction is uncertain, but undoubtedly both he and the Cabinet realized the value of academic backing for the proposals and saw that in the event of their being accepted the university would in any case be an integral part of scientific co-operation. Through his acquaintance with Sir Arthur Stanley, with whom he dined regularly each Sunday to discuss affairs of State, Hagelthorn knew of the Governor's close association with several of the senior professors of the University of Melbourne more especially with Masson, so he may well have reasoned that the Governor, before sending a dispatch of a scientific nature, would inquire whether university support had been enlisted.

As a man of clear mind, quick decision and spontaneity of action, Hagelthorn abhorred delay to the point of impatience, a trait which on occasion had incurred the displeasure of his fellow members of the Legislative Council the conservative and dignified Upper House of the Victorian Parliament.[4] Characteristically he had the communication to the Chancellor delivered by hand to enable it to be tabled at a meeting of the University Council that evening. At the meeting the subject of the Premier's communication was discussed at length, and on the motion of the Chancellor it was decided to form a committee to draft a letter to be sent to the British authorities through the Premier concurring with the proposed extension of the British scheme and offering suggestions as to how this might be done. The committee consisted of the Vice Chancellor, Professor John Henry MacFarland; the President of the Professorial Board, Professor Masson; the Dean of the Faculty of Medicine, Professor Sir Harry Allen; and the Dean of the Faculty of Science, Professor Baldwin Spencer.

The University Council, by appointing a committee of four of the most celebrated professors in Australia, recognized the importance of the implications of the communication and the possibilities the British science scheme presented for adaptation to Australian needs. Another notable feature of the membership of this committee is that it marked Professor Orme Masson's entry into the discussion of Commonwealth-sponsored scientific research.

[4] One of his unorthodox methods to hasten the passing of legislation was to move that the second reading of a Bill be made 'an order of the day for later in the day'.

On the following day, 21 September 1915, the daily newspapers announced to the Australian public the story of the British scheme for scientific research and the news that the Victorian Government intended to apply for extension of the scheme to include the overseas Dominions. The deliberations of the University Council meeting were also reported including a comment by Professor Masson that:

> scientific chemists in Great Britain had been screeching for years for some such movement as was suggested, but they might just as well have given utterance to their words in the centre of the Arctic continent.

Whatever views the Press may have entertained regarding the possible implications of the State Government's extension proposals for Australian scientific research they did not disclose them, so, with speculation absent, little notice of the announcement was taken by the general public.

As an interim measure Hagelthorn wrote on 29 September 1915 to Sir Peter McBride, acknowledging the receipt of his dispatch to Livingston and informing him of the course of action to be pursued by the State Government. By this time he was waiting impatiently for the university's reply to his letter so, knowing of the general approval by the University as reported in the Press, and knowing also that the University Committee was delaying its reply by entering into details from which it had been specifically asked to refrain, he wrote again to the Premier on 1 October 1915 asking that the Governor be authorized to transmit the dispatch to the British authorities. Although familiar with Hagelthorn's impetuosity, Peacock acted immediately and wrote on 4 October 1915 to the Governor enclosing Hagelthorn's dispatch for transmission to the Secretary of State for the Colonies. Peacock added the assurance that both the State Government and University of Melbourne would render every possible assistance should extension of the British scheme be found practicable. Ironically the university's reply was forthcoming next day but fortunately it not only endorsed the State Government's action in associating itself with the British scheme but recommended that Australia should establish a similar scheme on its own account. The university suggested that this could be achieved by the formation in each Australian State of a government committee, assisted by a Scientific Advisory Council, which in turn would be responsible for the institution of investigations through special scientific sub-committees, and suggested also that a Federal Council with Federal Government recognition should be responsible for the co-ordination of all activities.

In support of this recommendation for a specifically Australian scheme it was emphasized that a scheme with headquarters in Lon-

don would not be in a position to solve specifically Australian problems. Many of these were climatic in origin, and a scheme providing for local investigations should clearly lead to more practical results. Typical instances were then given of important problems that called for scientific investigation, including recovery of lanoline and potash, salts from the suint thrown away in wool scouring, cultivation of beet sugar, development of fisheries, improvement of gold recovery and other metallurgical problems, extraction of valuable oils and resins from native plants, afforestation, utilization of native timbers, and systematic investigation of pests and diseases affecting stock and crops in Australia.

The letter from the University Council contained the recommendations of its special committee, the discussions of which were informal and not recorded, and this letter, together with the British White Paper were destined to be the two basic documents on which Commonwealth government-sponsored scientific research was founded.

October of that year was to prove an eventful month for Australian science. The Victorian Premier himself unwittingly started proceedings by referring the university's reply to Hagelthorn, who was so impressed that he immediately consulted Professor Osborne as to the practicability of establishing such a scheme. The discussions between these two men led them to the conclusion it would not be possible to organize an Australia-wide scheme on a State by State basis and that it would need involvement, or indeed direct sponsorship, by the Commonwealth Government if it were to succeed.

Having reached this conclusion, they were confronted with the dual problem of how to induce the Commonwealth Government to acknowledge the need for a national scheme for scientific research, and to accept responsibility for its establishment. Hagelthorn believed that any representations he himself might make would have little chance of success, and he knew protocol forbade his own State Government, even in the event of his obtaining its support, from making official overtures to the Commonwealth Government on an issue of this nature without prior consultation with the other States. This of necessity would be the sort of long-winded affair for which he had no patience. After a great deal of discussion Hagelthorn and Osborne conceived a three-point plan of approach:

First, the States must be made to realize the benefits which might accrue to them by an extension of the British plan, with the reasoning that if a sufficient number of them made application to the Imperial authorities they would not only assist the Victorian proposals for the extension of the scheme to the Dominions but also might draw the Commonwealth Government into the arena, either through these approaches or by direct communication from Britain with the Commonwealth authorities.

Second, public opinion had to be aroused by personal approaches, public lectures and newspaper publicity in sufficient quantity and quality to make an impact on Commonwealth political leaders.
Third, Hagelthorn, when suitable opportunity offered, would make personal representations to the Commonwealth Attorney-General, W. M. Hughes, who seemed likely soon to become Prime Minister. (It was freely mooted at the time that Andrew Fisher would step down from the Prime Ministership in favour of Hughes and assume the post of High Commissioner for Australia in London, a position then held by Sir George Reid.)

Although Hagelthorn and Osborne were so closely associated with the earliest discussions about scientific research in Australia they never suggested a detailed plan of investigations to be undertaken nor did they put forward any scheme by which scientific research could be organized and operated in Australia. Osborne had general ideas, but no specific plan. Hagelthorn on the other hand realized that there was a limit to the extent to which he could venture into what he hoped would be a Federal affair and preferred not to be associated with organizational details.

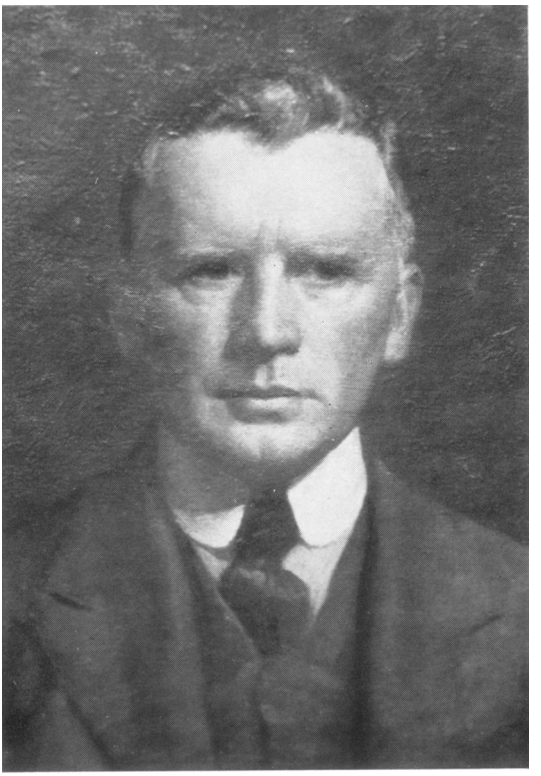
As a State Minister, Hagelthorn would have been aware of the powers reserved to the States by the Constitution of the Australian Commonwealth. It is not known whether he sought advice about the legality or otherwise of the Commonwealth entering the field of scientific research, especially in view of the fact that there was no expressed power in the Constitution enabling it to do so; nor does he appear to have been unduly perturbed by the fact that the Commonwealth would enter a field that could have been developed fully as a function of the States, in view of the powers reserved to them in relation to agriculture, artesian waters, fisheries, forests, minerals and education.

Some twelve months later, after the Commonwealth Government had instituted a national scheme for scientific research under its own authority, Hagelthorn was to have second thoughts on the wisdom of allowing the Commonwealth to have total control of the scheme's operations.[5] Although still of the opinion that the scheme should primarily be a Commonwealth responsibility, he nevertheless considered that the States should have some measure of control to provide for their own particular scientific requirements. To achieve this control, he believed that the States, in conjunction with the Commonwealth, should contribute proportionately towards the cost

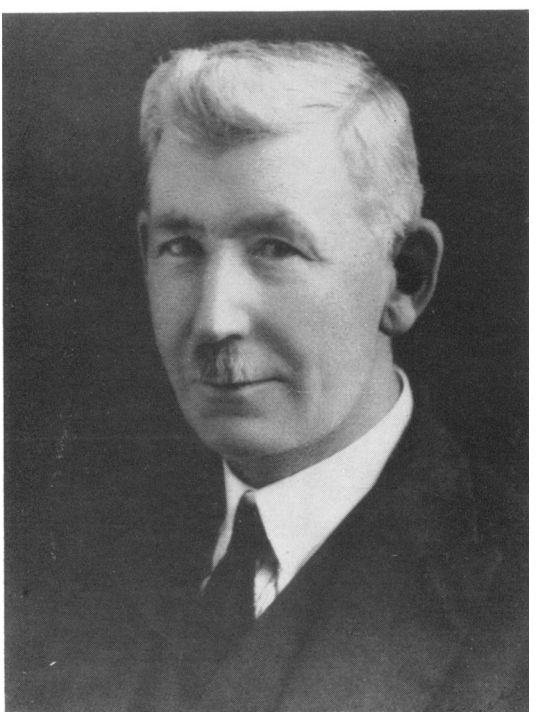
[5] At the time Hagelthorn was resisting the endeavours of W. A. Holman, the Premier of New South Wales, to establish a State-operated science scheme (an Institute of Industrial and Social Research) this, together with his position on the Australian Wheat Board, a joint Commonwealth and States venture, may partly explain his change of attitude.

L. E GROOM

G. F. PEARCE



W. A. OSBORNE



F. W. HAGELTHORN

of the upkeep of the scheme and that all financial provisions and allocations should be under control of a committee composed of the State Premiers and chaired by the Prime Minister. Nothing was to come of this proposal for joint Commonwealth-State control, and the Commonwealth remained the sole controlling authority for national scientific research in Australia.[6]

Although the University of Melbourne was to be used as a main element in the Hagelthorn-Osborne plan, the University Council and Professorial Board were never officially consulted and were forced to assume the role of spectators while awaiting an opportunity to take an active part. Their patronage was certainly required, but not their further advice and assistance. Why this should be so may be directly attributed to Osborne, who was at variance with some of his more senior colleagues in that he considered the science taught at the University of Melbourne, except at the Engineering School, gave scant heed to the needs of industry, primary or secondary. Whether Hagelthorn shared this view is unknown, but in any case he was wary of university politics and left university negotiations entirely to Osborne.

As a first step towards bringing his plan into operation, Hagelthorn wrote early in October to Holman, the Premier of New South Wales, informing him of the Victorian recommendations for the extension of the British scientific scheme to Australia and inviting him to make similar representations to Great Britain and, as the Premier of the senior State, to issue invitations to the other Premiers to do likewise—a strategy Hagelthorn had previously successfully employed to avoid the impression of Victorian autocracy. He was careful not to allude to his plans for Commonwealth participation in research, preferring for the present to avoid the possibility of State wrangling and wishing not to implicate either himself or his Government in what he knew would be a contentious subject.

It cannot be determined from existing records whether Holman did write to the Premiers of the other States or what their attitudes might have been, but New South Wales itself did accept the proposal and Hagelthorn may well have felt satisfied that the submissions made by the two premier States were adequate to his purpose.

Holman followed the Victorian pattern and, after obtaining both Ministerial and university approval, on 4 November, asked the State Governor to transmit a memorandum to the Secretary of State for the Colonies in support of the Victorian application for the extension of the British scheme to the Dominions.

[6] He was to inform a deputation from the Advisory Council of Science and Industry on 21 September 1916 that he intended to take the matter up with the Prime Minister. It is not known whether he did so.

Hagelthorn realized that many months must elapse before the outcome of these approaches would be known in Australia and proceeded meanwhile with the other stages of his plan. Although he could not expect to receive official sanction from the Victorian Government to pursue his plans his intentions were well known, and he was able privately to enlist the active support of many of his parliamentary colleagues, including his former schoolteacher, and firm friend, the Premier, Sir Alexander Peacock. Sir Arthur Stanley, the Governor, a man of great influence, was another to fall in with Hagelthorn's views, and his services were enlisted to speak in support of the movement at a demonstration Osborne gave at the University of Melbourne on 15 October 1915 when he showed by means of simple experiments the practical applications of science to industry. This demonstration was deliberately chosen in preference to a conventional lecture, as politicians were the people to be influenced and Hagelthorn, as a politician, reasoned that actions spoke louder than words and seeing was believing.

The invitations to the demonstration were issued by Hagelthorn, and the lecture room was filled with a distinguished audience which included Sir Arthur Stanley, Sir Alexander Peacock, the Chief Secretary John Murray, the Director of Education, members of the University Council, the Press, and many political and business men.

To gain the audience's immediate attention Professor Osborne resorted to scientific showmanship. He produced a heart dissected out of a newly dead rabbit and, by passing a saline solution through it at a given temperature, caused the organ to pulsate. This was followed by a similar experiment on the heart of a frog. The remainder of the demonstration was more germane to the subject, being devoted mainly to experiments determining the nutritive values of food. Despite the diversity of the experiments the audience, according to one Press account, was left with the impression that the scientist could render valuable aid to the farmer and producer if given the opportunity, this being precisely what the Minister and Osborne had intended.

Hagelthorn, in a short speech of thanks to Osborne, said that not only did the community need science, but that science now had an opportunity to get closer to the community and, after a brief reference to Australian agriculture, his favourite theme, Hagelthorn called upon the Governor to speak.

Sir Arthur Stanley had been well briefed and, after a short preamble on the excellence of the demonstration, said that:

> in war time they were called upon to mobilize first of all the country's manpower, but, as had been urged by Mr Hagelthorn, it was necessary also to mobilize the scientific power of the nation. They wanted to bring

that mass of power which was lying inert to some extent to the assistance of the nation and the Empire. They had throughout the Empire an inert mass of power which was invaluable and it had to be made available.

This statement was applauded and, after reference to overseas freight costs and the need for Australia to export primary products and raw materials in a refined state, Sir Arthur Stanley added that:

they would have to depend less upon the assistance of older countries and look to their own development. It assuredly would not be easy in the future to continue along the same lines as in the past. The change, however, must be gradual and they would have to call in the assistance of the men of science and mobilize science so that change could be brought about.

No direct suggestion was made as to whose duty it would be to mobilize science, but by inference it was clear that it should be that of the Commonwealth Government.

The Press gave prominence to the demonstration; actions had indeed spoken louder than words and, somewhat to Hagelthorn's dismay, the biological experiments were featured at the expense of the speeches. One newspaper headlined their article 'Dead Hearts Beat', while another reported that at the sight of the rabbit's pulsating heart 'Mr Murray seriously considered becoming a vegetarian, as for one horrid moment he thought this particularly lively heart had been abstracted from the animal he had enjoyed for lunch!' The message to the general public had been partly lost and the demonstrations may well have been further evidence to support a widespread image of scientists as crackpots and professors as unpractical. But public opinion was no longer quite so important for furthering Hagelthorn's plans since he had gained powerful backing for the idea that science should be more extensively used in Australia. He had the support of the Universities of Sydney and Melbourne, the State Governments of Victoria and New South Wales, the Governor of Victoria, and the Victorian Department of Agriculture. Now that he felt confident of the backing of these institutions and people, even if they were not all aware of his plan that the Commowealth Government might play a leading part in the scheme, Hagelthorn felt that the time was opportune for an approach to the Commonwealth Attorney-General, Hughes.

The wartime Wheat Pool was to provide him with abundant opportunity for meeting Hughes and, what was equally important, the opportunity for frequent meetings with the Ministers for Agriculture of New South Wales, South Australia and Western Australia. During the protracted negotiations leading to the establishment of

the Wheat Pool he took every opportunity to further his science proposals. The very concept of the Wheat Pool, in essence a Federal organization, on which Hagelthorn was to have such a major influence, and the opportunities it gave him to plead his case for national scientific research with Hughes and the State Ministers for Agriculture make it necessary to trace the circumstances surrounding the Wheat Pool's establishment and form of organization.

Much has been written on the wartime Wheat Pool including an authoritative account by Professor Ernest Scott in his *Australia During the War,* a volume of the Australian Official War History, but little has been told of the significant contributions made by Hagelthorn to the establishment of the scheme or the influence his work on the scheme had on his thinking on federal lines.

In the winter months of 1915 it became clear that insufficient shipping would be available to transport an expected record-breaking wheat harvest to the British market. The situation was further aggravated by the financial plight of the farmers, who had experienced a severe drought the previous year and many of whom had to rely on State government assistance to plant the 1915-16 crop.

Concern about these matters was expressed by the wheat-growing States to the Commonwealth Government and Hughes plunged headlong into leadership on the issues involved. On 19 July 1915 he announced that an understanding had been reached with the States that the Commonwealth would accept responsibility for the provision of shipping for the coming harvest. In actual fact no such arrangement had been made, but before the States could find voice Hughes on 24 July launched a further bombshell by announcing in the Press that he had completed negotiations with the shipping firms of Gibbs Bright & Co., and Elder Smith & Co. to act as sole agents for the chartering of ships.

As the member for North Western Province, an area which encompassed one of the major wheat-growing areas of Victoria, and because of his own financial interests, Hagelthorn in conjunction with W. Hutchinson, the Victorian Minister for Agriculture, on reading Hughes's startling announcement, conferred immediately with Peacock. The three agreed that the provision of shipping should be left largely in the hands of the Commonwealth authorities but that the question of Commonwealth control of the disposal of wheat together with expected difficulties associated with the harvesting and marketing of wheat should be the subject of discussion by the Ministers for Agriculture of the wheat-growing States. This viewpoint was expressed in a letter written by Hagelthorn, on behalf of Peacock, to Holman, Premier of New South Wales, who was invited to convene the suggested conference. Holman readily accepted the

proposal and made arrangements for the conference to be held in Melbourne, then the seat of Federal Government, on 13 August 1915.

The Victorian Premier's action in communicating with Holman, and the action proposed, were endorsed by the Victorian State Parliament on 26 July, but so alarmed were members by the speed of developments and the lack of communication from Hughes that Hagelthorn was asked to wait upon him to ascertain the Commonwealth's precise intentions. At the ensuing interview on 3 August 1915 Hughes defended the Commonwealth's action, saying that while freight rates were ever increasing, wheat prices were fluctuating and seemed likely to fall. To secure freight at a reasonable cost, he pointed out, it was clearly desirable to have but one agency.

Hagelthorn did not differ from Hughes on the objective to be reached but only on the means. While agreeing that the Commonwealth should secure the vessels, Hagelthorn remained sceptical of the wisdom of placing the exclusive chartering rights in the hands of only two shipping companies. He feared that the interests of the producers had not been adequately safeguarded in that the merchants who had lifelong experience of arranging for the export of wheat must know more of the intricacies of the task than the two shipping companies who were now to relieve them of these duties. Hagelthorn wanted to know also who was to allocate the shipping between the wheat-exporting States; as it stood, the Commonwealth Government had full control.

At the conference of Ministers for Agriculture in August (which was attended also by Hughes) it was evident immediately that the intervention of the Commonwealth in chartering freight was not desired. After three days of discussion the meeting finally agreed that the chartering arrangements with Gibbs Bright & Co. and Elder Smith & Co. should stand, but instead of the Commonwealth assuming authority for the allotment of ships this should be left to the jurisdiction of the Ministers for Agriculture of the wheat-growing States of New South Wales, Victoria, South Australia and Western Australia. The allotment of freight between States and the important question of marketing were not decided but were left to be discussed further at a conference provisionally arranged for the last week of October.

As early as June 1915 Hagelthorn had been privately investigating the possibility of establishing a State-operated wheat pool to control marketing and finance, but the conference of Ministers for Agriculture suggested to him the idea that a wheat pool might be operated on a Federal instead of a State basis.

For advice on such a scheme Hagelthorn consulted W. L. Baillieu M.L.C., a director of several large companies, and after they had

obtained information from banks, shipping agents and exporters, they prepared a scheme to be Victoria's contribution to the agenda of the meeting of Ministers for Agriculture convened by Hughes, which opened on 29 October 1915. The Victorian scheme at its first presentation did not gain a single supporter from the other States and was regarded as impracticable by the Ministers for Agriculture, by the State Premiers who were meeting concurrently, and by Hughes himself. South Australia and New South Wales both produced schemes of their own, but they were likewise rejected. Then, as Hagelthorn was to state later 'because there was nothing better on offer Hughes reverted to the Victorian scheme and strongly advocated it'. It survived a fire of criticism and keen investigation and was finally adopted by the conference as the basis of the final scheme subsequently drawn up by the Ministers for Agriculture.

To give effect to the scheme an Australian Wheat Board was established; Hughes, now Prime Minister, was appointed chairman. Hagelthorn, now Victorian Minister for Agriculture, was appointed vice-chairman and, since the Prime Minister could but rarely chair the frequent meetings of the Board, Hagelthorn's influence as vice-chairman was so much the greater. The Ministers for Agriculture for New South Wales, South Australia and Western Australia were the other members of the Board.

An article in Melbourne *Punch* of the period described Hagelthorn's influence in the Wheat Board in the following terms:

> He controls the wheat harvest by reason of the authority which Hughes has shifted from his own shoulders to the shoulders of Hagelthorn. Hughes is a quick thinker, and he never thought more quickly than when he made Hagelthorn the wheat dictator. He brought to the overlordship of the Commonwealth all the organization of the States. Had Hughes tried to administer the wheat scheme he would have had to make a complete and new organization to do so. By passing authority to Hagelthorn the organization is ready to hand, and here is the strangest part of the business—two great departments of the State—Agriculture and Railways—are for the purpose of the wheat scheme brought under the overlordship of the Commonwealth because of the power which the Vice-Chairman of the Australian Wheat Board carries with him as Minister for Agriculture.

Despite numerous difficulties including a chronic shortage of shipping, wharf stoppages, the depredations of mice and weevils, and some hostility from certain sections of the growers, the Wheat Pool was an almost unqualified success. In its six years of operation the Wheat Board handled 636,298,507 bushels realizing an average price to the producer of 5s. 5.53d a bushel.

Notwithstanding his major involvement in the complex issues and

incessant negotiations which were a feature of the establishment of the Wheat Pool, Hagelthorn never lost sight of his goal of research on a national basis and used every opportunity to preach the gospel of science. In Hughes he found a receptive although sometimes conveniently defective ear.

Hughes already had acquired a deep respect for the value of scientific research in industry. Earlier, in the office of Attorney-General, he had been the leader in a fight to free Australian companies dealing in metals from German influence—an influence which was world-wide and which Hughes well knew had been acquired not only by business acumen but also by the skilful application of the results of scientific research to the treatment of ores. No one realized more than he that, when the war ended, Australia would again be competing against countries with markedly superior industrial methods. The war had highlighted Australia's infant manufacturing industries and he believed it was essential that they be fostered and developed, and that scientific technology be applied in industry; to Hughes, Hagelthorn's science proposals presented a means to this end.

The British scientific scheme and the action taken by Victoria in seeking its extension to the Dominions was of intense interest to Hughes. Although favourably inclined towards national research he was reluctant to take the initiative at a time when he was facing an avalanche of criticism over his intervention without prior discussion in chartering ships for the wheat harvest. Not being prepared to accept further criticism on an issue, which, even with Hagelthorn's support, could provoke an outcry from the States about Federal intervention, he adopted a wait-and-see attitude. It was left to Hagelthorn to clear the path of possible opposition by the States, and to do this he knew that he had to gain the support of the State Ministers for Agriculture. It was in the Departments of Agriculture that all agricultural research in Australia was then carried out.

During frequent discussions with the State Ministers throughout November and December 1915 on the wheat pool scheme Hagelthorn pressed for co-ordinated agricultural research throughout Australia with the valid argument, which had been reiterated before by the Scottish Commissioners amongst others, that such a course would avoid duplication of effort on problems that were nation-wide. Hagelthorn's task had been materially assisted by his appointment in November as Minister for Agriculture. Before this he had been Minister for Public Works since 1913, but had progressively moved into agricultural affairs, which were more in keeping with his background and experience.

Events moved so rapidly that by 16 December, which marked the successful completion of details associated with the establishment of

the Wheat Pool, Hagelthorn could inform Hughes that agreement had been reached with the Ministers for Agriculture representing the wheat-growing States on the need to establish a national scheme for agricultural research.

The evidence to substantiate this statement is based upon an announcement given by Hagelthorn to the Press which appeared in both the Melbourne *Age* and the *Argus* on 21 December 1915. Both newspaper accounts are substantially the same but, in the absence of other evidence, both are quoted in part here because of the importance of the decision in relation to developments which occurred in 1918, when the then Ministers for Agriculture strongly opposed the Commonwealth-sponsored scheme for scientific research.

In the *Argus* of 21 December 1915 the statement was as follows:

SCIENCE AND INDUSTRY

An Empire Movement

For some time past the various States' Ministries have been giving attention to the movement in Great Britain which is aimed at bringing about a wider application of science to industry. . . .

The Minister for Agriculture (Mr Hagelthorn) said yesterday that in Great Britain it was recognised that the application of science to the activities of the people was much more comprehensive in Germany than in Great Britain, and that the problem of effecting a wider application would have to be solved after the war. Thus in order to retain and extend the trade it would be necessary to apply to some extent the methods which Germany had adopted with success. The importance of the proposition would be impressed upon Mr Hughes. . . . The Ministers for Agriculture of the different States recognised that a number of questions could be settled easier and research work done more effectively by joint action than by each State working separately. That understanding had been arrived at informally as a result of Ministerial conferences. For instance it was recognised that the question of propagating new varieties of wheat did not affect Victoria only but all the States. The Prime Minister was taking a lively interest in the co-ordination of effort, and he would be urged to do everything possible to develop the agricultural resources of Australia.

The *Age* of 21 December put the case in the following words:

AGRICULTURAL DEVELOPMENT

States to co-ordinate a National Policy

A national policy of agricultural development is in process of being evolved by the Ministers for Agriculture for the various States. The announcement was made yesterday by the Minister for Agriculture for Victoria who stated that the Ministers had given the matter considerable attention of late in the conferences they have held regarding the wheat scheme. . . .

The Minister intends tomorrow to make a full exposition of the scheme

for the standardisation of Australia's agricultural effort at a luncheon to be tendered by the University Council for the Prime Minister at which the Premiers of Victoria, New South Wales and South Australia will be present. . . . Mr Hagelthorn's announcement will be of more than ordinary interest, covering as it does the decisions which the Ministers for Agriculture of all the States have arrived at after considerable study of the situation arising out of the war and the lessons which they have assimilated from facts made public as to the organization of Germany's power of production from a food point of view. . . . Already Mr Hughes has exhibited a lively interest in the proposals for the co-ordination of Australia's agricultural effort on these lines, and there is every prospect that he will be willing to undertake the commission which it is sought to entrust him with.

To obtain this decision from the Ministers, Hagelthorn had reiterated the lessons learnt from Germany about the application of science to industry, and the awakening of Great Britain to the need for scientific research for national well-being. As tantalizing bait on the value of co-operative research the sheep-breeding experiments were quoted, and also the success obtained by the propagation of new varieties of wheat. Co-operative bulk handling of grain was another example of successful co-operation, but it was the buoyant hopes held by the Ministers for the success of the Wheat Pool that clinched the issue with them.

When he learned that the State Ministers had agreed on the need for a national scheme Hughes immediately took up the challenge. He agreed to discuss with Professor Osborne, whose praises had been often sung by Hagelthorn, technical details of a plan for national research, embracing both secondary and primary industries.

Osborne was already acquainted with Hughes, both being members of the Wallaby Club, the objects of which were the 'pursuit of health and recreation, by means of walks, excursions and social intercourse'. While the talk appealed to Hughes, the walk did not and his attendances at outings had become rare events.

The meeting arranged by Hagelthorn resulted in a clash of ideas and personalities. Describing Hughes's attitude towards his ideas for national research Professor Osborne wrote in 1964:

I found Mr Hughes had opinions somewhat different from my own. He appeared to me to believe that science had already in hand an immense store of knowledge ready for instant application. All that was necessary for the farmer, pastoralist and manufacturer was 'to dip his pannikin into the reservoir of knowledge and obtain abundant help'. I stressed again and again the view that a Government body to be effective must conduct research on a multitude of problems which so far had not been investigated. My insistance on specially directed researches was

not welcome to Mr Hughes who subjected me in consequence to some acidulous criticism.[7]

At the conclusion of the meeting Osborne was none the wiser as to which, if any, of the plans suggested by him Hughes favoured. Non-committal though he was, Hughes was nevertheless enthusiastic about a Federal research scheme and he agreed to expound his views to the members of the Professorial Board of the University of Melbourne: Osborne was charged with the duty of arranging a meeting.[8]

Hughes's willingness to discuss a scientific research scheme came as welcome news to both the Professorial Board and University Council. It was suggested to Osborne, as Hughes's emissary, that, in view of the auspicious occasion and the Prime Minister's imminent departure for Great Britain, instead of holding a formal meeting to discuss matters with him the university should tender a valedictory luncheon in his honour. This proposal met with Hughes's approval and arrangements were made for the luncheon to be held on 22 December 1915. Perhaps because of the short notice leaders of industry were not invited and invitations were restricted to academic men and politicians; the university authorities were responsible for the invitations to the former and Hagelthorn for the invitations to the latter. The list of speakers was left entirely in the care of Hagelthorn who, in addition to Osborne, enlisted the aid of J. H. Vaughan, Attorney-General for South Australia, and Professor Thomas Cherry, Professor of Agriculture at the University of Melbourne, to speak in support of the movement.

Wednesday, 22 December 1915, was a memorable day in the lives of all Australians. In their morning newspapers they read of the successful withdrawal of the Australian troops from Anzac and Suvla. Gallipoli was over; the initial shock was now tempered by a feeling of relief which to many promised temporary respite from the ominous Defence Department telegrams and newspaper casualty lists.

Inspired by the occasion, Hughes, at 51 years of age the Prime Minister of Australia, President of the Waterside Workers' Union, Chairman of the Wheat Board and 'chief recruiting sergeant in Australia', entered the luncheon as a prize fighter the ring, determined to challenge the scientific prowess of the Teuton warrior.

In attendance at the luncheon were Hagelthorn, G. A. Elmslie, M.L.A., J. E. Mackey, M.L.A., W. L. Baillieu, M.L.C., Honorary Minister, the Attorney-General for South Australia, J. H. Vaughan, Professor Sir Thomas Anderson Stuart, L. A. Adamson, W. S. Little-

[7] Letter of 15 October 1964 to senior author, CSIRO records.

[8] In letter quoted above Osborne wrote 'I can answer one of your questions and state with assurance I alone was responsible for Mr Hughes being invited to the University luncheon'.

john, Herbert Power, representatives of the Press, headmasters of leading schools, members of the University Council and members of the Professorial Board. The Chancellor of the University, Sir John Madden, presided.

Sir John Madden, in proposing the toast of the Prime Minister said that:

one reason for the gathering was to present to Mr Hughes a project to formulate a scheme whereby scientific research could be conducted in connection with the advancement of industry. They wanted to find a way of utilizing to the utmost the brains, talents and ability of those in the community to the very best advantage. They wanted to bring together the representatives of the States and the Commonwealth in the formulation of the scheme. What that scheme was to be had to be decided upon later.

It is recorded that Mr Hughes's health was then drunk enthusiastically.[9]

With the introductory remarks and welcoming formalities over, it was left for the Hagelthorn group to play their parts. Professor Osborne was the first speaker. He said:

The co-operation of industry had been a dream of men of science for half a century. The influence which science had already on industry was enormous. The case of Germany has been reiterated to a point of nausea.

Nausea or not, Osborne went on to give examples of the industrial application of scientific research in Germany and stated that industry throughout the world had reached a stage where it could not progress without scientific assistance. He continued:

Coming to the question of how closer co-operation in industry could be effected many schemes had been suggested. The one that appealed to him was the establishment of a Federal institution of scientific research. To effectively carry out such a project the institution would have to be liberally endowed, the staff must have a minimum of teaching to do, and the incubus of administrative work would have to be removed. Another scheme was the establishment of fellowships such as those recently started in America. Then there was the suggestion of Professor Flemming that there should be associations of men of science. It had been pointed out that previously scientists had been too individualistic. That scheme was not so adaptable to this country.
Before the establishment of such an institution as had been suggested there should be obtained the fullest information and advice from those

[9] The members of the professorial board must have abstained however or drunk the toast in coffee since they had entered earlier into a self-denying ordinance not to drink alcoholic liquor while the war lasted! The reports of the luncheon are from the Melbourne *Age* and *Argus* of 23 December.

men who were constantly handling scientific 'gear'.[10] A project that was conducted by practical men only without the aid of men of science was doomed to failure. He trusted that when the Prime Minister returned he would come back with his ideas reinforced and his determination to bring about a closer co-operation of industry and science reinforced also.

It is evident that even at this late stage, Osborne still did not know the Prime Minister's intentions and thought that the organization of a national research scheme would have to await his return from Britain, since he was to leave Australia for Britain within a month.

Professor Cherry the next speaker opened on the now familiar note of 'populate or perish'. 'Science affected the primary industries of Australia in a striking degree. Properly applied it would bring about a closer settlement of the waste lands of Australia.'

The remainder of his speech was devoted to the pounds, shillings and pence aspects of existing and attainable rewards of scientific research in the wheat industry.

Referring to the value of research in wheat-breeding Cherry claimed that the variety of wheat 'Federation', developed by William Farrer, had resulted in an increase of about three bushels an acre over the previous average yield. In terms of tonnage and money this amounted to some 500,000 tons, worth between £4,000,000 and £5,000,000 for the 1915-16 crop alone. Commenting on the cost of superphosphate to the Australian farmer he further claimed:

If the wheat crop were exported as flour instead of grain, the farmers would save £750,000 as the value of the phosphoric acid that was retained in the bran and pollard . . . The indirect results would be even greater, Australian flour would become the standard of the world, whereas the wheat was now purchased to mix with inferior wheat and did not create a standard.

The academic men having had their say, politicians took the floor. Hagelthorn used as his main argument some startling statistical comparisons between agricultural production in Victoria and Great Britain, which as early as 1909 had established by Act of Parliament the Agricultural Development Commission to develop rural industries through the means of scientific research, and he said:

Industry today depended more upon the application of scientific methods than ever before. Great Britain had realized that fact. The University of Cambridge was conducting experiments in the interests of Australian woolgrowers for the production of a certain kind of sheep. In Australia agriculture transcended in importance every other industry. In Victoria,

[10] This quotation is from the *Age*, the *Argus* quoted Professor Osborne as saying that the 'scientific work of the country should be "pooled" so that there should not be the waste and overlapping which occurred under the present individualistic system'.

on an area of 56,000,000 acres, the annual production from agriculture was valued at £31,000,000 out of a total production of £49,000,000. In Great Britain the same area produced twice as much wheat, twelve times as much oats, thirty times as much barley, fifteen times as much potatoes, three times as many horses, four and a half times as many cattle, twice as many sheep, and twelve times as many pigs. In Germany during a decade from 1894 to 1904 they had increased the yield of cereals per acre by at least fifty per cent, but nothing like that had been done in Australia. If they were going to see this Southern continent peopled and its population kept in happiness they would have to adopt the methods which Germany had found so successful and which Great Britain recognized were necessary. It remained for the University and those of other States to join in a proposition to see how far this could be remedied. The policy of the State in spending £1,000 a year on the chair of agriculture was a starvation one. Such a chair could do little and it would be better to wipe it out altogether.

The latter statement, harsh words for a State politician, was a boost for his colleague, Professor Cherry, the then Professor of Agriculture, with whom he was engaged in discussions on the possibility of establishing a lucerne pool in Victoria.[11]

J. H. Vaughan, representing the Premier of South Australia (Crawford Vaughan) was brief and to the point:

War could not be won by arms alone, and it was necessary to foster industrial production while the war was in progress. There had undoubtedly in the past been an impression that barriers existed between the man on the land and the man of science, and he hoped that as a result of the movement amongst men of science and men of business, those barriers would be broken down.

With the conclusion of this speech, the case for national research rested. In retrospect it would appear that many more arguments could have been advanced in favour of promoting scientific research, and one may wonder why the University Council and Professorial Board did not exercise their prerogative as official hosts at the luncheon to state their own views. Not having been invited to do so by those who chose the speakers they may have been reluctant to intrude upon a movement piloted by a State politician, preferring first to hear out the Prime Minister.

Apart from the suggestions made by Osborne and Hagelthorn, Hughes apparently had not sought other advice but had formulated his own ideas on the character of a national research scheme. Indeed his ideas were so carefully kept to himself, it appears, that on the day of his announcement even his own Cabinet colleagues did not know of his intentions. They were soon to know in no uncertain manner.

[11] Professor Cherry had previously been Victorian Director of Agriculture.

The Prime Minister ascended the rostrum and proceeded to set forth his ideas:

He was glad to have the opportunity of placing before the gathering the views of the Government on this all-important matter. What he would say, was what he considered was the business of Australia at the present juncture. This was no party matter. It was national. We had to look upon this heritage of ours as a man looked upon his own heritage. We had to devise the best means of developing it; how to make the most of it so that the maximum of happiness could be derived for the people. It was obvious that what best served the people generally, best served the interest of a particular party. The truth that was obvious was not at once clear to many people who had often conceived the idea that their benefits should be promoted by a policy that neglected the welfare of Australia generally. That was their side of the policy, and it might for a time serve them, but they must look at the body politic and the body economic. That was the function of science. It should act as a beacon of industry and guide its feet through mazes of experiments. It has to cure the existing diseases of the body economic and be its striking and producing power. It had been shown what potential wealth there was in this country, but we were practically in our swaddling clothes. Economically we were in our school days. It seemed to him that the policy of this country should be—must be—to take advantage of the plastic state of public opinion as we passed through the hour of trial. We had a great opportunity now.

There was now seething in the cauldron of this great war all the possibilities of a great and high civilization. It was one of the essentials of a real and satisfactory state of society that each man and woman should give a given amount of labour and this should be the maximum. He did not fall in with all that had been suggested but he thought the idea of the national laboratory was the corner stone of the edifice. We could gather around us men of all branches of science and use their capabilities in an application to industry. Applied to agriculture and the secondary industries science would solve the problems that beset us. With this institution fitted out for research work we would endeavour to open up new avenues for fresh industrial efforts. He believed in the power of science and business ability and the determination of our race to increase without limit the productivity of mankind. With scientific methods we could increase our productivity from fifteen to twenty per cent, and that applied to a million of money would mean a splendid investment. It was perfectly clear that whatever was done in connection with the institution it must be done on sound lines. It would have to stand on solid rock though its topmost pinnacles pierced the fleecy clouds of the sky. There must be a combination of science and business capacity. As far as possible they must induce the co-operation of existing institutions in each State. The Commonwealth Government would endeavour to co-ordinate the universities of the various States in this direction. It would not only co-ordinate but superimpose upon itself that

which was necessary to create an institution similar to that in England, America and Germany. He gave the assurance that, as far as the Government could, it would give every assistance to make the project a success. Of course the Government was not committed to details. The idea was plastic and would be moulded according to suggestions, which, in the fire of criticism, showed themselves best worthy. As far as possible they should avail themselves of the ability and service of scientific men in our own universities, but if necessary the strength of the staff could be reinforced from outside. He would certainly make it a point when he went to England to see the manner in which such laboratories carried on their business, and would do the same in America if he went that far. The Government without delay would take the necessary steps to give this institution a start.

Before the applause had died down Sir Thomas Anderson Stuart, unable to contain himself any longer, jumped to his feet, protesting that he hoped the Prime Minister's 'practical steps were not to be too practical'. He urged the Prime Minister to bide his time until some form of commission could inquire into the subject.

Needled to retaliation Hughes threw caution to the winds. With gesticulating arms and snapping fingers, reminiscent of his many battles in the House, he spurned Stuart's suggestion. 'He had lost faith in commissions', he retorted, 'no institution began better or ended worse.' The roars of laughter that greeted this statement were soon to be changed to gasps of amazement when the Prime Minister announced:

They should invite representatives of all the Universities to meet in Melbourne at an early date to consider the whole question and make suggestions. An institution was wanted that was capable of adapting itself at once to the circumstances of Australia.

Then, in deliberate voice, the Prime Minister committed himself irretrievably:

The Government wanted the co-operation of science and business to further the ends of industry, and the Government was prepared to give 20s. for every 20s. worth. The Government would give £5,000, £50,000 or £500,000 if necessary. It was the best investment Australia could make. If it cost £500,000 they would be getting every penny of their money back again.

The enthusiastic applause that greeted this announcement faded quickly into silence, the Prime Minister's promises and proposals had struck his audience dumb for the time being and Hughes was able to take his leave of the luncheon without being subjected to further questioning. There was an air of excitement, especially amongst the university members: science was on the march to the tune of half a million pounds, a truly princely sum in 1915.

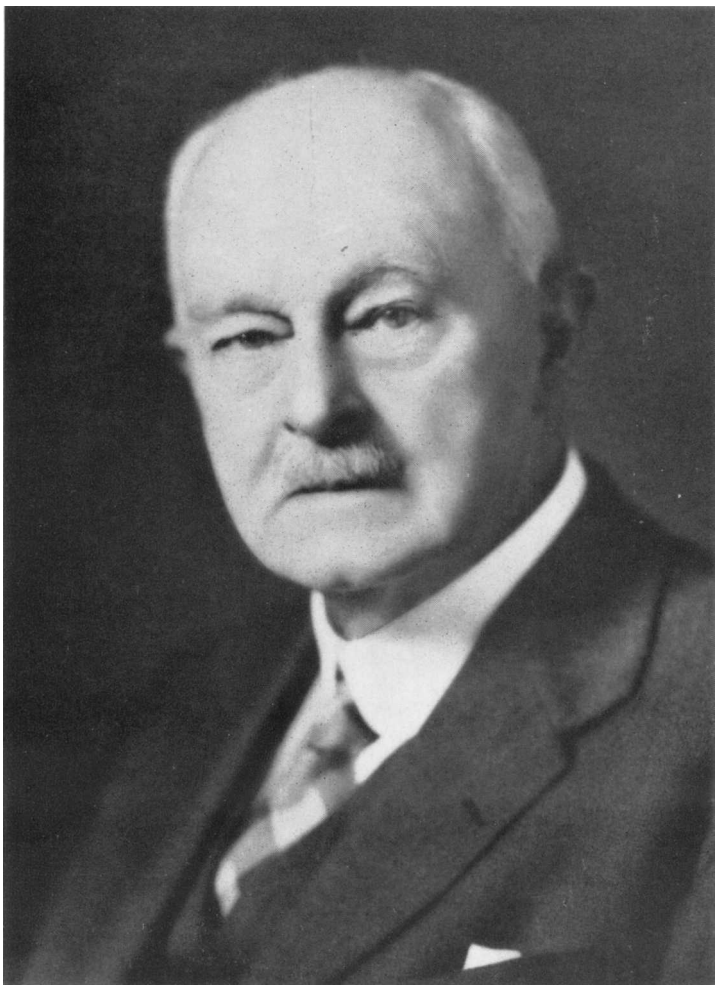
The members of the University Council and Professorial Board, knowing the impact a liberally endowed National Laboratory for scientific research would have on university research and teaching as well as on the development of Australian industry, decided to do all they could to keep the Prime Minister to his promises.

From being spectators, they were now to become active participants; had they then known of the tight hold the Prime Minister was to keep on the purse strings and that to extract £5,000 let alone £500,000 would be painful they might have been less enthusiastic. Their immediate concern, however, was that the conference of representatives of the universities the Prime Minister had promised to convene to discuss the organizational details of a National Laboratory for scientific research was not sufficiently representative; they considered that delegates from the scientific departments of State Governments, together with leaders of primary and secondary industry should be included.

There and then it was decided that a deputation from the University of Melbourne consisting of Professors T. R. Lyle, T. H. Laby (Natural Philosophy), Osborne (Physiology) and Cherry (Agriculture) should wait upon the Prime Minister on the following day to impress upon him this viewpoint and establish if possible a firm date for the conference.

The appointments to this deputation are worthy of comment. Because of their endeavours some few hours earlier, Professors Osborne and Cherry were automatic selections. But it is puzzling why Professors Lyle and Laby were named instead of two of the members of the original committee appointed by the University Council to inquire into the Victorian Premier's proposals for extension of the British scientific scheme to the Dominions. Undoubtedly the deputation was briefed by members of that committee, but it cannot now be established why they were not appointed to it. Whatever the reason, Commonwealth research gained another powerful protagonist in Professor Lyle, who had recently retired from the chair of natural philosophy in the University of Melbourne.

Next day, 23 December, the publicity Hagelthorn had been so avidly seeking came forth in an avalanche and national attention was drawn to the movement. Money had spoken louder than both actions and words; the Prime Minister's promise to spend up to £500,000 if necessary on the establishment of a National Laboratory was headlined by metropolitan and provincial newspapers. Not only were the luncheon speeches quoted at length but in leading articles spaced over the next few weeks columns were devoted to speculation and appraisal of the Prime Minister's proposals. Almost unanimously the newspapers expressed their approval, even the Melbourne *Age*,



D. O. MASSON

T. R. LYLE

which later became the most severe critic of Commonwealth scientific research, remained only mildly sceptical of the wisdom of establishing a National Laboratory immediately.

Although the Prime Minister's action had been praised, the opportunity was taken to remind the universities of their past aloofness in ignoring the requirements of industry. 'Science for science sake has long been the motto of the Universities' wrote the Melbourne *Argus,* 'and Professors have looked down with more or less disfavour on those who regarded science as the handmaiden of material progress.' But there was another side to the story.

With outstanding exceptions such as G. D. Delprat, W. R. Grimwade, H. W. Gepp, E. W. Knox, W. L. Baillieu and certain others, most leaders of industry in Australia at that period had not sought high levels of education for those employed in their enterprises, since they could get along in the business climate of the period without them. They distrusted somewhat the university man with his theoretical training and his tendency to experiment and seek change. They liked men who had their feet on the ground, reared in the hard school of practical experience, men they could depend upon! Family traditions existed, and change was resisted on the premise that 'what was good enough for their fathers was good enough for them'. The universities, in the popular mind, were places for training theorists, a notion modified in some degree by a narrow but universal recognition that useful people like doctors, lawyers and engineers emerged from within their walls. Australian people, still in the pioneering phase, had little conception of the place science was rapidly assuming in national development and very few appreciated the place of original research in advanced nations. But the establishment of a National Laboratory now promised to lower the educational and social barriers that existed between the university scientists and industry.

The morning newspapers on 23 December, having paved the way with prominent and favourable publicity, the university deputation experienced no difficulty in gaining immediate audience with the Prime Minister. After a long discussion, during which other aspects of the establishment of a National Laboratory may have been raised, the important fact emerged that Hughes promised to convene immediately a conference of interested parties in Melbourne on 5 January 1916; he agreed to invite, in addition to university representatives, businessmen and representatives of Commonwealth and State departments likely to be concerned with the establishment of a National Laboratory. Hughes also informed the deputation that, because of his departure for Great Britain early in the New Year, a time limit had to be placed on the deliberations of this conference;

so, by mutual agreement, 10 January 1916 was set as the date by which the conference should report its findings.

Christmas Eve found the Prime Minister and his secretary, M. L. Shepherd, busily engaged sending invitations to attend the National Laboratory Conference, which was to be held in Melbourne. Invitations were sent to the Ministers for Agriculture of New South Wales, Victoria, Queensland, South Australia, Western Australia and Tasmania, to W. Russell Grimwade, G. D. Delprat, A. B. Piddington, G. Swinburne, W. C. T. Goodman, E. W. Knox, B. T. McKay, J. Winter-Irving, Griffith Taylor, W. W. Forwood, W. T. Appleton, James Alex Smith, W. S. Robinson, W. P. Wilkinson, A. De Bavay, J. M. Higgins, C. F. Courtney, G. H. Knibbs, Dr S. S. Cameron and W. L. Baillieu. The Chancellor of each of the six Australian Universities was invited to nominate two university representatives for the conference.[12]

The letter of invitation, the first occasion on which Hughes had put pen to paper on the establishment of the National Laboratory, gave neither the precise venue nor the time of the conference. It was not until 31 December, after a meeting of the Federal Cabinet, that Hughes advised that the place was the Cabinet room of the New Commonwealth Offices, Melbourne, and the time 3 p.m. on 5 January.

During the last days of 1915, there had been speculation in Melbourne why a meeting of the Federal Cabinet had been called for 31 December, since a sitting between Christmas and New Year was a complete departure from tradition. Federal members when asked the nature of the business to be discussed confessed their ignorance, and even suggested the possibility of Parliament being assembled! Cabinet Ministers refused to comment; they hinted however that ordinary business before the departure of the Prime Minister for Great Britain provided sufficient explanation of extraordinary Cabinet meetings. The 'ordinary business' turned out to be the scheme for the establishment of a National Laboratory, and to stifle rumours an announcement to this effect was made by Hughes on 30 December.

Whether Hughes, through his promises at the university luncheon, was subjected to criticism at the Cabinet meeting was never disclosed; whatever misgivings the Cabinet may have had about the wisdom of the Commonwealth's entry into the sphere of scientific research, the Prime Minister had committed himself so far already that they had no option but to approve of his plans. So either by a 'tour de force' on the part of the Prime Minister supported by a reluctant Cabinet, or less probably through a decision of Cabinet loyally and enthusiastically supporting the Prime Minister's pro-

12 Membership of Conference Appendix 2.

posals' on 31 December scientific research was formally accepted by Federal Cabinet as a Commonwealth responsibility.

Meanwhile Sir John Madden wrote on 26 December to Professor Orme Masson, President of the Professorial Board, asking him to nominate two delegates to represent the University at the National Laboratory Conference.

Professor David Orme Masson son of the celebrated Historiographer Royal of Scotland; was at the zenith of a long and distinguished scientific career, having been appointed in 1886 at the age of 28 to the chair of chemistry at the University of Melbourne and having played a leading part in university and scientific development in Australia since his arrival. Apart from the reputation he had acquired as an investigator and 'the builder of a University School of lofty scientific ideals and attainment', the year 1915 found Professor Masson the founder of the Australian Chemical Institute, the Society of Chemical Industry of Victoria and the University Chemical Society. In his capacity as President of the Australasian Association for the Advancement of Science, he was instrumental in promoting the first Mawson expedition to the Antarctic in 1912-14 and had been Chairman of the Australian Committee of the Australasian Association for the Advancement of Science, which arranged the details of the British Association meeting in Australia in 1914.

It was inevitable, therefore, that Professor Masson should himself be one of the university delegates to the conference. Professor Baldwin Spencer, Professor of Biology and also a member of the University Committee appointed to report on the Victorian Premier's extension proposals, was nominated as the other.

Before a National Laboratory could be established, it required months of careful planning and on this subject Masson had certain preconceived ideas. In discussions with visiting university representatives and members of the science faculty of the University of Melbourne immediately before the conference he was able to gain support for a scheme he had prepared on the necessary preliminary organization. This scheme of Masson's was to be a major item in the discussion at the January conference.

At this point we leave the story of the January conference to be told in the next chapter, in order to follow the fortunes of the recommendations made by the Governments of Victoria and New South Wales for the extension of the British scheme to the Dominions.

The Secretary of State for the Colonies, Bonar Law, on receiving the dispatches from the Governors of Victoria and New South Wales sent them on 23 November and 3 January respectively, to the Committee of the Privy Council for Scientific and Industrial Research.

After detailed consideration of the dispatches, the Committee of

the Privy Council considered the findings of such importance that they were issued as a 4-page printed memorandum for circulation by the Colonial Office to Dominion Governments and educational institutions. This memorandum dated 2 March 1916, and signed by Lord Crewe, Arthur Henderson and L. A. Selby-Bigge, was entitled 'Memorandum on the Suggestions made by the Governments of Victoria and New South Wales for making the Scheme for the Organization and Development of Scientific and Industrial Research applicable to the whole Empire.'

To support his request for extension of the British scheme to the Dominions, Hagelthorn in his submission to the Victorian Premier which had been forwarded to London with the dispatch from the Governor had used as his main argument the interpretation of paragraph three of the White Paper (Cd 8005).

> It is clearly desirable that the scheme should operate over the Kingdom as a whole with as little regard as possible to the Tweed and the Irish Channel. The research done should be for the Kingdom as a whole, and there should be complete liberty to utilize the most effective institutions and investigators as available, irrespective of their location in England, Wales, Scotland or Ireland.

The Committee of Council in citing this passage in their memorandum agreed that it was:

> capable of a much wider application and that they were prepared to co-operate cordially with the Secretary of State in promoting such an arrangement between the Mother Country and the Overseas Dominions as would secure the effective application of the principle throughout the Empire.

They added:

> a complete and effective system of research implies the power to carry out each piece of work in the place where the conditions are most favourable and where it can be performed most thoroughly, quickly and economically. It is obvious a reciprocal arrangement by which the scientific and industrial resources of the Mother Country in men, material and equipment, could be made available for a research in which any of the Dominions were primarily interested, and which conversely would place the resources of the Overseas Dominions at the disposal of the Mother Country and of each other, would greatly augment the aggregate research capacity of the Empire and enhance the productivity of its industries.

Various ways were then suggested of achieving co-operation between the organization in Great Britain and the Dominions, and reference was made to the feasibility of establishing a central body with a common fund 'supported by contributions from the United

Kingdom and Overseas Dominions' for the 'pooling or consolidation of the resources of the Empire for the purposes of scientific research'.

With a view to impressing upon Dominion Governments the necessity for them to organize their own schemes as a preliminary step towards Imperial scientific cooperation, the Committee of Council in paragraph seven of the memorandum made the one and only direct suggestion:

> If the general proposal commends itself, each overseas Government which is willing to enter into a co-operative arrangement should, as a first step and at an early date, constitute some body or agency having functions analogous to those of the Advisory Council which acts for the U.K.

For the successful working of any such body or agency it was stressed that the following conditions should prevail:

1. It shall have responsible functions and substantial authority.
2. It shall be supported by the resources and influences of the Ministry of Commerce.
3. It shall maintain a close contact with the public educational systems and institutions.
4. It shall be at liberty to communicate freely with corresponding bodies in Great Britain and other parts of the Empire.

Indicating their eagerness to promote scientific co-operation, the Committee of Council further stated they would be willing to co-operate with the Secretary of State in the establishment and conduct (if deemed necessary) of a central organization in London for the prosecution of an Imperial scheme of research. The memoradum presented a skilful mixture of promise and suggestion, in which Britain encouraged to the utmost Dominion Governments to adopt scientific research as a means towards national development.

Of the Dominions that received this memorandum in May 1916, Canada, by an Order-in-Council approved on 6 June 1916, established machinery on similar lines to that of Britain. South Africa was soon to follow suit, by the appointment in 1917 of a Scientific and Technical Committee acting under the authority of the Industries Advisory Board, a body which had been constituted in October 1916 to develop the industrial resources of the Union. New Zealand on the other hand, although the Government of the time did focus considerable attention on the subject, was to wait a further ten years before launching its own scheme for scientific research.

Because of the dramatic intervention of the Commonwealth Government in launching its own scheme unilaterally at the beginning of 1916 the British memorandum of 2 March had little impact on Australia. Although the idea of co-operation with the Imperial

authorities was readily accepted the Australian organization was to be Australian and not just a branch of an Imperial one.

Hagelthorn had served his State and country well in his work on the wartime Wheat Pool; now his advocacy and representations on the value of scientific research which led to the production of the British memorandum of 2 March had far-reaching consequences for the other Dominions. Through the memorandum, they had accepted the view that their material progress could depend to a considerable degree on the extent to which they applied scientific research to the problems of industry.

3

THE ADVISORY COUNCIL FORMED, 1916

Of the thirty-six important people invited to the January conference, twenty-nine were able to attend, and Hughes's opening speech was indeed a stirring affair. He had fully absorbed the idea that science must be used to its utmost both to win the war and to develop a great continent when the war was over. He cited frequently German success in science as an example of what should happen, although he warned the conference that other features of German development should not be copied. He had caught fire at the vision of a whole nation inspired by the scientific spirit and assisted by the application of the scientific method in all areas of production. Not only did he see Commonwealth and State institutions staffed by the very best scientists available, solving problems of national importance and contributing to developments in both agriculture and secondary industry, but he saw universities equipped for research as they had never been before, and the secondary schools staffed with suitable science teachers and provided with laboratories so that from them should come forth a generation who could see the meaning of and use the methods of science to bring forth a new earth if not a new heaven. There were no half measures in the address which he gave. He was a man seeing the great vision which came to life vividly in his peroration:

I have a profound belief in the destiny of this great country. It's future is bright with promise. To paraphrase the words of glorious John Milton, I see a puissant nation mewing her mighty youth, her fertile lands smiling with green pastures and waving corn, flocks and herds innumerable, and a free and virile people widely spread through her far-flung heritage. I see her a great nation with out-stretched arms encircling a continent, her feet lapped by the waters of two oceans, standing erect and gazing with clear and friendly eyes upon a world which has no cause to fear her and which she does not fear. Ours is a great and glorious heritage and we must defend it at all hazards. We must create conditions which will attract and maintain a virile population of whom a sufficient number must settle upon the land and I know of no way of settling people on the land except to make rural industry attractive, and

to this science can lend a most powerful aid. Science can make rural industries commercially profitable, making the desert bloom like a rose; it can make rural life pleasant as well as profitable. Science can develop great mineral wealth of which, after all, only the rich outcrop has yet been exploited. It can with its magic wand turn heaps of what is termed refuse into shining gold; and by utilization of by-products make that which was unprofitable to work profitably.

Science will lead the manufacturer into green pastures by solving for him problems that seemed to him insoluble. It will open up a thousand new avenues for capital and labour, and lastly science thus familiarized to the people will help them to clear thinking; to the rejection of shams; to healthier and better lives; to a saner and wider outlook on life.

After this stirring address the discussion which followed could hardly avoid a certain bathos, although it was of a high order and contributed to by men who were all leaders in their fields. It seems as if the audience, while approving the address were saying in effect, 'now we've had the oratory let's get down to business'. The lift to the spirit which the Prime Minister was so well fitted to give was soon brought down to earth by the debate on ways and means and in this field his special gifts did not serve him so well.

Even at that early date conflicting interests and attitudes emerged which have influenced the train of events to this day. Some of the members felt that the major role of the Commonwealth should be to assist and strengthen existing State agencies to tackle special problems; some university people thought that since the universities had to be relied upon to train the scientists who would later be research workers employed by the Commonwealth, the Commonwealth should farm out research problems to them so that not only could the problems be tackled, but also students could be trained in research methods while working on them.

Manufacturers were well disposed; they could see a strong central Commonwealth laboratory tackling problems of value to secondary industry, and one member argued that the universities should concentrate on teaching while new and separate institutions were set up to carry out needed research. This last point of view was strongly opposed by the university representatives, Professor Masson describing it as 'the most absolute heresy that a man could possibly give utterance to'.

The trend of the discussion showed, however, that in spite of differences in points of view, a big majority of those present favoured the central institution and the notion that the Commonwealth should develop an organization for scientific research to assist primary and secondary industries throughout the Commonwealth.

After Hughes had given his opening address Professor Masson at

once took leadership in the discussion and indicated that his university colleagues and he wanted to put before the Prime Minister a scheme which involved the appointment of a Scientific Industrial Council as a practically self-governing institution somewhat on the lines of the Interstate Commission. This Council was to have control of an annual budget and its members were to be appointed for their fitness and not on a representative basis. He thought that any decision to found an Institute should be postponed until such a Council could report to the Government on the establishment of the Institute.

Hughes's remarks at a later stage in the proceedings suggest that he was somewhat nettled by the cut and dried nature of Masson's very capable suggestions, and it is noteworthy that in the years 1916 to 1920, during which the Advisory Council operated, there was friction between these two able men.

After Masson's leading suggestions, W. W. Forwood of the Associated Chambers of Manufactures spoke strongly in favour of the establishment by the Commonwealth of a National Laboratory and made the interesting statement that at a conference of the Associated Chambers presided over by him in September 1915 a resolution had been carried unanimously embodying the scheme now under consideration, since it was thought by those attending that a laboratory of the kind now proposed would be of great assistance to secondary industry.

Edward Knox of the Colonial Sugar Refining Company spoke in favour of strengthening the universities and of employing more scientists in industry. He seems not to have favoured research by the Commonwealth since he believed that the elimination of waste in industry was much more vital than the advancement of research. 'It was chemical control which the industries of Australia required', he said, 'and not research'. Later, when a report of a committee appointed by the conference to recommend action to the Government was sent to all members of the Committee for signature, Knox said that he preferred not to sign the report since, he said, 'my long experience in the application of science to industry in Australia had not led me to the hopeful views expressed in the third paragraph of the introduction'.[1] That paragraph read: 'the Committee is convinced that the results of properly conducted investigations into many of the subjects referred to in his address will amply repay considerable expenditure and fully justify a bold and comprehensive policy being adopted'.[2] However, Knox added that, although he had the reservations mentioned, he had also been absent from three of the five meetings of the committee and had not heard all the opinions

[1] Knox to Secretary, Prime Minister's Department, 21 January 1916. CSIRO records.
[2] The address referred to was the opening address by the Prime Minister.

expressed by his colleagues, and on this account also he should not sign.

On the other hand, a leading industrialist, G. D. Delprat of the Broken Hill Proprietary Co. Ltd., strongly supported the idea of a National Laboratory to assist industry in general and especially the smaller firms which could not themselves afford to pay for research on a big scale. He was a strong supporter of research and continued so throughout his very considerable association with the Advisory Council and with its Executive Committee.

A. B. Piddington, Chairman of the Interstate Commission, suggested that the conference was not called upon to formulate a detailed scheme at the very first meeting, and moved 'that an Advisory Committee be constituted to formulate proposals for a Commonwealth Bureau of Science and Industry'. He was entirely in favour of research, but as befitted an eminent legal man he wanted everything to be done in proper order and after due preparation.

George Knibbs, the Commonwealth Statistician, supported the idea of a research institution at the centre, but favoured even more the strengthening of schools and universities on the science side so that the whole country should be suffused with the scientific spirit. His views were of special interest since he was later to be the first Director of the Institute of Science and Industry.

Speeches by J. M. Higgins, a leading metallurgist and expert on wool, and George Swinburne, a director of several big companies, must have annoyed the university professors present very considerably. Both indicated their belief that the universities were primarily teaching bodies and were not fitted for applied research, so a new national research laboratory to help solve the problems of the man on the land was of first-rate importance. This brought a plaintive objection from Professor Sir Thomas Anderson Stuart of Sydney, who said the reason why Australian universities had done so little research was that the teachers were overwhelmed with teaching duties; this he thought was not right—they should have more time for research too.

Professor Sir Douglas Mawson of Adelaide brought a refreshingly candid note to the discussions when he insisted that anyone to be appointed to such an institute should have some business ability as well as having appropriate academic qualifications. He knew from his experience, he said, that on the staffs of some universities there were examples of the greatest fossils that it was possible to find. From a distinguished professor of geology this might in a different setting have been mistaken for high praise. He sweetened this bitter pill, however, by adding 'on the other hand members of university staffs as a body represent what is foremost in scientific research in the

country, and many of the individuals are pre-eminent in that respect'.

Dr S. S. Cameron, Director of Agriculture of Victoria, put in a strong plea for research in agriculture, the problems of which were so many and varied. He advocated a wide-spread recognition of the view that science must be allowed to play its full part in education, through research and through the diffusion of the results of research to both primary and secondary industry. He said he would not like to see all the effort concentrated in one large central laboratory—effort should be applied much more widely.

Professor Kerr Grant believed that it would be disastrous if all the research were to be centralized and separated entirely from the universities. Students likely to take up research careers could be trained satisfactorily at the universities only in an atmosphere of active research.

Frederick Hagelthorn, Minister for Agriculture of Victoria, introduced a note of caution which was to be sounded again and again by many speakers in the debates on the Bill which was later introduced into Parliament. He was concerned, he said, with the limited resources of Australia, a nation of only five million people, who could apply to the scheme such a limited amount of money that the fields of endeavour in which the proposed institution could operate would have to be restricted if effective work was to be done. Too diffuse aims, he said, with limited resources, could lead only to failure;[3] he agreed, however, with the necessity for making men and women as effective as possible in their own situations and believed in the capacity of science to assist this aim.

Hughes summing up the discussion, showed that he was more of a unificationist than most of the people present. He took to task the suggestion that problems be farmed out to the universities saying:

Dr Cameron has suggested that they should leave to each university the task of setting about those mighty problems as numerous as the sands of the seashore and as difficult as human problems could be—leaving each State to a university to pedal away on this little problem or that with its insufficient equipment and with its unsupported effort, instead of gathering into one mighty correlated whole the efforts of the nation. They would have to give to each university its work, but that is different to each university doing it in its own way. Germany is a nation; it does not say to every state or hamlet 'Go about the matter of preparation as you please', it gathers them together and breathes the breath of life into them and they become part of the great German machine. God forbid that we should make of this nation a machine, but we could

[3] A similar statement was made again, speaking in retrospect, by the Prime Minister, S. M. Bruce, at the 1925 Conference.

systematize our efforts and the proposal now before them was a step in that direction. The function of a university is not to take charge of this scheme but to do its part.

Speaking of the lack of equipment in the universities and certain other scientific institutions he said: 'The Government will not hesitate to offer whatever inducement is necessary to the universities'. We can ponder this statement against the hard fact that not until the early 1950s, and after another world war, did the Commonwealth freely supply the inducements which would allow the universities to equip themselves reasonably adequately for both teaching and research.

When it came to money Hughes muted only slightly his enthusiastic statement at the university luncheon that £500,000 could be made available for research. He said:

> He had made a statement the other day, which had filled some of his friends with despair. He had said they were prepared to go up to £500,000! What he had then intended to convey was that mere money would not stand in the way—they would, however, spend as much as was necessary.

When, however, a Committee formed by the same meeting to advise on steps which should be taken towards the development of the Institute suggested in its draft proposals that £25,000 should be allotted for immediate requirements, the Prime Minister himself asked that no specific sum should be mentioned! The Committee in its report of 8 January had recommended 'that a sum of £25,000 be placed at the disposal of the Advisory Council for the above purposes', but this was changed in the later drafts finally approved by the Cabinet to 'that *funds* be placed at the disposal of the Advisory Council for the above purposes'. So much for the £500,000!

After the discussion had indicated a generally favourable reception to the Government's proposal, the motion by Piddington to set up a committee to report on the proposal was adopted; and on Hughes's motion a Committee of fourteen members of the conference was appointed. The Prime Minister and those State Ministers for Agriculture who were present would be members ex officio.

Hughes indicated that Gerald Lightfoot, then an officer of the Bureau of Census and Statistics, would act as secretary to the Committee, and thus began a long and useful association between Lightfoot and the organizations which followed the Advisory Council until he retired as secretary of C.S.I.R. in 1944.

After the conference, the Committee held five meetings. Although the *ex officio* members were invited to attend, the only one who did so was C. Goode, Minister for Agriculture for South Australia, who

was at a meeting on 6 January, but did not attend thereafter. Goode preferred not to sign the final report of the conference since he did not agree fully with some of the policies proposed. He feared that the conference wanted to 'utilize universities and similar institutions rather than State departments in connection with their proposals' and this he said would be a grave mistake. Moreover, he did not approve of any distinction being made between applied research and pure research.

The Committee itself worked with great diligence on 6 and 7 January and presented a draft report to the Prime Minister on Saturday the 8th. Hughes said that he approved of most of the things they had said, but he objected to a sub-section which provided for the appointment of three directors by the Governor-General in Council *on the recommendation of the Council of the Institute.* The Government which paid the piper should have some say in the appointments, he thought. He realized, he said, that members were fearful of government control, but in organizations which could be run on business lines on the model of the Commonwealth Bank, which, he claimed, was free from political control, there should be no danger. In deference to the Prime Minister's views the offending section was altered to allow for the appointment of the directors by the Governor-General in Council and the words 'on the recommendation of the Council of the Institute' did not appear on any further drafts.

The revised draft was submitted to the Prime Minister on 11 January and Cabinet approval was obtained with some suggested amendments. The Committee met again for further discussions on the 12th and 13th, and gave effect to the amendments suggested by the Cabinet and the Prime Minister. Those amendments related to two matters; the relationship between the Commonwealth laboratories and the proposed Institute and the constitution of the controlling body of the Institute.

There was a good deal of discussion in the Committee about the relationship of the Commonwealth laboratories to the proposed Institute, and as matters turned out in the next four years before the Act setting up the Institute was passed, there was good reason for a close examination of this particular question. It is clear from the record that the Commonwealth Analyst, W. P. Wilkinson, although he had been appointed a member of the Committee to draft recommendations about the new institution, consistently pursued a policy of non-co-operation with the Advisory Council which was formed as a result of the conference. It was perhaps not unnatural that the Commonwealth Analyst should see in the proposed new Institute of Science and Industry some challenge to his own laboratory in the Customs Department. It is noteworthy that, though

his name appears among those present at the meetings of the drafting committee on 6 and 7 January while the first draft proposals were being prepared, he is not recorded as having been present at the meeting on 8 January, nor on the 12th and 13th when the final draft was agreed to after consultations with the Prime Minister. Nor does his name appear on the record of those who signed the final report which was circulated to all members of the original Committee.[4]

It was abundantly clear that the leading members of the Committee, and more particularly Masson and his university colleagues, believed research could best be carried out in institutions not burdened with routine analyses nor tied to restrictive procedures which could hamper true research; it is equally clear that the Commonwealth Analyst thought that the new activities could be wedded to the old, and he feared, one must suspect, that his empire would suffer a relative eclipse in the face of the rising sun of research. The Committee had to be rather careful in this delicate field, so after a long preamble it said:

A convincing reason for drawing a line of distinction between laboratories primarily for scientific research and laboratories primarily for the necessary routine work of departmental testing, is that any attempt to combine the two would lead to confusion and hamper and weaken both branches of activity, and would tend to drown the research work for which the institute is being created. It cannot be too strongly insisted that the qualifications of staff for researching are different in character from those of staff which is to carry out scientific routine testing. The Committee therefore recommends, (a) that control of the present Commonwealth Laboratories be not disturbed but that they be co-ordinated their staff increased and their equipment improved, and (b) any new national laboratories which may be created for special purposes of research and experimental inquiry, including a physical laboratory for testing and standardizing purposes, should be controlled by the Institute.

The other point brought up by the Prime Minister—the constitution of the controlling body of the Institute—stimulated a great deal of discussion, especially about the merits of different forms of control. The final recommendation was embodied in the following resolutions:

[4] Those members of the drafting committee whose signatures were on the document submitted to, and finally approved by, Cabinet were: D. Orme Masson (chairman), A. B. Piddington, G. D. Delprat, W. Russell Grimwade, J. M. Higgins, W. S. Robinson, George Swinburne, Alec J. Gibson, Douglas Mawson, W. W. Forwood.

Names added subsequently, approval having been expressed by letter were: F. Hagelthorn (Minister for Agriculture, Victoria), W. Lennan (Minister for Agriculture, Queensland), Thomas Anderson Stuart, William Appleton.

Members of committee who did not sign were: C. Goode, W. P. Wilkinson, E. W. Knox.

1. That an Advisory Council consisting of nine members representing science and the principal primary and secondary industries, be appointed who shall advise and co-operate with the directors in framing the policy and in the administration of the Institute.
2. That the members be appointed by the Governor-General in Council.
3. That for the purposes of controlling and administering the Institute and of collecting information and determining on the researches to be undertaken and directing their elucidation, three highly qualified salaried directors, of whom one should be chairman of the directors, shall be appointed by the Governor-General in Council. The directors shall seek the advice and co-operation of the Council and shall be *ex officio* members thereof.
4. That of the three directors one should be an expert business and financial man with ability in organization, the other two should be chosen mainly on account of scientific attainments and wide experience.
5. The tenure of the directors shall be fixed by the Act.
6. That the scientific staff should be appointed by the Governor-General in Council on the recommendation of the Directors.

The Committee realized that the Institute itself could be established only by Act of Parliament, and this would take some time, so, recognizing the urgency expressed by the Prime Minister, it recommended under the heading 'Immediate Arrangements' that until the Institute could be established a Preliminary Advisory Council be appointed by the Governor-General in Council 'to consider and initiate scientific researches in connection with, or for the promotion of, primary or secondary industries in the Commonwealth and the collection of industrial scientific information and the formation of a bureau for its dissemination amongst those engaged in industry'. It was recommended accordingly that the Preliminary Advisory Council:

be appointed forthwith and that when appointed it immediately take steps to initiate research work into the most pressing matters needing investigation and seeks the co-operation of existing institutions and utilizes the resources of staff and equipment at our disposal at the present time.

To give the Preliminary Advisory Council and its Executive something to bite on, the Committee suggested that the following problems were pressing:

1. The sheep fly pest.
2. Improved methods of extracting zinc from Australian ores including the commercial manufacture of electrolytic zinc.
3. The utilization of brown coal with recovery of by-products.
4. The introduction of a mechanical cotton picker.
5. The eradication of the prickly pear.

6. The production of aluminium and ferro alloys.
7. The recovery of potash, manufacture of alkali, and condensation of sulphurous acid gas at present being wasted.
8. The cultivation of useful indigenous grasses and salt-bushes.
9. The manufacture of fine chemicals, drugs and explosives.

The report of the Committee was then sent out to all members of the Committee and to all other members of the January conference.

While preparing for a visit to Great Britain the Prime Minister had promised the Committee that:

he would make every effort to gain further information in England and elsewhere, and to see at first hand the men who were controlling such institutions and ascertain, if possible, whether they were successes. He would find out what should be done and what should not be done, and as soon as possible after his return they would, he hoped, have an opportunity of meeting again, when he would put before them the ideas that he would then have in the light of the experience gained. Parliament would meet in June, and they would make the matter one of their first measures, it would depend on what the Committee did in the meantime.

In order the better to fulfill his promise to look into organizations abroad and to see how scientific research was carried out there the Prime Minister selected Lightfoot to travel abroad with him and prepare a report.[5] From the steamer *Makura* in Sydney he sent a message to the acting Prime Minister, Senator Pearce, saying that he would communicate again from Auckland giving the names of men he would personally suggest for membership of the Preliminary Advisory Council.

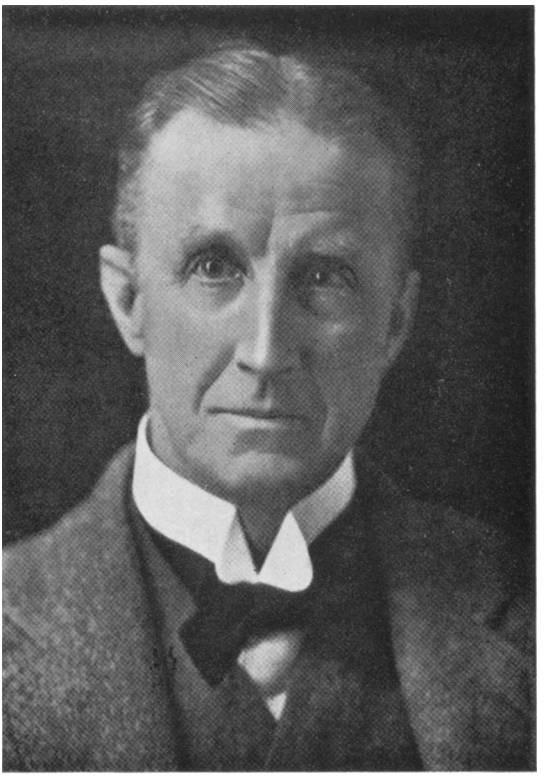
As good as his word, he cabled from Auckland on 24 January a list of eighteen names and a suggestion that a further name from Western Australia be added.[6] He followed his cable with a memorandum repeating the names and suggesting that the Council be summoned to meet at the earliest convenient time. In his memorandum he suggested that the Advisory Council should:

[5] Gerald Lightfoot graduated with first-class honours in the mechanical sciences tripos from Cambridge in 1898. After graduation he carried out original research in the field of refrigeration, then studied law and was called to the Bar at the Middle Temple, London, in 1902. He came to Australia in 1906 and shortly afterwards was appointed as a professional officer in the Bureau of Census and Statistics, where, under George Knibbs, he contributed original sections to the *Commonwealth Year Book*. He was seconded from the Bureau to accompany Hughes overseas.

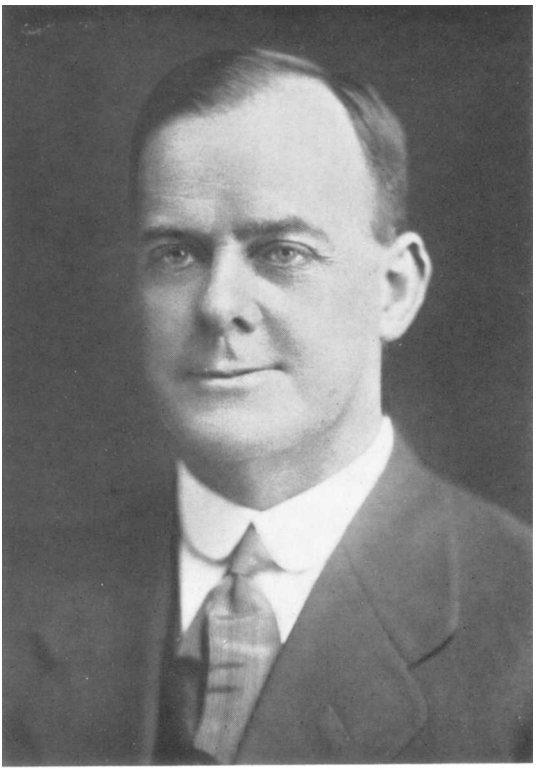
[6] List of names sent by Prime Minister from Auckland suggested for membership of Preliminary Advisory Council of Science and Industry: Professors C. E. Fawsitt, R. D. Watt, D. O. Masson, T. H. Laby, A. J. Gibson, T. R. Lyle, Messrs A. B. Piddington, K.C., G. Swinburne, G. D. Delprat, J. M. Higgins, W. T. Appleton, W. W. Forwood, W. P. Wilkinson, W. Russell Grimwade, J. Winter-Irving, F. Leverrier, K.C., F. B. Guthrie, Dr J. F. Elliott.

Senator Pearce added E. A. Mann and Donald Clark. The Ministers for Agriculture of the States were to be *ex officio* members.

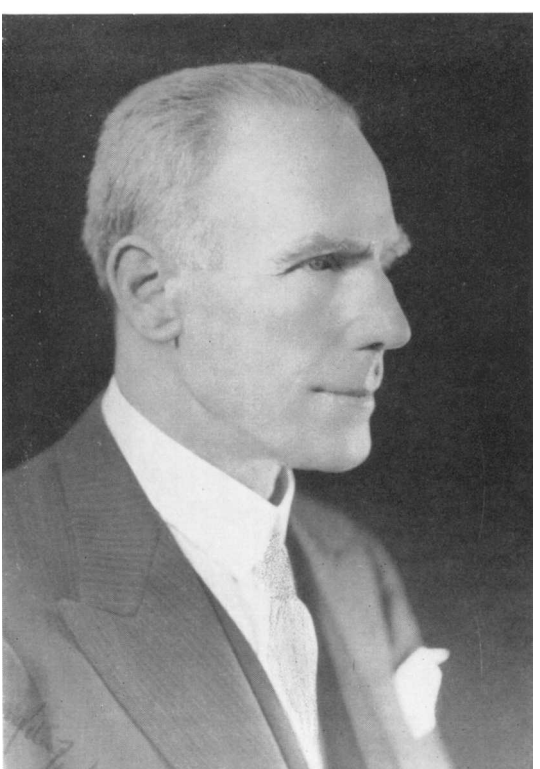
A. B. PIDDINGTON



G. D. DELPRAT



E. A. MANN



R. D. WATT

(a) make an assessment and analysis of the existing scientific resources including staff, apparatus and equipment available in departmental, university, technical and other scientific institutions throughout the Commonwealth, (b) draw up classified statements showing in what respects these institutions are lacking in apparatus and equipment with a view to their being supplied. When this is ascertained the Government to favourably consider the making good of deficiencies.

In a hand-written letter dated 24 January 1916 to Senator Pearce, the Prime Minister wrote:

Herewith I enclose memo re Preliminary Science Council. I know how busy you are, but please try to get the thing going at once. Once started, you should have little or no trouble with it.

After receiving the letter and memorandum Pearce invited the men named in the cable and memorandum to accept membership of the Preliminary Advisory Council. He pointed out that it was indeed a *preliminary* Advisory Council and that membership of this Council would give no right to a permanent appointment when a complete scheme came into operation. The first nineteen members of the Advisory Council were appointed by the Governor-General in Council on 16 March 1916, and the first meeting of the Council was held in the Prime Minister's Department in Melbourne on 14 and 15 April 1916.[7]

When Senator Pearce opened the meeting he expressed the confidence of his Government in the potential of scientific research in these words:

The Federal Government believes that it will lead to the establishment of a permanent body which will render incalculable services to Australia. I feel confident that the Commonwealth will look back to this day as the inauguration of a period of scientific order in grappling with the question of production that will lead to big results for the future. It is, I believe, the organization of industry and its linking up with science here for the first time on such big lines that will help us to learn one of the lessons that our enemies have taught us in this war—the benefit of organization of industry and linking up the brains of a nation with the brawn of a nation.

Pearce then left the meeting in charge of Senator Albert Gardiner, Vice-President of the Executive Council, who lost no time in coming down to business. He suggested that the appointment of an Executive might well be the first business of the meeting.

Professor Masson suggested that a small Executive which could meet frequently in one place would be essential, and in order that State interests could be catered for in a direct way local State com-

[7] Of those named by the Prime Minister only Winter-Irving did not accept membership.

mittees should be set up in each State, the chairmen being *ex officio* members of the Executive, on the understanding that they would attend meetings when they could arrange it.

There was then a good deal of discussion during which the special interests of the various States were canvassed, but in the end the Council came round to the view that Masson's plan was a workable one. It was therefore resolved that the Council would appoint an Executive of six, of whom three would form a quorum, and that the chairman of each local committee should be an *ex officio* member of the Executive.

Masson, always anxious to arrange matters so that the States would take a real interest in the work of the Council, pointed out that the Council as then constituted left some States with inadequate representation, and proposed that the Government be asked to provide that each State have not less than three members of Council. This gave rise to a discussion on the merits of State representation as against the principle of selecting the best-qualified persons wherever they might be found, but again the Council agreed with Masson's suggestion and recommended that action be taken to ensure balanced representation of the States.

These organizational matters having been dealt with the Council turned its attention to the problem of getting enough scientific and technical staff for research purposes. Professor Laby put forward a motion for the appointment of an education sub-committee to report on the supply of scientists available to carry out original investigations and to form the junior staff of the proposed Commonwealth Institute of Science and Industry. The sub-committee should also report on the supply of scientifically trained craftsmen in Australia, and frame a system of industrial research fellowships to be held at Australian universities and technical colleges to increase the supply of highly trained scientists and technicians. Laby's idea was adopted, and the sub-committee was formed.

The Council then appointed the following six ordinary members to the Executive Committee: Professor Orme Masson, G. D. Delprat, Professor T. R. Lyle, E. A. Mann, A. B. Piddington, Professor R. D. Watt.

Hughes meanwhile was on the high seas on his way to wartime Britain. On the voyage, according to Lightfoot, he seemed to have lost interest in the science project and, in a letter written in June 1964, Lightfoot described the difficult situation in which he found himself:[8]

I was told by Sir George Knibbs that I was to go to England but I was not given either there or at any later time any information, advice or

[8] Letter from G. Lightfoot to senior author, 22 June 1964. CSIRO records.

instruction as to what I was to do, though I came to understand that in some vague way I was to obtain information which might be of value in determining on some form of Commonwealth organization for research in Australia.

Very soon after leaving Sydney it became obvious to me that the Prime Minister did not wish to discuss matters with me and I was astonished to find that he had lost all interest in the matter. This has always remained a complete mystery to me. I can offer no explanation of it. The day before we arrived at Vancouver I was told by Shepherd, the then Secretary of the Prime Minister's Department, that I was to spend two or three weeks in the U.S.A. visiting such places I thought fit, then I was to come on to England. I was in fact, very distressed about the position in which I found myself and this continued in England where I saw the Prime Minister only on one or two occasions; I was ultimately able to get him to attend a meeting of the Advisory Committee with me; he was half an hour late in attending and any discussions were very flat and useless. You will probably be surprised to learn what I have told you; the Prime Minister's complete loss of interest was astonishing and has remained a mystery to me ever since; in fact, I too lost my interest which was, however, revived when I saw Sir David Orme Masson and others on my return to Australia.

Although Lightfoot seems to have had rather a sketchy briefing from Hughes and Shepherd, arrangements for his visit abroad had not been neglected; the evidence for this lies in the records of cables sent. Here is the story of one such cable, as the message it contained made its tortuous way through official channels to its destination.

On 9 February the Prime Minister sent a cable to Melbourne from *Makura* saying:

'Ask the Governor-General of Australia to notify the British Ambassador in Washington Lightfoot intends to visit Universities Federal Departments of the United States of America ask afford every facility carries letters of introduction signed Prime Minister'.

This cable was received in Melbourne by the then acting Secretary of the Prime Minister's Department, J. H. Starling, who passed its contents on 10 February to the Official Secretary to the Governor-General. The message from the Governor-General conveying the information from the Prime Minister went to Downing Street whence it was no doubt transmitted to the Foreign Office, which sent it to its embassy in Washington to be conveyed to the State Department. The Secretary of State for the Colonies, Bonar Law, on 8 March sent a communication to the Governor-General of Australia in the following terms:

With reference to your Excellency's telegram of February 11 I have the honour to request you to inform your Ministers that their message that

facilities might be obtained for Mr. G. Lightfoot in the United States, was communicated to His Majesty's Ambassador at Washington by telegraph on the 12 February.

This communication was duly transmitted from Government House, Melbourne, in a memorandum dated 20 April to the Prime Minister's Department. In view of what Lightfoot wrote later, one wonders whether, in all this circumambulatory exchange, somebody had forgotten to tell him about it!

At any rate, after his visit to the United States where he was able to visit universities and research institutions, Lightfoot prepared a memorandum on the organization of research in the United States. This was published by the Government on 13 December as a document of 42 pages, which was considered important enough for *Nature* to publish a four-and-a-half page summary in its May 1917 number. Lightfoot then travelled extensively and wrote a report on scientific research in England entitled, 'Notes on the Organization of Scientific Research and the Application of Science in Industry'.[9] In London, probably at the urging of Lightfoot, Hughes visited the British Advisory Council of the Privy Council for Scientific and Industrial Research, the visit being recorded in the Council's report for the year 1915-16 in the following terms:

During his recent visit to this country, Mr Hughes, the Prime Minister of Australia, honoured the Advisory Council by attending one of its meetings and explaining the intentions of his Government and their desire for a free exchange of views with the Council and its officers.

Once he had set matters in train for establishing the Advisory Council the Prime Minister had turned his restless energy to other important matters. He had left behind in the capable hands of Senators Pearce and Gardiner the responsibility for seeing that the young organization was not neglected by the Government.

[9] There is a 20-page summary in CSIRO records.

4

THE EXECUTIVE COMMITTEE AT WORK, 1916-1918

THE Executive Committee held its first meeting on 28 April 1916 with Senator Gardiner in the chair and a full muster of all six ordinary members. Its first task was to deal with house-keeping arrangements and W. R. Constable, a clerk in the Customs Department, was appointed temporary Secretary. The Committee decided to meet each Tuesday and Thursday evening, and accepted an offer by the Interstate Commission of office accommodation at 314 Albert Street, East Melbourne.

Members conceived their main task in the early stages to be the collection of data about the problems and personnel on which future work of a permanent Institute was to be based, and they assumed that when they had drawn up the lines along which an Institute should be developed the Government would at once prepare an Act under which it could operate.

In accordance with resolutions carried at the Advisory Council meeting, questionnaires were sent out to State departments, to universities, to industry and to individuals in order to secure data on which activities might be based later. Lists were made of the scientists in laboratories throughout Australia and of problems which called for scientific investigation in primary and secondary industry. A survey was also made of the prospects of providing a regular supply of trained scientists for research work in Australia as the Institute developed.

As a sequel to the Prime Minister's communications from Auckland, information was sought from universities and higher technical colleges about pressing requirements of equipment, staff and scholarships. Public Service Commisioners were asked what encouragement was given to qualified public servants to pursue higher studies in science and to carry on original research while in the service.

The Executive Committee moved to complete the formation of State Committees in the manner recommended by the Council and later approved by the Government.

Members of the Advisory Council had been appointed members of the committees of their own States but in order to secure equitable

representation in each State the Government approved of the following steps:

(a) That the chairman of each State Committee be *ex officio* a member of the Executive Committee.
(b) The local State Committee should elect as its chairman one of its members who was also on the Advisory Council.
(c) That State Governments, in order to even up the constitution of State Committees, should nominate additional representatives, to be appointed by the Commonwealth Government, as follows: Queensland 2, South Australia 3 (one to be a professor of the university), West Australia 2 (one to be a professor of the university), Tasmania 2 (one to be a professor of the university).
(d) State Committees should consist of the members of the Council in each State and a number of associate members appointed by the Commonwealth Government on the nomination of the State Government.

The general theory about State Committees was that they would provide broadly-based liaison with the Council and be at the same time channels of communication in both directions about scientific problems and bodies which could keep Commonwealth-State relations on scientific matters free from friction or rancour. Whatever may have been the effectiveness of State Committees in those early days one thing is certain, Masson placed a high importance on their existence.

From the outset the Excutive had a multitude of matters referred to it by Ministers, by government departments and by primary and secondary industry, and since it had no scientific staff of its own and little money to subsidize research work its lot was not easy. Claims on the time of members were so heavy that before long some of them found those demands too much for men occupying full-time positions. At a meeting on 8 June Lyle moved and Delprat seconded 'that no new business be taken at the meetings of this Committee after 10.30 p.m.'. This proposal appears to have been carried. It came after a series of meetings in which many matters had to be held over until the next meeting because there had been no time to deal with them, but the minutes do not disclose whether the Committee was able thereafter to hold to its decision to stop at 10.30 p.m.

It is of interest to note the frequency of attendance by members of the Committee from April 1916 to April 1917: Professor Masson 79, Professor Lyle 76, A. B. Piddington 46, E. A. Mann 40, G. D. Delprat 38, Professor R. D. Watt 6. G. Lightfoot, who had been appointed Secretary at a meeting on 1 August, attended 55 meetings from that date to the end of the first year.

However, frequency of attendance was not a true indicator of the interest of individual members since three of them, Piddington,

Mann and Delprat, had often to attend to duties in other States, and Watt was tied to his professorial duties in Sydney. Masson, who had been appointed deputy chairman at the eleventh meeting on 8 June 1916, never missed a meeting from April 1916 to April 1917, and Lyle missed only three. Devotion to the task was quite remarkable. It applied to all members since their interest was so great that only urgent business outside Melbourne could induce any of them to miss a meeting.

There can be no doubt that the six men were buoyed up by the conviction that they were laying the foundations of an organization which would give practical expression to their faith in the benefits that would follow the greater application of science to industry.

The attendance of Ministers acting as chairmen, as deputies for the Prime Minister, was of necessity erratic, but they attended at any time their presence was needed for some specific purpose. At other times the deputy chairman, Masson, took the chair. Senator Gardiner chaired the first meeting and four other meetings during his period in office. He was followed by W. G. Spence, who chaired eight meetings at various times towards the end of 1916 and early in 1917, and he in turn was followed by Senator E. D. Millen, who presided at three meetings in the first quarter of 1917. Sixteen meetings in all were chaired by Ministers during this first year, and the other sixty-three by Masson. The good record of attendance at Executive Committee meetings continued throughout the life of the committee.[1]

During the discussions in the early stages of the formation of the Advisory Council, the world 'Preliminary' was always placed before the words 'Advisory Council'. But as soon as the Advisory Council was formed by the Governor-General in Council in March 1916 the word 'Preliminary' was dropped and thereafter the Council became known as the Commonwealth Advisory Council of Science and Industry.

It appears likely that members of the Council and even some members of the Government considered that the intention of the Government had been to set up an Advisory Council which would merely report on the steps needed for the establishment of a permanent

[1] *Executive Committee Meetings Financial Year 1917-18, Attendances:*
Professor Orme Masson* (Vic.) 72, Professor Lyle 68, W. R. Grimwade (Not appointed until 21 August 1917) 47, A. B. Piddington (Frequently absent from Melbourne) 36, G. D. Delprat (Frequently absent from Melbourne) 30, A. E. V. Richardson (Not appointed until 21 August 1917. Absent from Australia for several months) 20, Professor Douglas Stewart (Appointed 21 August 1917, resident in New South Wales greater part of year) 16, Professor A. J. Gibson (Appointed December 1916, absent from Australia several months) 12, Dr F. M. Gellatly (Not formally appointed member until 1 June 1918) 6, H. W. Gepp (Tas.) 5, Professor J. W. Patterson* (W.A.) 4, Professor R. D. Watt (N.S.W.) 4, E. A. Mann (W.A.) 3, C. S. Nathan (Not appointed member until 21 February 1918) 3, Professor E. H. Rennie* (S.A.) 1, J. B. Henderson (Q.) 1.

* Chairmen of State Committees.

Institute of Science and Industry at the earliest date. If that had been the intention, then it was clearly not in accord with the recommendations of the January conference, which had recommended the establishment of an Institute of Science and Industry under an Act of Parliament, but recommended also that, until such an Institute could be established, an Advisory Council should be appointed to start work along the lines which the Institute would follow later. The Conference had appointed a drafting committee 'to formulate proposals to the Government to establish a Commonwealth Bureau of Science and Industry' and its report, which was later endorsed by the Conference and by Cabinet, set out the functions of 'A Commonwealth Institute of Science and Industry' and recommended that it should be set up by Act of Parliament. This report had also recommended, however:

(i) That until the Institute is established an Advisory Council be appointed by the Governor-General in Council particularly to carry out the objects expressed in Resolutions 2(i) and (ii), viz.—'To consider and initiate scientific researches in connection with, or for the promotion of, primary or secondary industries in the Commonwealth', and (ii) 'The collection of industrial scientific information and the formation of a Bureau for its dissemination amongst those engaged in industry'.

(ii) That the Advisory Council be appointed forthwith and that when appointed it immediately take steps to initiate research work into the most pressing matters needing investigation and seek the co-operation of existing institutions and utilize the resources of staff and equipment at our disposal at the present time.

So the Advisory Council right from the beginning had a clear mandate to do more than prepare the way for the later establishment of an Institute; moreover, it was given a budget, a very modest one it is true, to finance research projects.

At the first meeting of the Advisory Council on 14 and 15 April 1916 it had been decided that the next meeting would be held within two months to receive a report from the Executive Committee.

This second meeting was not called until 4 August because, as Masson, who chaired the meeting, explained 'delays had occurred chiefly in connection with the necessary transactions between the Federal and State Governments'. One of the reasons for the delay was that after two months had elapsed State Committees had not been formed in all States, and even at the date of the meeting Tasmania had not yet got its State Committee. The Executive Committee itself had held some twenty-four meetings since its appointment and had circulated to members of Council two reports for the agenda.

The meeting was well attended; some twenty members were present, but Senator Gardiner and the State Ministers for Agriculture were unavoidably absent. The business of the meeting was to discuss the two reports of the Executive Committee. Items discussed in the first report included the collection of data and the problem of 'worm nodule disease' in cattle. Concerning collection of data, some members were rather timorous about asking businessmen for information about their manufacturing processes and figures relating to their business, but others took the bolder view that businessmen would co-operate in the interests of Commonwealth development. It was left to the Executive to collect information in such manner as it judged best.

Worm nodules in meat had caused a considerable quantity of Australian meat to be refused admission to the United Kingdom, so a lengthy discussion was held on this subject. G. E. Bunning of Queensland stated that the disease was innocuous and that the Executive should get in touch, through any useful channel, with Great Britain to have the ban on imported Australian meat removed. The Executive Committee had already considered the problem and, as in other instances, this problem was passed over from the Council to the Executive Committee for action.

In the second report there was a long discussion about the formation of State Committees and about the division of function between such committees and the central Advisory Council. Members tried to devise a means of giving the State Committees clear responsibility and defined areas of work, but without special allocation of funds their role had to remain advisory; although they could support and recommend work, they could not directly supervise or control it. It was decided that no very definite rules should be set for the State Committees, but they should be expected to collect information in their several areas about scientific problems requiring attention and inform the Executive about them; they should keep in touch with work being done in other areas and form a liaison between the Advisory Council and the people of the States so as to give a broad Australia-wide base for the organization. Communication, of course, would be a two-way affair. It was further decided that when the Advisory Council or its Executive had decided to initiate any research there should be a communication to State Committees about it and, if any State Committee wished research to be initiated, it should inform the central body which would in turn advise the other committees and so help to avoid duplication.

One matter which had not previously been brought to the notice of the Executive was raised in the Council: the question of reserving persons engaged in scientific occupations from military service if

compulsory service were introduced during the war. Swinburne said: 'The Minister of Defence has made a statement and is giving effect to it, that all teachers of technical schools should be relieved of service'. Professor Laby added: 'The teachers in technical schools are apparently not desired to enlist, as has been stated, but as regards the staff of the university which teaches science there is no similar provision'.

It would appear that Professor Laby was torn between two different ideas of the duty of scientists to the community; on the one hand he obviously felt that to serve in the armed forces in war was a good thing, on the other he felt that if a scientist were serving in a position in which his scientific training was not properly used in the services it would be better for him to be used outside the forces but in a position which would properly use his scientific training. 'The university' he said, 'would be reluctant to make such an application' (for reserving scientists from service in the armed forces); then, showing how his mind was torn between the two ideas of duty, he said: 'In Great Britain, Oxford and Cambridge have set a magnificent example, ninety per cent of their men having gone'. Referring to science teachers in technical schools and universities he said: 'I think they should all be on the same basis, but I do not consider it desirable for the university to make the actual application for the same treatment for technical college teachers and university teachers'.

The upshot of this discussion was that, although the meeting believed that any scientist who could be used in scientific work in the services should regard such work as his first duty, other trained scientists whose scientific training could not be properly employed in the services would be better employed in some other form of national service which could use their scientific training to the full.

After much discussion, in which individual examples of the use and misuse of scientific training were quoted, Piddington moved:

> that it be represented to the Minister for Defence that the universities and other institutions engaged in the teaching and training of scientific men should inform the defence authorities when such students or members of their scientific staffs enlist whether in their opinion they give promise of being useful for scientific research and in such cases the Minister for Defence should consider the question of releasing them from the AIF.

This motion was seconded by Professor Gibson of Queensland and carried.

After this discussion on a matter of general interest, the Advisory Council embarked on what was to be the only substantial discussion of scientific problems it was ever to hold. (At its next meeting a year

later the whole of the discussion concerned the future of the organization and after that there were no further meetings of the full Council.)

The tick pest in cattle was discussed at length, and Bunning of Queensland gave the history of the early infestation of cattle in Queensland and listed the tremendous losses sustained by the industry when the tick first spread through the country. Although immunity was obtained by the cattle in the areas in which the tick and its attendant fever became endemic, new areas were continually threatened and the tick itself caused considerable loss of production of milk and even of beef where infestation was heavy. The Advisory Council decided to set up a committee to study the question further. This decision does not appear so very inept today since there was not a very great change in the tick position in the next fifty years. Although better sprays and dips are available and more selective dipping times have been worked out; quarantine regulations, restricted stock movements, dipping and spraying are still the order of the day and tick control committees and advisory boards are still operating.

Next on the list for discussion was the sheep blowfly which, the Council was informed, was already being investigated by a committee formed by co-operation between the pastoralists of New South Wales and the State Government. This committee had intimated that its work could cease at the end of the year and had asked the Council to take the problem over. Masson said he agreed that it was one for a Commonwealth body and should be tackled by the organization, but at present was quite beyond its scope. He suggested that the work might be taken up by the permanent Institute when it had been set up and when sufficient money was available to attack the problem adequately.

After considering a few more individual scientific problems (for example wheat breeding and a standard for alcoholometry) the Council, at the request of Professor Laby, took up the question of how to develop scientific and technical education in universities and technical colleges to provide the staff needed by the proposed Institute and trained men for the development of post-war industry. Swinburne, who was also a member of the Interstate Commission, said that the facilities for technical education and training in Australia were very poor indeed in most States and this would greatly limit the opportunities of men returning from the forces after the war who wished to equip themselves for the needs of developing industry. The States, he claimed, had not the means to improve technical schools and scientific education and the Federal Government should assist in this. He moved that:

the Executive should take into consideration the very great desirability, especially at the present time, of the Victorian State Government and the Federal Government having some form of co-operation to build up and further expand both technical and scientific education for the technical schools as well as for the technical universities.

It would appear that Swinburne's motion, in which he mentioned the Victorian Government but not other State governments, was taken to mean all State governments, because the discussion which followed indicated that the motion was so regarded by the other members of the Council. Although some members thought it might be better to hold back the motion for further consideration, the majority spoke strongly in favour of sending it forward. Clark seconded it, saying: 'We cannot get teachers, physicists, chemists and men of various types because there is no opportunity for training them.' It was agreed to unanimously. The chairman indicated that since the full Council had carried the motion it would be implemented, but he regarded it as an instruction to the Executive Committee to give it attention 'with a view to formulating some definite line of procedure.' He obviously thought that the bare motion was not enough and that the Minister needed a definite plan to put before the Government.

Professor Patterson of Western Australia then mounted a favourite hobby horse of his which has some special relevance to the present day; the question of introducing the metric system and decimal currency in Australia. 'In addition to weights and measures' he said, 'of course we would like to see centigrade introduced and in estimating the costs of production it would be found to be of great advantage if we had a decimal system of coinage'. He then moved that:

> the Executive Committee be requested, if it considered the time ripe, to represent to the Federal Government the advantages of the introduction of the metric system with a view to communicating with the Imperial authorities in regard to making the system compulsory.

A Standing Committee later reported that the time was unripe!

This meeting of the full Advisory Council in August has been given a good deal of attention here because the discussions followed the pattern which members had expected when they were first appointed. Experience soon showed, however, that only the small Executive Committee, meeting frequently, could cope with agenda containing so many items and concerned with so many individual problems of research, and that the full Council was too unwieldy and too widely dispersed to handle it.

The full Advisory Council thereafter became a body to which the Executive could turn for support in straits and to which the Execu-

tive could submit reports of its activities. The Executive became the effective body, the Council largely the rubber stamp. Members of the Executive Committee were sustained not only by their strong conviction that scientific research could be of incalculable benefit to Australia, but also by the confident belief that the establishment of a permanent Institute would not be long delayed, but they found their position getting increasingly difficult as time went on. In its report for the year 1916-17 the Executive Committee stated: 'The objects for which the temporary organization was established pending the organization of the permanent Institute for Science and Industry have now been largely carried out'. Clearly members were getting restive at the inactivity of the Government.

Hughes for his part was heavily engaged in the war effort and realized that legislation to establish a Commonwealth research organization could have a stormy passage in Parliament because of opposition of which he spoke to the Council at a meeting held in July. He was content therefore to let the Advisory Council and the Executive Committee carry on as best they could in the hope that some spectacular success or the lapse of time might create a more favourable political climate in which the proposed Bill could be brought forward. Even before they submitted their report of 1916-17 the members of the Executive Committee, and particularly Masson, had realized how difficult was their position since they had none of the authority which an Act of Parliament could give them and yet for effective research work in the more important projects a permanent organization with adequate funds and full-time staff was essential. This was understood too by the Ministers who took the chair at meetings of the Executive Committee. Thus on 13 February 1917 W. G. Spence, after a meeting of the Advisory Committee at which this problem was discussed, wrote to the Prime Minister:

As you are aware I have been acting as Chairman of the Advisory Council of Science and Industry. Very good work has been done by that body and the several State Committees but I am convinced that the limit of their useful work in a practical sense has been reached. To make the Bureau an effective Institution it should be put on a permanent footing with the necessary funds to carry on its work. I strongly recommend that this be done immediately.[2]

Next day Masson wrote to the Prime Minister conveying the views of the Executive Committee:[3]

Resolutions passed by the Executive Committee on the 13th February 1917, for Transmission to the Prime Minister.

[2] Spence to Hughes 13 February CSIRO records.
[3] Masson to Hughes 14 February 1917. CSIRO records.

1. In the opinion of the Executive Committee, the provisional organization of the Institute of Science and Industry is now approaching the limit of possible utility under its present constitution, which gives it financial and executive powers insufficient for further progress.
2. Insofar as the constitution and resources of the provisional organization permit, the purposes for which it was established have been largely accomplished. Several minor investigations involving the expenditure of comparatively small sums of money have been initiated and are now in progress. As regards many of the larger and more important problems, full information and reports have been obtained from experts and lines have been formulated for future action. Moreover, a large amount of information on a variety of matters has been collected and analysed with a view to breaking the ground for the work of the proposed permanent Institute. Efficient action in regard to these problems and matters is urgently needed, but is beyond the scope of the Executive Committee as at present constituted.
3. It is urgently desirable that steps should be taken forthwith to establish the proposed permanent Institute by Act of Parliament.
4. If this be impracticable at present, the Executive Committee should be reconstituted with a permanent Chairman and given such larger financial powers and executive authority as will facilitate the proper development of its work.

This letter was annotated by the Prime Minister: 'I approve a board of say, three persons clothed with executive powers', a statement which was not forgotten by Masson in later discussions.

Hughes had previously informed the Executive Committee that he himself would take over control of the Committee on 7 May from Senator Millen, who had been responsible for approving grants for the Council's work. At that time, Hughes had indicated to the Executive Committee through the Secretary of his department that he hoped to convene a meeting of the Executive Committee or the Council in the second or third week of May. He had not been able to arrange a meeting in May but, after repeated representations, he now arranged to meet the Executive Committee on 9 July in the morning and the full Council in the afternoon. When he finally met the Executive Committee he had to face charges by Masson that since 7 May when he had taken over responsibility for the Council and the Executive Committee from Senator Millen, letters sent to him had remained unanswered: no recommendation sent to the Prime Minister's Department had been approved or even acknowledged since that time. A list of the recommendations which had been ignored was then submitted and Hughes promised that he would see that the matters were attended to. Some time before the meeting he had been given a copy of the 'Report of the Executive Committee on the Organization and Work of the Permanent Institute' and, since

this was the basic document to be discussed with the Council later that day, the scheme was explained to him by Masson.

Masson, supported by Delprat, indicated that the following five points were essential for success:

(a) Of the three directors, one to be a business man, while the two scientific directors should represent respectively the biological and the physical and chemical sciences.
(b) An advisory council in each State.
(c) Authority for the directors to have control over the expenditure.
(d) Control of staff, which should be exempted from the provisions of the Public Service Act.
(e) Erection of national laboratories should be contemplated from the beginning.

Hughes did not like item (d) and, although he said that he generally accepted the views of the Executive on the organization of the Institute, he was careful not to commit himself to any immediate action. He commented on most of the major research problems in a way which suggested that he was still considering that the Council should continue working as it had been doing. The vaulting enthusiasm of his December 1915 and January 1916 utterances had evaporated or been overwhelmed by other matters. He promised, however, to see that a statement was made in the forthcoming Governor-General's speech about the losses due to sheep blowfly, cattle ticks, prickly pear and certain other pests, and a further statement made emphasizing the importance of conducting researches into cotton-growing, power alcohol production and the tanning industry. He asked the Executive for an estimate of the cost of continuing researches on all these problems.

The Council met the same afternoon and Hughes, who chaired the meeting, faced a Council which was in no softer mood than the Executive Committee had been in the morning. In his opening address he said: 'I have ventured to ask you to meet in order that the Government might have the benefit of your advice and counsel with regard to the steps that are necessary to place this scheme which was inaugurated in January 1916 and which has since been under your care on a permanent basis'.

He apologized for his inability to meet the Council earlier but at the same time seized the opportunity to have a little thrust at scientists; he had clearly been stung by Masson's disclosure at the Executive Committee meeting of his remissness in not answering correspondence:

I think (he said) first of all, I owe you very many apologies for not having called you together sooner, but although some of you live in those quiet

backwaters of science where everything goes very well, I have been otherwise engaged and I have not been able to find until now, the opportunity of meeting you to discuss this matter.

It may be noted here that Hughes had returned from Britain in July 1916, a full year before the meeting, and by his own decision he had taken over from Senator Millen responsibility for dealing with the Advisory Council a good two months before the meeting, even though Senator Millen had been handling all the matters presented to him very satisfactorily.

Hughes did, however, congratulate the Council on the good work it had done 'during the past year and six months', though he carefully pointed out that 'no great and outstanding achievement can be claimed during that period'. When he mentioned the year and six months he was thinking no doubt of the original conference in January 1916, forgetting that the Council had been formed only in March of that year, and that the first Executive meeting had taken place at the end of April, thus giving them just fourteen months and not eighteen since they had started their meetings. He stressed too the opposition which he felt existed to the further development of the permanent institute. 'There is a spirit abroad', he said, 'which is somewhat sceptical of good resulting from such an institution as this'. And then again, 'The destructive critics who stand at a safe distance and throw stones are as the sands of the sea in number'. Here, then, was his hedge against undue optimism on the part of the Council, and his way of warning them that further development would not be easy. Later in his address he said: 'While not committing myself to the recommendations of the Executive in detail in regard to the manner and form in which the scheme should take permanent shape . . . in the main I agree with them'. He then spoke of the problems on which the Council should concentrate, mentioning in particular the prickly pear, cattle tick, nodule disease in cattle, the blowfly and the production of tanning liquors and power alcohol; subjects which had been spoken of earlier in the Executive meeting that morning.

Hughes then adjourned the meeting to allow the Council to confer with the Executive since the two bodies had not had an earlier chance to discuss matters together. He joined them later and resumed the chair. Some of the matters troubling the Council were put forward by Frank Leverrier, Chairman of the New South Wales Committee.

When Hughes asked him what kind of man was connoted by the words 'mainly on account of scientific attainments and wide experience' (this being the description of a suitable director for the Institute contained in the Executive's report) Leverrier replied:

S. S. CAMERON

W. R. GRIMWADE

A. E. V. RICHARDSON

We (the State Committee, New South Wales) think the qualifications of the directors of this post should be . . . that they should be men of science, not merely with scientific knowledge, but with wide experience in human affairs . . . We think the man with scientific attainments who has taken a great interest in the application of science would be of the greatest value.

Hughes replied, 'You could postulate of most men of science that they have not any knowledge of human affairs'. And then, 'To which do you attach most importance, the scientist or the man of affairs?'. To this sally Leverrier replied doughtily—for he must have felt that the question was seeking a different answer: 'The scientist, I think, sir', and gave the Prime Minister a little homily on the need for a scientific man as the 'Director for Technical Industrial Improvements'. The Prime Minister said grudgingly, 'I see your point', and then went on to weave a web of possible difficulties if two men of the three were scientists and the third, the chairman, was a business man, so that the scientists might outvote him 'against the common interest of the nation'. The assumption was unquestionably that scientists could not be trusted with 'affairs' and that he could not believe that scientists, who understood 'affairs' really existed.

Leverrier stuck to his point. He said:

The view I take is that you should attempt to get the man I have suggested—the man who, with business qualities and wide knowledge of human affairs, is at the same time distinctly a scientist. Personally I think such men are procurable. We had such a man in Professor Threlfall of Sydney University.[4]

Hughes reiterated his fear that if the business chairman was to be outvoted and:

the views of the other two are to determine the policy of the Directors, then the scheme will be subdued to what it works in, and that will be the scientific atmosphere. If it be not diluted with business experience it will fail, though you clothe it from head to foot with cloth of gold . . . To get the confidence of the commercial and industrial community you must let them see that you are prepared to act as business men and not in the toga of the scientist.

Again Leverrier came back to the fray with clear and cogent argument:

[4] Threlfall was a distinguished graduate of Cambridge University trained in advanced physics, chemistry and engineering chemistry. He studied at Strasbourg in Germany and worked at the Cavendish Laboratory whence he was appointed Professor of Physics in Sydney in 1886. He was a Fellow of the Royal Society. In 1898 he returned to England to private practice as a consulting engineer. In 1915 he was appointed a member of the British Advisory Council of Science and Industry.

It is quite possible that scientific problems will arise and the views of the scientific men will determine the question; but, as regards the business side, I do not think that one should assume that, because a man may have knowledge of men as a business man, he would not have such knowledge as a scientist. The scientists surely would give voice to the man who was appointed by the Government to look after the business side of things. We cannot assume that they are going to overrule one another in that way. I should not think that that was likely to arise in an Institute of this kind. If all three men are of high character—men deeply impressed with the great importance of their task—it follows that each will attempt to do the best in his own line. The scientist will seek where the best means are to be selected in the matter of some problem, and on the business side the man of special qualifications will have the principal views.[5]

On this high note the Council meeting of the 9th adjourned until the 11th. It seems doubtful that the Prime Minister was really convinced; he held his peace and bided his time, for he had other undisclosed fish to fry. Scientists, he must still have thought, are not men of affairs, even though a legal man had wielded cudgels so stoutly on their behalf.

The Council met on the evenings of the 9th and 10th in the absence of the Prime Minister to consider policies and problems which would be placed before him on the 11th when he would be in the chair again. Members agreed to submit two documents to him. The first contained the special report of the Executive Committee on the future organization and work of the permanent Institute and indicated that the Council had approved the report as it stood. Five resolutions of Council carried at its meetings since it had met the Prime Minister were appended to this document. The second was an estimate of the money considered necessary for the first year of work of the Institute.

When the Council assembled on the 11th with Hughes in the chair, Masson reported that the Council had held certain meetings since they had seen him on the 9th and had passed certain resolutions which Masson asked that the Prime Minister might allow him to read without comment. This in itself must have been like a red rag to a bull but Masson read blandly on to the end. Then he suggested that Leverrier or Henderson might be allowed to explain the position.[6]

But the 'fiery particle', had listened long enough. 'The position was sufficiently explained by the resolutions', he said, 'and of these resolutions the fifth,—"That in the unanimous opinion of the Council the new Institute cannot be satisfactorily worked as an

[5] Minutes of meeting on 9 July, CSIRO records.
[6] Resolutions presented to Prime Minister, Appendix 3.

adjunct to any existing Federal Government laboratories'—gave him obvious offence. 'You are not to say what the Government is to do or is not to do!' he exploded. 'To say that it is not to use Government laboratories in connection with a Government scheme is, I consider, beyond your scope'.

He got no soothing syrup from the Council. First Masson took up the argument with his usual strength in reply, and then came Piddington's turn. This was Piddington's day, as the earlier meeting day had been Leverrier's, and the law again brilliantly stood up for the freedom of scientists to work without undue restraints, and for freedom of scientific research institutions to operate without undue Government control. The argument ran like this:

The Prime Minister: From what Mr. Piddington said the day before yesterday, it appears that there is a strong difference of opinion between the Government Analyst and this Council. What am I to do with that? . . . you say you will not be an adjunct with Federal Government laboratories Well what are we going to do with these laboratories?.
Piddington: Use them!
The Prime Minister: Are they to be in this scheme by themselves?
Piddington: The Government would use them through the Institute.
The Prime Minister: Practically you say that for the present direct control by the Government you propose to substitute control by the Institute.
Piddington: The present Government laboratories are used for departmental purposes, but we understood that you proposed to establish a new institute to be specifically directed to constant intercourse between science and industry. Our opinion is that you cannot develop or evolve it out of Government laboratories which are made up for different purposes altogether.

At this point Hughes hastily changed the subject, saying that the real problem of the Institute would be to find a man who would direct it, and he agreed to Masson's suggestion that he might consider the names of persons thought by the Council to be qualified for the post. A list of such names would be received, he said, 'entirely without prejudice'.[7] He promised to recommend to his Cabinet that £10,000 be provided for the use of the Council for the financial year, but added: 'I hope this will not be a hardy annual, because it will be a thorny subject'. He warned them further, when discussing research problems: 'You have to make good with some of these'.

The proceedings terminated without the usual vote of thanks,

[7] The list was to be made up under three heads:
(a) Those specially fitted for the chairmanship.
(b) Those suitable to advise and control in matters connected with the primary interests, pastoral and agricultural.
(c) Those specially useful as directors in connection with mining and secondary industry.

and it is to be noted that Hughes although approving in principle the scheme for the development of the permanent Institute did not commit himself about the time of his next move.

The fact seems to be that although members of Council considered the setting up of a permanent Institute a matter of extreme urgency, since they felt that they had done all they could as a temporary Advisory Council, Hughes himself was reluctant to put the matter to the test of parliamentary debate at that time. He probably assessed the opposition as being strong and preferred to wait for more favourable omens before going ahead.

Between the urgency expressed by the Council and the evasiveness of the Prime Minister, the meeting was not a happy one, but some progress was made. The Governor-General's next speech at the opening of Parliament contained a statement about the work of the Council and the value of scientific research generally. Moreover, the meeting had the effect of unifying the Council behind the Executive; and some money had been promised. The Council continued to function with just enough money to allow it to support a minimum amount of research work and it was assured of continuous attention from a Minister who would be the acting chairman in the absence abroad of the Prime Minister.

In letters to his elder daughter then in London, Masson, who wielded a pen with skill, told the story of the meetings more pungently than has been possible in this account.[8] On 12 July he wrote:

This has been a busy week of Science and Industry. Hughes appointed 3 p.m. on Monday to meet the whole Advisory Council, most of whom had to come from other States. On Friday he coolly sent a message that the hour was to be 12 noon—too early for some of those who had planned to arrive from Sydney at 1 o'clock, though some of these got wires in time to catch a steamer that got here on Monday morning. Then, late on Sunday evening, I had a private message that Hughes would meet the Executive at 11.30 a.m., before meeting the others, and I managed to collect the more important members. This was really a belated concession to many urgent representations from us that the Executive *must* see him first,—else there might be trouble, for we were certain Hughes knew absolutely nothing of our work. On Sunday afternoon we had the majority of the Council and Executive here (Chanonry) for a talk, and we agreed on the main lines of action—viz. to take our stand on the necessity for immediate legislation to found the permanent Institute on the exact lines of the Executive's recent recommendations (submitted to Hughes in a special report and never acknowledged).

At the 11.30 meeting it was quickly evident that Hughes meant to do the talking and was inclined to dictate to us; also to take up the attitude

[8] Lady Bassett of Melbourne in a letter of 13 June 1964 to Guy B. Gresford, Secretary CSIRO. CSIRO records.

that it was impossible to find scientific men sufficiently versed in business and organization for the position of Directors. You can fancy we were not in a mood for this; and it gave me satisfaction to say (1) that he had sent us a message about three months ago that he was now going to take personal charge of our work, (2) that we had not once seen him, in spite of repeated attempts to do so, (3) that we had during that time sent him seven important letters (typed list, with dates and details, handed in) not one of which was even acknowledged, (4) that this was not what we called business, (5) that either he must make other arrangements giving us proper powers, or we must ask him to seek other advisers. That rather brought the little man to his bearings and he was fairly polite for the rest of the Monday sittings. He even consented to my suggestions that we should confidentially send him the names of Australian scientists qualified for Directors; and he also agreed to give us more money to go on with in the meantime and power to spend it without specific reference to himself; also to give us a ministerial chairman who would really keep in touch with our work.

The Council sat all Tuesday and the Executive between times and we went again to Hughes, by his appointment, at 11.30 on Wednesday—armed this time with much sound advice for him in the form of specific resolutions. But now we found him in a worse mood, for he would have none of our advice and proceeded to scold us, forsooth, for offering opinions he had not asked for!

So there were more ructions, and I shouted (luckily one can shout, for he is deaf!) that we claimed the right to express any opinions we pleased and that, if he did not like them, he was only too welcome to find other advisers. Once more the recipe worked pretty well, but this time he got rather sulky and when he left us finally he did not even say good-bye or thank the delegates from distant States—nor any of us for our work of the last 15 months. However, he has promised to introduce the Bill (but will he?) and has asked us to carry on meanwhile and given us £10,000 for researches and as much as we may need for administration. It is all rather amusing and—in the upshot—not unsatisfactory. Personally, I rather enjoyed myself but, my dear, a Prime Minister really ought to have something besides patriotism brains and self conceit.

Since it was wartime and letters could readily go astray, he wrote to his daughter again on 19 July telling the same story more succinctly, but equally racily:

We wrote to you last week (posted Friday 13th via India) and I gave you an account of our Sc. & Ind. Conference with Hughes. In case of accident to that letter, let me repeat briefly that I feel disappointed with Hughes (as Oscar Wilde felt with the Atlantic Ocean) not to say sick (as lesser folk do) but that we have his promise—for what it is worth—to go on with the permanent Institute and his commission to continue our labours meanwhile, with £10,000 to spend on researches. Also he accepted

our offer to supply his sceptical majesty with the names and descriptions of Australian scientists who have some modicum of organizing ability (possible Directors).

On 15 August, he wrote:

The Sc. & Ind. goes ahead and is busy, though we have had no contact with Hughes since our conference,—not even an acknowledgement of our confidential list of men fitted for the positions of Direcor of the permanent Institute, a thing that cost us a good deal of time and trouble.

At this point in the letter Masson allowed his irritation with the Prime Minister to burst through his habitual restraint: 'Pity' he added 'he is not even an imitation gentleman!'

It was with a considerable sense of frustration that the Council, and particularly the Executive, returned to work. Having corresponded with the chairmen of the State Committees about the list of names of those considered suitable to direct the affairs of the proposed Institute of Science and Industry and duly delivered the list to the Prime Minister, the Executive settled back to the task as before.

Since funds were so very limited and it had no permanent laboratories of its own the Council was restricted in its methods of attacking problems. First, it sought to get all possible existing information about the problems both at home and abroad and in this work the science abstractor, W. B. Alexander, was a key man; he had good sources of Australian scientific publications in the Victorian Public Library and in the scientific branches of the State departments. From England he could obtain scientific material from the Committee of the Privy Council for Scientific and Industrial Research, from the Imperial Institute and the Colonial Office. From the United States much valuable material could be had from the Department of Agriculture and other departments.

After collecting existing information, the Executive Committee called in recognized experts to discuss each problem. Such experts as Dr J. A. Gilruth and F. E. Trollope were interviewed about problems of the meat industry; Dr. J. H. L. Cumpston of the Commonwealth Health Department was interviewed on the quarantine laws in relation to the introduction of insects from abroad; A. O. Barrett of the firm of Barrett Bros was consulted on problems of the storage of grains; a host of others were interviewed in appropriate fields of inquiry. A special committee was then set up to deal with each specific problem and, if thought fit, an allocation of money from the Research Fund was made to assist the chosen research project. The money could be used in the first instance to examine problems to see if promising lines of investigation could be found and if satis-

factory lines could be identified then full-time investigators, usually seconded from State Government departments or from universities, were appointed to carry out the scientific work.

The Executive Committee in its fifty-six page report of 2 July 1917, listed twenty committees set up to investigate individual problems in both primary and secondary industry. The report devoted a special section to the prickly pear problem, in which a joint effort of the States of Queensland and New South Wales with the Commonwealth Government was recommended. The sheep blowfly was reported as being under investigation by government scientists in New South Wales working in collaboration with the Pastoralists Association but the Executive Committee took no active part in the work at that time. In the circumstances under which the Executive Committee operated the report makes impressive reading.

Under the heading 'Agricultural and Pastoral Industries' ten major problems, ranging from ticks to prickly pear, were listed, and an equal number under the heading 'Forest and Vegetable Products'. Add to these the problems of 'Fisheries', of 'Mining and Metallurgy', of 'the Chemical Industry', of 'Standardization' and of 'Other Secondary Industries', and it can be seen that the Executive could hardly avoid being snowed under by the multitude of problems which industry, both primary and secondary, had showered upon it. To give even minimum attention to this vast array of problems on a total budget of £10,000 a year and to maintain a Bureau of Information and to keep in touch with the State Committees sufficiently to make them feel that they had a meaningful place in the Council's activities were tasks which could only be done by spreading resources so thin that few problems could be pursued with vigour.

Meanwhile the legislation for setting up the permanent Institute was making no headway. Early in October 1917 Masson voiced the concern of the Executive to Senator Russell saying that the Committee feared that soon the view might be taken that it could be left to function indefinitely while the interest of the country urgently required a permanent organization.

Senator Russell promised to try to see the Prime Minister soon and expressed the opinion that there might be a fair chance of getting a Bill introduced early in the session the following year. If he were able to see the Prime Minister in the next few days he would report back to the Executive Committee in the following week. It appears that he was unable to see the Prime Minister at that time, or else that the Prime Minister gave no satisfactory reply; Russell did not appear at the Executive Committee again for some weeks, and when he did he made no mention of the matter, so the year closed without further progress towards a permanent Institute.

In April 1918 Russell informed the Executive Committee that: 'the Prime Minister was arranging for the Bill to be introduced *and passed* at the present session of Parliament'. The Prime Minister, he said, would be leaving for England soon to attend the Imperial Conference.[9]

At a meeting on 25 April the Executive Committee, through Lightfoot, received a message from Senator Russell that Dr F. M. Gellatly, Financial Editor of the *Sydney Morning Herald,* had been appointed Chairman of Directors of the projected Institute of Science and Industry and that immediate steps were being taken to introduce the promised Bill to establish the Institute.

The Executive Committee accepted Dr Gellatly's appointment with considerable grace, especially in view of the fact that members had no warning that an appointment was imminent and that the appointment was made before the Bill to set up the Institute had been drafted, let alone introduced. During his term on both the Council and the Executive Committee Dr Gellatly made a good impression on his fellow members and was able to contribute much to the work of the Council as a result of his administrative ability and his understanding of the points of view of the scientist, the politician and the man in the street.

[9] Hughes left in April and did not return to Australia until late in August of the following year.

5

GELLATLY TO KNIBBS, 1918-1920

THE Prime Minister, W. M. Hughes, announced in the *Commonwealth Gazette* of 26 April 1918:

His Excellency the Governor-General in Council has been pleased to appoint Dr Francis Mephan Gellatly as Director of the Institute of Science and Industry with salary at the rate of £1,250 per annum.

This appointment was an earnest of the clear intention of Hughes and his Government to go on with the legislation to establish the Institute on a permanent basis, so when Senator Russell told the Executive Committee of Dr Gellatly's appointment he told it also that steps would be taken to introduce a Bill immediately.

In the report of the Executive Committee for the year ended 30 June 1918 it was recorded that Dr Gellatly had been appointed a member of the Advisory Council and of the Executive Committee pending the passing of the legislation to set up the permanent Institute and the appointment of two scientific colleagues who would be co-directors. His appointment to the Advisory Council and the Executive Committee would bridge the gap until he should be given his proper place as Chairman of Directors and, although it was intended that this should apply after the passing of the Act, what happened in fact was that Gellatly served for the rest of 1918 on the Executive Committee as an ordinary member, but in January 1919 by ministerial direction he became Chairman of the Council and of the Executive Committee.

Although in the *Gazette* he is referred to as Director of the Institute, it was obviously intended that he should be the Chairman of Directors, and he is referred to as Chairman of Directors in the minutes of the meeting and elsewhere; it was clearly understood that he should be chairman of a directorate of three. As such he was welcomed without rancour by the members of the Executive Committee, who looked forward to the early appointment of the two scientific directors. The rather sudden appointment of Gellatly seems to have been due to Hughes's desire to have a 'man of affairs' appointed as Chairman of Directors before he himself left for Lon-

don. As it happened, Gellatly, whom he knew personally and who was a 'man of affairs' of the kind he wanted, was ready to his hand.

Gellatly's experience fitted in well with the image Hughes had of the kind of man who should be Chairman of Directors. After leaving high school he served for two years as a forestry cadet in New South Wales there gaining experience in one phase of land use. He joined the staff of the *Sydney Morning Herald* in 1893 and, except for a short period when he did actuarial work for the Equitable Life Assurance Society, he served the *Herald* until he joined the Institute. He was the highly respected Financial Editor of the *Herald* for over twelve years, and in that position gained a wide knowledge of business and of the Australian economy. He found time to study law at Sydney University and obtained his first degree (LL.B.) in 1912. In that year he travelled to Great Britain and to the United States of America to widen his experience and enhance his knowledge of economics and commercial journalism. On his return to Australia he was called to the Bar and, although he did not practise, he pursued advanced studies and was admitted to the degree of Doctor of Laws in 1916.

After obtaining his doctorate Gellatly indicated to Hughes, whom he had known for a number of years, that he would be available if required for some suitable appointment in the Commonwealth service.[1] The appointment having been made, Gellatly paid a courtesy call on the Executive Committee at its meeting on 30 April but did not take up his official duties until 1 June 1918. He attended the meetings of the Executive Committee from that date onward. Masson retained the Deputy Chairmanship for the time being and relations with all members of the Executive Committee remained harmonious throughout the period. Gellatly found himself in full sympathy with the policies of the Committee: he was personally acceptable to them and they to him. Thoroughly familiar with the Press and understanding well the power of publicity, he set out at once to inform the public of Australia, or at least such part of it as he could reach through public meetings, private discussions and the newspapers, about the proposed Institute and the benefits which must flow to the nation from researches which it would undertake.

He visited each State addressing public meetings, meeting leading men in politics, in high public office, in commerce and industry. His campaign was well planned and reached out to a great number of people in all walks of life; and since he was known favourably to so many people in the newspaper world he had a consistently good

[1] In a letter (8 July 1964) to the senior author Mrs Agnes Gellatly wrote: 'Mr Hughes knew my husband for many years when my husband was Financial Editor of the Sydney Morning Herald. Mr Hughes often asked his advice concerning financial affairs of state'. CSIRO records.

Press. There were very few voices raised against him although, on one occasion when the Institute Bill was being discussed in the Senate in November, Senator Foll from Queensland criticized the appointment, but cast no slur on Dr Gellatly personally.

During his visits to the States Gellatly did all he could to sort out Commonwealth-State relations where there were difficulties in such matters as co-operative work on prickly pear in Queensland and New South Wales and the Forest Products Laboratory in Western Australia. He pointed out how it would benefit not only the Commonwealth but the States themselves if New South Wales and Queensland could co-operate with the Commonwealth in prickly pear research. Later the correctness of this view became abundantly clear in the work of the Commonwealth Prickly Pear Board.

In Western Australia the Minister for Industries, R. T. Robinson, warmly welcomed him and co-operated to the maximum in establishing close liaison between the Advisory Council and Western Australia. A letter from Robinson to Gellatly dated 6 November 1918 shows not only the personal goodwill which existed between the two men, but also the strong official support for the Institute which was coming from Western Australia and which continued throughout the period when the Bill was going through the Houses of Parliament and thereafter. Robinson wrote:

> I am glad to get your letter of 28th ultimo, the critical vote in the Senate being beaten by such a big majority of 17 to 2 argues well for the Bill and from what Nathan tells me, there would seem to be no doubt that it will go through without any further trouble.
>
> I am very glad that the Government of Western Australia has been a help to you. Personally I cannot see how any Government can oppose the constitution of so essential an Institute as yours. The fact that Queensland and New South Wales are both co-operating in the matter of finance would lead one to believe that the opposition comes not from the Government itself, but from the scientific heads, who consider that the establishment of a Federal Institute will cut out their own little departments and laboratories.

For the rest of 1918 Gellatly played his part as a member of the Executive Committee, carried on the work of publicizing the Institute, saw Ministers from time to time about the progress of the Bill and informed himself on all phases of the work of the Council.

His forays into the different States bore fruit. Not only was he able to publicize the value of the Council's work and the work of the Executive Committee, but he was able in his dealings with State officials and Governments to allay considerably some of the suspicions of the Commonwealth's intentions, and even succeeded in obtaining additional funds for scientific work. After a visit to

Queensland and New South Wales in August that year he reported to Senator Russell:

It would seem that as a result of my trip north the Institute will have at its disposal some £5,000 or £6,000 a year of State money to dispense while at the time having full use of State Officials and State Laboratories.

Perhaps the phrase 'having full use of State Officials' was not happily turned, but in his enthusiasm he was not able to see as clearly as he would have done later that State officers would very happily co-operate with the Commonwealth on equal terms but could not be *used* by the Commonwealth.

At the beginning of 1919 the Government placed the Advisory Council and the Executive Committee under the direction of Massy Greene, the Minister of Trade and Customs, and under arrangements made by the new Minister, Gellatly became Chairman of the Council and of the Executive Committee. Further, in April of that year, by direction of the Minister the name of the organization was changed from the Advisory Council of Science and Industry to the Commonwealth Institute of Science and Industry. In practise the older name tended to remain pending the passing of the Act. In the minutes and in official correspondence it was called the temporary or the preliminary Institute until the permanent Institute was established.

Gellatly took the chair at Executive meetings, again without rancour on the part of Professors Masson and Lyle or of the other members. What did annoy the two professors, however, was that they had not been consulted about all the changes before they took place, and that without discussing the matter with them executive authority had passed from the Executive Committee to the Director. They were afraid also—and their fear proved to be fully justified—that the appointment of the two scientific directors might be postponed indefinitely. A fear which they shared with Gellatly was that since the Minister for Trade and Customs was to be the one through whom administrative arrangements were made there might be some interference by his department.

Part of this apprehension was due to the fact that Wilkinson, the Federal Analyst, was an officer of the Department of Trade and Customs and was believed to have opposed the development of the Institute and to be still opposing it. At a conference between the acting Prime Minister, W. A. Watt, and the Executive Committee on 19 May 1918, Masson spoke of the need for the Government to advise Commonwealth departments to co-operate sympathetically with the Advisory Council and said that the Customs Department was particularly lacking in understanding. 'In the Customs Depart-

ment,' he said, 'we knew from the beginning that we have a sworn enemy there.' Watt said: 'You do not call him a sworn enemy do you? He is a member of the Council!' Masson replied: 'He has never attended a single meeting; as a member resident in Victoria he is a member of one of our standing committees and he has never attended a meeting of that either . . . and he has told people from the beginning that he was going to smash our organization if he could.'

Therefore, some months after the meeting, the news that they had been transferred from the care of Senator Russell to that of the Minister for Trade and Customs must have been particularly galling. The enemies within the Commonwealth Public Service were, however, less a danger to the progress of the new Bill than the enemies in the various States, and in order to give an especially important illustration of opposition from the States it is necessary to go back again to May 1918, the month after Gellatly had been appointed but before he had taken up duty.

Early in 1918 the Advisory Council had set up its State Committees, had started investigations and had produced a number of bulletins, *'The Cattle Tick in Australia'* being No. 1 in the series.[2] These activities had alerted officers in the State Departments of Agriculture to the fact that an organization for scientific research was actually competing with some of them in a few of their own cherished fields of study and this caused some resentment among State officers working on problems dealt with in the bulletins. To make matters worse, some members of the Executive Committee before the advent of Gellatly, had written, or had caused to be written, letters addressed directly to individual scientists in State Departments of Agriculture instead of addressing them to the heads of the department concerned. This error in procedure was obviously the result of lack of administrative experience in the sensitive relationship between the Commonwealth and the States, but the result was that some heads of departments were offended and criticism filtered through to the State Ministers.

One particular area of irritation had come into the open on 8 May 1918 in Sydney at an interstate conference of Ministers for Agriculture and, since this was perhaps the most acute direct opposition which the Commonwealth Government ever experienced from the States in relation to scientific research, it is worthy of fairly extensive notice.

The meeting of State Ministers was attended by D. S. Osman, Minister for Agriculture, Victoria; W. M. Sieman, Minister for Agriculture and Stock, Queensland; E. A. Anstey, Minister for Crown Lands, Agriculture and Repatriation, South Australia; and W. C.

[2] List of publications issued by Advisory Council and by The Institute of Science and Industry 1916-1925. Appendix 4.

Grahame, Minister for Agriculture, New South Wales. There was no representative of Western Australia or Tasmania.

The four Ministers discussed at length instances of what they considered to be encroachment by the Commonwealth on the functions of the State Departments of Agriculture. Two areas of encroachment they said were (a) the War Precautions Act and (b) the establishment of the Advisory Council of Science and Industry. Only with the second will we be concerned here. Since the war started, the Ministers claimed, the Commonwealth had, under cover of war emergency, made these encroachments, and they prepared a memorandum setting forth actual cases of what they considered to be encroachment by the Commonwealth Government on the functions of the State Departments of Agriculture. This memorandum, which was prepared for submission to the Premiers' Conference in Sydney the day after the meeting of the Ministers for Agriculture, was rounded off with a resolution which, although open to a number of interpretations about the meaning of certain words, left no doubt about the intention of the four Ministers:

This conference unanimously resolves that the Honorable Premiers will request the Commonwealth Government to cease the procedure at present being carried out whereby unnecessary expenditure is being incurred in the assumption of functions by the Commonwealth which are at present being efficiently performed by the States.

The Premiers of all six States attended the conference, plus another Minister from each of five States and two from New South Wales. The acting Prime Minister, W. A. Watt, and the acting Attorney-General, Littleton Groom, represented the Federal Government.

The item from the four Ministers for Agriculture came up for discussion on the fourth and fifth days of the conference and the president, W. A. Holman, Premier of New South Wales, the State sponsoring the resolution, led the attack on the Commonwealth. Holman, a strong advocate of State rights attacked the Commonwealth with great vigour; he was only too pleased to use this particular stick to belabour the Commonwealth. The Commonwealth for its part had, in Watt and Groom, two men particularly well qualified to defend its policies. Watt had been a Minister in the Victorian Parliament before entering the Commonwealth Parliament and had been a strong supporter of State rights; and Groom had been a strong advocate of Commonwealth interest in scientific research almost from the first year of federation.

Opening the discussion Holman said flatly:

We are unable at present to see what functions the Bureau of Science and Industry can perform which will not be a direct duplication of

functions already discharged by the various scientific departments of the States.

In defence of Commonwealth policy Watt presented a memorandum entitled 'Establishment of Commonwealth Bureau of Science and Industry' which dealt with the origin of the Council in 1916, the problems attacked by the Council, the proposed permanent Institute of Science and Industry for which the Bill was about to be presented, the urgent need to establish such an Institute in view of the problems waiting to be solved and the appointment in April of Gellatly. He charged that Holman had made a statement to the Press three days previously which said: 'The Commonwealth had founded a Bureau of original scientific research which represented nothing but a duplication of the scientific departments of the States.' This statement, Watt said, was incorrect. Holman made no apologies for his Press statement and was not at all impressed by the memorandum. 'Nothing,' he said, 'so far has been enumerated which the States cannot do.'

The meeting then began to discuss individual research problems. The Premiers from different States were interested in different subjects and the heat rather went out of the argument for the time being, but at the the end of the day, when Watt asked Holman: 'Mr President, do you withdraw your attacks on the Commonwealth?.' The answer came back at once from Holman, 'No, I shall resume it at ten o'clock tomorrow.'

This he did the following morning but, having seen that if heads were counted he would not be sure of a majority for his anti-Commonwealth attitude, he contended himself by making a further attack, ending with the phrase, 'with these observations I am prepared to leave the matter'.

Others, however, were not prepared to leave it there. Watt spoke further in defence of Commonwealth policy and Groom gave a thoughtful speech showing that great national benefits should flow from scientific research done by the Commonwealth. The president was less than mollified and suggested that the Commonwealth could use the same kind of argument for taking over any State function. Both Watt and Groom challenged this statement and after a few more sharp exchanges the president, who must have felt that his willingness to 'leave the matter' should have ended discussion, came to the boil saying:

This discussion is becoming more academic as we go on and having made my own protest and explained my view that this is one of the most unwarranted and impudent assumptions of State powers on the part of the Commonwealth which is doing work it is under no obligation to undertake I will let the matter rest.

But rest is what the matter could not be allowed to do after such an outburst. Said Watt: 'I cannot let the matter rest at that point. The use of the term "an unwarrantable and impudent assumption of powers" is not the way to add to the harmony of discussion and I take leave to throw these words right back.'

Holman admitted grudgingly: 'It is no desire of mine to give offence to the representatives of the Commonwealth.' Watt replied: 'I can assure you, Mr President, that your words do offend.'

The calm voice of the Premier of South Australia, R. H. Peake, was heard at this point. He claimed to be a strong defender of State rights in most matters, but science he thought, was different:

> No scientific discovery will be purely a State affair: If the Commonwealth can show us that we are going to have increased efficiency without duplication of the cost to State Departments . . . then I for one will heartily support the Commonwealth taking over the whole of the departments of scientific research because I think they would do the work much better. Research does not belong to any one State, it is a matter affecting the whole Commonwealth.

Western Australia had consistently supported scientific research by the Commonwealth and now the Premier, H. B. Lefroy, commented: 'There are many diseases of stock that are common to the whole of Australia and I am of opinion that better research work could be done by a central body.' The Premier of Victoria, H. S. W. Lawson, said:

> I think we might reasonably welcome this institution as being capable of doing something which unfortunately the States have not succeeded in doing. In the State activities and State enquiries there have been overlapping and duplication, but by means of centralization more satisfactory results can be achieved.

After that there were no more fireworks, but neither were there any gracious exchanges to restore harmony. Watt suggested that a motion for full co-operation by the States would help matters along, but this was not accepted as a motion and the president finished the session by saying, 'We will leave the matter for further discussion'. As it happened no further discussion took place and the record of the meeting on the sixth day of the Conference merely carries: 'Item 2, Establishment of Commonwealth Bureau of Science and Industry. The orders for the day for the consideration of these questions were discharged.' The Premiers then returned to their States.

Some echoes of the discussion were heard in the Commonwealth Parliament when the Institute of Science and Industry Bill was introduced about four months after the May conference. Duplication

of State services and unnecessary expenditure were the two main arguments used by those opposing the Bill.

The members of the Executive Committee became aware of the criticism at the Premiers' Conference through the newspapers, but they may not have actually seen the memorandum by the Ministers for Agriculture or the minutes of the Premiers' Conference. They were sufficiently concerned, however, to seek the interview with Watt on 28 May described earlier, so that they could discuss further means for co-operation with the States and means for reducing anti-Federal feeling in the States. At that meeting Watt had advised them the anti-Federal feeling had already largely disappeared.[3]

The weight to be given to the word 'largely' in that context is still hard to assess. The evidence of anti-Federal feeling at the Premiers' Conference must have made Gellatly, who took up his duties at the beginning of June, decide that he must make a very special effort to gain the friendly co-operation of the States; hence his visits to all States and his explanatory speeches.

The Institute of Science and Industry Bill[4] was introduced into the Senate and read for the first time on 21 September 1918. The second reading was moved by Senator Russell, who quoted again the mistake that Britain had made before the war and during the early part of the war by neglecting science. He reminded Senators that Britain could not at the beginning of the war produce a khaki dye of constant colour and stability for the uniforms of her soldiers and had been dependent upon Germany also for drugs, optical glass, tungsten steel, magnetos and zinc. He added:

> There has been a belated recognition of this sad mistake on the part of the British people, and a universal attempt is being made throughout the Empire to direct attention to the seriousness of the position and to stimulate a higher scientific education with the object of the definite establishment of our industries and our resources generally.

He pointed out the attention paid to scientific training and research in the United States, Japan and Canada, as well as in Germany, all aimed at improving production in both primary and secondary industry. Later in the debate strong support came from Senators Pearce and Millen.

The attack on the Bill was led by Senator G. Fairbairn, who ignored references to the exigencies of war and set the pattern for other opponents of the Bill by dwelling on the heavy expenditure involved and the danger of overlapping State activities. He had no doubt heard of the resolution carried at the meeting of the Ministers for Agricul-

[3] Minutes of meeting of Executive Committee with W. A. Watt, 28 May 1918. CSIRO records.

[4] For copy of 1918 Bill, see Appendix 13.

ture and of the discussions about the Institute at the Premiers' Conference. He said the Commonwealth would be 'involved in huge expenditure which at present I contemplate with horror'. He thought it would be better in any case to wait for results from overseas, a much more economical proposition! Moreover, he pooh-poohed the value of scientists in any case.

This contempt for the scientist and respect for the practical man—'the man of affairs'—was expressed freely by both sides. It is difficult to estimate the true meaning of this apparent contempt, but there is no doubt that it still existed in the Australia of that day. Recognition for achievement was limited to the practical pioneers who cleared the bush, grew the crops, reared the sheep and cattle and mined the earth for minerals, and for the men who turned the produce of the land into hard cash by selling at home and overseas. The obverse of this was the real or assumed belief that scientists and other scholars were mere theorists, with heads in the clouds and feet off the ground. Senator J. Grant referred sarcastically to scientists 'not caring to do productive work' and to young scientists 'who are out to get soft jobs in magnificent suites of rooms in Melbourne, but are not interested in the prickly pear lands'.

Senator H. S. Foll exploited another angle when he hinted darkly, 'it was a whim of a member of the Government[5] who desires to create fat billets for two or three gentlemen, one of whom[6] has already been approached'.

Senator Gardiner defended the Bill strongly and said: 'It will cost a lot of money and so it should, it's a good thing that we must always pay for.' He forecast that 'it would and should be a huge department which must be paid for'. Senator M. Reid of Queensland spoke strongly in favour and rubbed salt into some wounds by saying that many State departments were failures. Amendments designed to delay application of the Bill for five years and to consult the States further before taking any action were defeated. The Bill passed all stages in the Senate and was sent on to the House of Representatives on 27 November 1918.

In that House, Groom, then Minister for Works and Railways and acting Attorney-General, moved a first reading of the Bill that same day. Thereafter there occurred an interval of nine months during which the Bill was withdrawn and considerable discussion about it took place between the Commonwealth authorities and the State Governments. As was to be expected, Holman continued his opposition and in a telegram dated 11 October 1918 to the acting Prime Minister he had said:

[5] The Prime Minister, W. M. Hughes.
[6] Dr Gellatly.

Your confidential letter 14 September: this Government informed that Senator Russell postponed the Institute of Science Bill to obtain opinions of States. If this correct beg you convey to him opinion of this Government is unchanged that duplication of effort involved is undesirable and will lead to large avoidable expenditure both money and effort. As you are aware we have accepted it as accomplished fact but if now matter is open to reconsideration beg you will understand that we are emphatically of opinion formerly expressed.

Discussion with the States continued and on 20 January 1919 a further communication was sent by the Premier of New South Wales to the Prime Minister suggesting a basis of co-operation which would be satisfactory to him. This letter is quoted here in full since it is important in itself and also because the Premier of Victoria received a copy and probably the other Premiers also:

Referring to previous correspondence with respect to the activities of the Commonwealth Bureau of Science and Industry, I have to inform you that I have given careful consideration to the steps which should be taken to ensure that no duplication of the work occurs in connection with the scientific investigations of the State and Commonwealth Governments. In order that such duplication may be avoided I would ask that the Director of the Bureau will, before embarking upon any investigation, communicate with the various State Departments interested in the particular subject under review and ascertain whether the matter has already been the subject of attention by State scientists. If it be found that any of the State Departments has already been investigating the problem under consideration, then, in my opinion, the Bureau should confine its activities to subsidising the State or States which have undertaken the work and to making suggestions for the more efficient performance of the work.

If, on the other hand, the problem has not been the subject of inquiry by the States, then I think the Commonwealth should, before authorizing the Bureau to commence an investigation, invite the views of the States and ascertain whether the States' Scientific Departments have adequate facilities for carrying on the work.

In other cases, namely, in those in which the State Governments have no facilities for the proposed investigation or in which the problem is one which can only be dealt with by a central organization, then the Bureau should undertake the whole of the work and ask the States for such assistance as it may need.

The State Departments will, I feel sure, be glad to have the advice of the scientific experts of the Bureau, and if the actual carrying out of the experiments be left to the State Departments I am convinced that the State and Commonwealth officers could work harmoniously together and that any danger of overlapping could be avoided. I would ask for your concurrence in the adoption of the procedure outlined above.

The Premier of Victoria advised the acting Prime Minister:

The scheme which Mr. Holman has outlined in his letter appears to this Government to afford a satisfactory basis for co-operation between the Commonwealth and the States in this matter.

The Premier of Queensland, T. J. Ryan, who had joined with Holman in some opposition to the Advisory Council at the Premiers' Conference, wrote to oppose the proposals in the Bill. Inter alia he said:

I desire to bring under your notice that this State and probably certain other States do not agree with the proposals and that it is essential that the States and the interests referred to should be adequately represented and possess some controlling interest in the councils of the permanent institute if established.

Even Peake, Premier of South Australia, who had supported in principle the scientific work by the Commonwealth at the Premiers' Conference of May 1918, now found it expedient to write to the acting Prime Minister in February 1919 saying:

I have the honour to remind you that the Government of this State does not view with favour the establishment by the Commonwealth Government of an institute which will have the effect merely of duplicating and overlapping scientific departments now existing in the several States.[7]

A copy of the letter of 20 January from the Premier of New South Wales had been sent to the Advisory Council, and the members of the Executive Committee had given some thought to a possible reply. They could see that acceptance of the New South Wales proposals would hamstring the Commonwealth and prevent almost all research work from being undertaken.

A. B. Piddington prepared a draft reply to the letter and with little alteration it was adopted and dispatched by the acting Prime Minister on 14 April to the Premier of New South Wales.

As one would expect from a legal man of Piddington's stature the letter was a subtle blend of acquiescence and reservation which did not commit the Commonwealth to anything but communication, consultations and co-operation with the States. The letter said:

With reference to your letter of the 20th January last I desire to inform you that the Commonwealth Government welcomes the opportunity afforded thereby of stating that it is in cordial agreement with the main object of the letter, viz: that of avoiding the overlapping of scientific

[7] In a letter to Senator Russell (11 September 1918) Gellatly said: 'Mr. Peake . . . was personally favourable to co-operation but anticipated trouble among the State officials'. In addition, South Australia had in 1918 established its own Advisory Council of Science and Industry of South Australia. Its Report No. 1, 1919, CSIRO records.

research work to be undertaken by the Commonwealth Institute of Science and Industry and the various State Governments respectively.

The Commonwealth Government accordingly concurs in the view that before embarking upon any investigation the Institute should communicate with the State Departments likely to be already investigating the problem. I should be glad if this course could be reciprocal, especially in cases where problems of interest to more than one State are concerned, so that either body might be saved the time and expense of preparatory inquiries or arrangements. This will provide the additional advantages of enabling the Institute to be of service in preventing duplication of the same effort by Departments in different States, which in the present dearth of scientific investigators in Australia—comparatively, that is, to the immense field of desirable researches—might easily lead to a serious waste both of talent and of money. When such cases arise the Institute might perform the friendly office of suggestion contemplated in your letter in another connection.

So, too, with regard to new investigations (i.e. those not yet begun in any State) it will be the policy of the Institute to invite the views of the States, and ascertain whether the States have adequate facilities for the proposed work. The Institute is prepared to follow the same course with respect to the Universities in the several States.

It appears to this Government that until greater experience has been obtained by the Institute in carrying out its functions, and until therefore both the Commonwealth and the States have acquired a working knowledge of the way in which they can best pursue the common object of concentrating the best talent available on the many problems now urgently demanding solution, it would be in the interests both of the State Departments and the Institute not to lay down any precise lines of demarcation.

The Institute has found throughout Australia a great eagerness on the part of scientific men, whether in the Public Service or in private callings, to take part in a vigorous pursuit of research as applied to industry, and the Commonwealth Government has no doubt that this admirable spirit which in many instances gives very high service without reward, can be provided full play by frank consultation and conjoint effort on the part of the Commonwealth and the States, acting in each instance in accordance with the methods that seem best in the particular case.

This letter appears to have closed the correspondence on this subject between New South Wales and the Commonwealth, even if it may have had little effect on opposition to the Bill.

Although some Premiers had taken their cue from Holman's letter, the States as a whole were by no means in full sympathy with their Premiers on this subject. In New South Wales branches of the administration were already co-operating to some degree in cattle tick and blowfly investigations, sharing the cost with the Common-

wealth. In the same State the Director of Education, Peter Board, was chairman of a committee of scientists, business men and educators which called a widely representative conference 'to consider the best way in which the scientific institutes of New South Wales could collaborate with the Federal Bureau of Science and Industry'.

In Victoria two prominent scientists in the Department of Agriculture—the Director of Agriculture, S. S. Cameron, and the Superintendent of Agriculture, A. E. V. Richardson—were active members of the Executive Committee of the Council.

In Queensland the Government itself had agreed to co-operate on the prickly pear problem and had offered to hand over the Dulacca Experiment Station to the Commonwealth Institute for research purposes. In Western Australia the Government and people had supported the Commonwealth in its decision to develop an Institute of Science and Industry and co-operation by the State with the Commonwealth in this activity never faltered through the years.

Scientists in universities in the States were in the main anxious to collaborate with the Commonwealth in research, since they approved of increased scientific research in Australia for its own sake and hoped also, no doubt, that their own departments would benefit thereby.

When the Bill came up for discussion again on 19 August 1919, Groom in his second reading speech recalled to the House the long history of efforts which had been made in Parliament to bring such a measure into effective being. He detailed the steps taken from 1901, through the two Bills of 1909 and 1913 proposing the establishment of a Bureau of Agriculture. He quoted also from a French commission on technical education in 1863:

> It is certain that henceforth the most powerful nation will not be that which possesses the most territory, not that which has the largest population, but that which is the most industrious, the most skilful, best educated, most capable of utilizing all the means and forces that science can place at man's disposal and which enables him to triumph over matter.

Littleton Groom's interest in the subject never flagged. His advocacy now had nothing to do with the emergency of the war, except that he was willing to use the lessons of the war to support his arguments in favour of bringing scientific methods to bear on all phases of production and development, particularly agriculture.

The Government itself was not entirely of the same mind as Groom, some members were swayed by the argument that at a time of financial stringency money should not be spent on a new department, others feared the opposition of the States and the danger of overlapping with State activities. Hughes had left for England in April, but

before leaving had sent a message to the Executive Committee through Senator Russell that he had arranged for the Bill to be introduced and passed during the present session. He said also that appointments should be made without him since he would be leaving for England soon. Clearly he had not forgotten the scientific organization he had brought into being in January 1916 and he had left Watt to give it the necessary backing in the confident belief that the Bill would be passed. Further evidence of his continuing interest was shown in a letter which Gellatly wrote to a member of the Legislative Council in Sydney in June: 'I received a very encouraging letter from Mr Hughes from Honolulu; he regards the Institute as a particular baby of his own and is very anxious that it should be a huge success.'[8]

Hughes returned from England at the end of August 1919, and it may have been the fact that his return was imminent which constrained the Government to return the Bill to the order paper at the beginning of that month, even although discussions with the States earlier in that year had not proved as satisfactory as had been hoped.

Soon after Hughes's return, Lightfoot received a telegram from Gellatly:

Talk about troubles coming in battalions. On Thurday it was realised that I had influenza with pneumonic symptoms and my condition on Friday night was not at all pleasant. There is very little doubt that if I had carried out my original idea of returning to Melbourne on Wednesday I would have been taken off the train a corpse, but now I am making substantial progress but feel very sick. I saw the Prime Minister on the train and he received me with great cordiality and promised to shove the bill along, he seemed quite as keen on it as he used to be.

Gellatly had been on his way back from a visit to Brisbane and had stopped in Sydney instead of going on to an Executive meeting in Melbourne. The telegram seems to have been written in the week-end and was received in Melbourne on Monday 22 September.

This telegram was the last communication from Gellatly. At 4 a.m. on Wednesday 24 September 1919 he was dead.

The Executive Committee got warning on the 23rd that he was critically ill, and at their meeting on the 24th the news that he had died. They carried unanimously the following resolution:

That the Executive Committee desires to record its high appreciation of the valuable services rendered to the Institute by its first Director, the late Dr Gellatly and its sense of the severe loss the Institute and the Commonwealth have sustained by his untimely death. The Committee feels deeply that the Australian movement for bringing science to bear upon the practical problems of industry will always owe a debt to the untiring

[8] Gellatly to James Ashton, M.L.C., 20 June 1918. CSIRO records.

energy, the alertness of intellect, the wise and moderate council and the sympathetic temperament of the Director.

The Executive Committee now had to reorient its work, so it was decided at a meeting with the Minister that, pending the passing of the Bill, Professor Masson should act as Chairman of the Executive Committee and that:

Mr Lightfoot as Chief Executive Officer should exercise in regard to the general administration the powers previously vested in the late Director, except those powers which were exercised by Dr Gellatly by virtue of his position as Chairman of the Executive Committee.

Meanwhile the Bill had been withdrawn, partly one supposes, because of the opposition by the States, partly because of doubts in the minds of some members of the Government itself, partly because of the fact that elections were near and a matter which had proved to be controversial had better be withdrawn, and partly because of the death of Gellatly.

The Sydney members of the Executive Committee suggested that a meeting of the full Executive Committee should be called to discuss the situation arising from the Government's decision not to go on with the Bill. The members of the Executive Committee in Melbourne, however, decided that no good purpose could be served by having a full meeting and adopted the view of Professor Masson that 'The Executive would have to confine itself to carrying on as it had been carrying on for the past three years and wait patiently the passing of the Bill'; so for the rest of that year the Executive Committee continued to operate as before. In late October it set out to organize a new attack on the problem of controlling prickly pear in Queensland and New South Wales, since the pear was still spreading alarmingly and no concerted action had been taken by the States to control it.

The story of the association of the Council with the successful control of prickly pear deserves special treatment here because it illustrates both the difficulties against which the Commonwealth body had to work at that time and the means it took to overcome them.

The prickly pears, cactus plants belonging to the order *Opuntia,* had infested some 20,000,000 acres of Queensland and 2,500,000 acres of New South Wales about the time the Council was first established and were spreading at the rate of about 1,000,000 acres a year.[9] The Queensland Government had done a great deal to try to control the pear before the Commonwealth Advisory Council had been established. As far back as 1895 it had passed a Crown Lands Act to try

[9] A. P. Dodd in CSIR Bulletin 34, said: '60 million acres were infested in 1927'; this would be at the time of its maximum spread.

to stop the spread of the pear, and in 1901 it passed the Prickly Pear Selectors Act which offered infested land to settlers on favourable terms provided they took steps to eradicate the pear. Other Acts followed, but the pear continued to spread and in 1911 Queensland appointed a scientific board of advice to assist it. In the next year the Queensland Government appointed a Prickly Pear Travelling Commission consisting of Professor T. Harvey Johnston of the University of Queensland and Henry Tryon, the Government Entomologist in Queensland, to visit the areas of the world where prickly pear was endemic and report on possible means of control. The commissioners set out on their world tour on 1 September 1912 and, having visited various areas in both northern and southern hemispheres where the pear grew freely, returned to Australia on 30 April 1914. Their report coincided with the outbreak of the 1914-18 War, and their recommendation that biological control of the pest pear be tried, using insects and other organisms from North and South America where much destruction was caused to the pear by the organisms, was not followed at that time.[10]

The Commonwealth Advisory Council had tried from its inception in 1916 to organize a scheme of co-operative research between Queensland and New South Wales with the Commonwealth under which each State would contribute £2,000 and the Commonwealth £4,000. Queensland was well disposed towards this scheme and offered the use of its field station at Dulacca for scientific investigations. The Government of New South Wales was not so willing at that time to co-operate in a joint scheme, and in October 1917 the Premier of New South Wales in a letter to the Prime Minister said:

> This matter has received the careful consideration of my colleague, the Minister for Agriculture, who is advised by his Experiment Supervision Committee that an expenditure of £8,000 per annum as contemplated is not warranted at the present time and he cannot see his way to recommend your proposal on the basis of an annual contribution of £2,000 per annum from this State.[11]

The New South Wales Experiment Supervision Committee was doubtless composed of State departmental officers from whom a good deal of the early opposition to the Commonwealth Advisory Committee had come.

A further letter from the Premier of New South Wales in March 1918 was still critical of the scheme, but somewhat more hopeful because it did suggest a basis for co-operation. The letter read in part:

[10] *Report of Prickly Pear Travelling Commission.* Queensland Parliamentary Paper CA.91, 25 November 1914.

[11] Letter of 18 October 1917. CSIRO records.

I have the honour to inform you that it is considered that the work already carried out by the State Department of Agriculture should be further extended by subsidies from the Federal Government rather than that the State should contribute to extra and probably overlapping departments. Considerable experimental work has already been done here and results lead to the expectation that by certain methods the pear can be cheaply and effectively eradicated. Much of the work proposed to be undertaken by the Commonwealth would only be duplication of that already carried out here and of further experiments in view . . . It is of course recognised that the Advisory Council of Science and Industry is especially interested in this matter and under the circumstances above indicated I would suggest that instead of the State contributing to an expenditure of £8,000 per annum by the Commonwealth the better course would be for a Committee of Experts representing the Commonwealth, New South Wales and Queensland to be formed for the purpose of carrying on the investigations. It is considered that for the first year a sum of £2,000 will be sufficient and it is suggested that your Government contribute a thousand of this, New South Wales and Queensland five hundred each.

It is proposed that the Committee comprise experts from New South Wales and Queensland who have devoted attention to the prickly pear eradication and a representative or representatives of the Advisory Council of Science and Industry that they make enquiry as to the most effective means of eradicating the pest and their function be similar to those of the Tick Advisory Committee. I shall be glad if you can see your way to concur with the above suggestions, a communication on the subject is also being despatched to the Premier of Queensland.[12]

Although the Premier of New South Wales had appeared to be optimistic when he said in his letter that 'Considerable experimental work has already been done here and results lead to the expectation that by certain methods the pear can be cheaply and effectively eradicated;' his optimism was without foundation since scientists in that State were no nearer a solution of their problem than the scientists in Queensland.

After much discussion, in which the Executive Committee used the suggestion of the Premier of New South Wales as a basis for collaboration, it was agreed that the Commonwealth and the two States should bear the costs in the proportion already mentioned and that a committee of three be appointed to supervise the work. The Executive Committee then invited Professor Harvey Johnston to visit it in Melbourne to put forward a plan for their consideration.

Professor Harvey Johnston attended a meeting of the Executive Committee in December 1919 and there put forward a scheme based on the recommendations which his Travelling Commission had made

[12] Letter of 12 March 1918 to Prime Minister. CSIRO records.

to the Queensland Government in 1914. This involved further studies of the organisms attacking prickly pear and the importation into Australia of those found suitable. Among the insects which had been recommended for further study was the moth, *Cactoblastis cactorum* (Berg), specimens of which had been brought to Queensland from the Argentine by the Commission in 1914 under the name *Zophodia cactorum* (Berg) but had died out after a few months in the insectaries in Brisbane. (This insect was rediscovered by A. P. Dodd, then a senior scientist on the Commonwealth Prickly Pear Board's staff, in the Argentine and in Uruguay at the end of 1924 and sent by him in the egg stage to Australia, where it arrived in May 1925. It achieved a dramatic success by destroying prickly pear over many million acres of infested country.)

The Executive Committee accepted Professor Harvey Johnston's proposals, offered him a salary of £1,200 as Chief Investigator and recommended to the Minister that a committee of three, consisting of the Under-Secretary of the Department of Agriculture of New South Wales, the Under-Secretary of the Department of Lands of Queensland and a representative of the Advisory Council, be appointed to control the business side of the investigations, and that the control of the scientific work should be in the hands of the Chief Investigator. The Commonwealth Government and the Governments of New South Wales and Queensland accepted the proposals and the Commonwealth Prickly Pear Board was set up in June 1920, the first representative of the Advisory Council for Science and Industry being Gerald Lightfoot. The Board carried out its work under the auspices of the Advisory Council and the preliminary Institute until those bodies ceased to function early in 1921, and then it operated under the auspices of the Institute of Science and Industry from 1921 until 1926 when the Institute in turn gave way to the Council for Scientific and Industrial Research constituted under an amending Act.

It is no exaggeration to say that the value of the part played by the Commonwealth in this investigation more than justified the whole of the meagre funds granted to the Advisory Council and to the Institute of Science and Industry during the ten years of their existence.

This digression from the flow of political events to tell the story of one particular problem in applied science serves to indicate the kinds of difficulties encountered by the Council in securing co-operation with, and between, State Governments and it highlights also the fact that only the Commonwealth, by intervention from its central position, could have carried out this manoeuvre.

Meanwhile on the political front events were leading to harsh times for the Advisory Council of the preliminary Institute but particularly

for its Executive Committee. In order to create a favourable climate of opinion for the debate on the Bill and counter adverse articles which had appeared in the *Age*, the Executive Committee appointed a propaganda committee consisting of Masson, Cameron, Gepp, Avery and Lightfoot to publicize the work of the Council. A statement drawn up by this committee was circulated to every newspaper in Australia, to professional associations, chambers of commerce and chambers of manufactures, scientific societies, associations of primary producers, members of State Committees, universities, in short, to every organization likely to read, publish or benefit by it.

Telegrams were sent to persons and associations known to be friendly suggesting that they should get their Federal member to support the Bill or to send telegrams of support to the Government itself. The document explained the origin of the Council, its activities since it was appointed and the kind of problems it was tackling and would tackle in the future. It brought results in telegrams and letters of support from graziers, chambers of manufactures and others and mostly favourable comment from the Press. The word 'mostly' is used advisedly here because, as has been noted, there had been some Press opposition to the Institute. The *Age* had carried opposition to the development of the Institute in its editorials from the very first conference in 1916. Its policy seems to have been to condemn the Commonwealth venture, to cry havoc whenever any money was spoken of in connection with the Council's work and to belittle any effort the Council made, or any pronouncement made by leading figures of the Council.

While the *Age* and particularly its editor, G. F. H. Schuler, stormed editorially against Hughes's 'mad scheme for an institute of science and industry,' the *Argus* was almost consistently favourable. Most country papers and primary producers' organizations were favourable, but some State public servants and politicians were still opposed on the ground that the Institute encroached on State functions. This time however, the Bill was to be passed, though not before heavy weather was experienced, not so much in Parliament as in the charged atmosphere of the relations between the Executive Committee and the Government, and particularly the Prime Minister.

The Executive had been trying to see Hughes ever since the end of 1919, but was unable to secure an appointment. Three times arrangements had been made to see him but twice urgent affairs of State prevented him from meeting them and the third time he was indisposed. The members of the Executive Committee were naturally very much concerned to see a copy of the new Bill before it reached the House and at their meeting of 11 May 1920 Lightfoot, then Chief Executive Officer, was able to inform them 'that he had ascertained

that the Minister (Mr. Massy Greene) will be pleased to let the Committee see a copy of the Bill as soon as the Prime Minister had approved of it.'

The Executive at its next meeting drafted a letter asking for an interview with the Minister to discuss the position of the Institute, but there is no record of such a meeting having taken place. The Bill was introduced into the House of Representatives on 1 July 1920 without the members of the Executive Committee having had a chance to read it and, when they did learn its contents, they found that instead of three directors the Bill proposed only one, and that no provission had been made for State Advisory Committees.

Then the storm broke: Masson resigned from the chairmanship of the Council and from membership of the Executive Committee and at the same time stated to the Press that 'as a nett result of four and a half years work I have no faith in politicians'. This outburst was much out of keeping with his normal calm. But frustrations and irritation had dogged him and his Committee ever since, in 1917, they had announced that the first phase of preparation was over and the Institute should be put on a permanent footing by an Act of Parliament at the earliest possible moment.

In his scientific associations and university career Masson was one of the most successful and influential professors not only in the University of Melbourne but in the whole of Australia. He was used to getting his own way and, faced with what he must have regarded as deviousness on the part of the Prime Minister, with whom he had crossed swords on previous occasions, he reacted imperiously. He was very hurt that the Bill which he and his colleagues had confidently expected to see, and had been told they would see before it was presented to Parliament, had not been shown to them at all. The bitterest pill of all was that the Bill had been altered, despite the recommendations of the original conference of 1916, in that it provided for only one director instead of three; this Masson considered crucial.

At a Press interview explaining the reasons for his resignation he expressed the view that the alterations made by the Government would utterly ruin the entire scheme and added that, as a result of four and a half year's work in connection with the attempt to bring science and industry into practical co-operation, he had come to the conclusion that there was a radical constitutional difference between the outlook of the politician and that of the scientist.[13]

It was in this interview that he declared that he had 'no faith in politicians.'

From a man of Masson's quality, such a statement has an extravagant, even a theatrical ring, so it may be worth while to examine

[13] The *Herald*, Melbourne, 8 July 1920.

it in the light of our modern views on the relation between science and government. In a recent book Wallace S. Sayre is quoted as follows:

The scientists are now inescapably committed to politics if they hope to exercise influence in the shaping of public policy including science politics. The leaders of the scientists, then, are perforce politicians. As politicians in a democratic order they are effective in the degree to which they understand the political process, accept its rules and play their part in the process with more candour than piety, accepting gladly the fact that they are in the battle rather than above it. The spokesmen for science have occasionally lectured the non-scientists, sometimes sternly upon their obligation to understand science. Perhaps the advice may be reversed: The scientist has an obligation to play a significant role forthrightly in politics.[14]

Accepting the thesis set out above and applying it to Masson's situation might lead to the conclusion that he was not willing to 'accept the rules' of the political process nor accept the idea that he was 'in the battle rather than above it' and that his resignation might have been a mistake.

There is in fact more than a suspicion that his words and action were arrogant, but such a suspicion must be balanced against the fact that five years after his resignation on a matter of principle he was called on to chair the most significant committee of a new conference which gave rise to the amended Act of 1926 by which his views were completely vindicated. In these circumstances adherence to principle paid off handsomely and may thus be regarded as the best politics.

It does appear strange that the Executive Committee of the Advisory Council was not allowed to see the Bill before its introduction, in view of the fact that it had been the official adviser to the Government on scientific matters for four years and a half. Possibly the Prime Minister himself had withheld it knowing that members of the Committee would object to the changes in it and feeling also that only those changes would make the Bill palatable enough to Parliament to ensure its passage through the two Houses. Whatever the reasons Masson would have none of them, so on 6 July, when the Executive Committee met to discuss its position, it was faced with his letter of resignation. Addressed to the Prime Minister, it read:

The Institute of Science and Industry Bill, which is now before Parliament, differs radically in two respects from the Bill which was debated last year. The latter embodied the recommendations of the original

[14] *Scientists and National Policy Making* by Gilpin and Wright, Columbia University Press, 1964. See also *Science and the Federal Government* by A. Hunter Dupree.

Committee of Conference in January 1916 and of the provisional Advisory Council which has carried on the work of the Institute since April 1916. The new Bill is contrary to these recommendations.

The Government did not, before making these changes, consult the Advisory Council, its Executive Committee or myself as its Chairman (and also Chairman of the original Committee of Conference); nor were we informed of them till after the Bill had passed its first reading.

The two changes to which I refer are (1) the substitution of one Director for three, two of whom were to be selected mainly on account of scientific attainments, and (2) the total omission of the provision for the appointment of Advisory Councils. Both these changes are embodied in Clause 4 (1) which reads "There shall be a Commonwealth Institute of Science and Industry, consisting of the Director, which shall be a body corporate" etc.

The apparent object, and the inevitable result, of these changes is to destroy the safeguards which were provided by the original scheme. These, as you will remember, were accepted by yourself in January, 1916 after full discussion with my Committee and were subsequently approved by your Cabinet. They were designed to ensure that the Directorate would be strong on the scientific as well as the business side and thus be truly representative of both Science and Industry and also that it would be constantly in touch, through the local Advisory Councils, with the leaders both of Science and of Industry in all parts of the Commonwealth.

If the Bill passes in its present form, the Institute will consist of one man who can hardly be expected to combine in his own person all the essential qualifications and who, if selected on account of his training in practical business, will not command the confidence and support of the scientific community. He may, indeed, be merely a departmental official subject to a Minister controlling clerks in an office in Melbourne and completely out of touch with the real leaders of Industry and of Science in Australia, especially in the more distant States.

As the scheme has thus assumed a form of which I cannot approve and which is utterly different from the one for which my colleagues and I have worked for the last four and a half years, I feel obliged to sever my connection with it and I therefore ask you to accept my imemediate resignation from the Provisional Advisory Council.[15]

The Bill had been discussed the day before the meeting between the Minister and Lightfoot and the Minister had then assured Lightfoot that the omission of the advisory councils from the Bill did not mean that scientists would not be consulted: the Director would be expected to seek the fullest advice from both the scientific and the industrial side. The general view of the members present was, however, that since the Bill was so radically different from the previous one the Chairman had no alternative but to resign and it was

[15] Masson to Hughes, 6 July 1920. CSIRO records.

decided to send telegrams to all members of the full Executive telling them of the feeling of the members present at that meeting that they should resign in protest.

Replies to the telegram came next day and an informal meeting was held on 8 July to study them. One member, Piddington, telegraphed to say he was opposed to the resignation en bloc since he believed that the Prime Minister should be interviewed before such a step was taken. Five other members had telegraphed agreeing to their signatures being appended to a letter of resignation, but some of them made a condition that the decision should be unanimous; and even the members present at this informal meeting were now rather divided on the matter. Masson had believed that the decision to send the telegrams from the last meeting had constituted full agreement on the part of all the members present that they would resign, but he found that only Grimwade was now firm in that decision. Lightfoot informed members that the Minister still hoped that he could amend the Bill to include provision for advisory committees, and Dr Cameron argued that in view of that statement they should continue in office and continue to press for such changes in the Bill as might be possible. He asked Masson to take the chair but Masson refused and withdrew from the meeting. It was then decided that a sub-committee should wait upon the Minister to see if any modification of the Bill in the direction desired by the Executive were possible, and that a further meeting should be called to consider the report of that sub-committee.

A sub-committee consisting of Cameron, Richardson, Lightfoot and Gepp was present at an interview arranged with the Minister and, at a further meeting of the Executive held on 14 July, Cameron reported that the Minister thought there would be no objection to an amendment providing for advisory councils, indeed the Minister said he would ask Cabinet to put such an amendment into the Bill. On the matter of one director instead of three, the Minister had indicated that the House was very conscious indeed of the need for economy and it was necessary to provide for only one director if the Bill were to pass at all.

At this meeting Professor Lyle had rather reluctantly taken the chair at the request of the others, his reluctance being due to his feeling of uncertainty that the meeting should be continued in view of Masson's resignation. He was not at all sure that they ought to function as an executive, since he shared in part the view that the decision to send out telegrams asking if the other members would like to resign en bloc had almost constituted a decision by the members present that resignation en bloc was the thing to do.

Cameron and Gepp both spoke of the Minister's insistence on the

difficult financial situation of the country and the need to cut demands for money to a minimum if the Bill were to go through at all, in view of the fears in Parliament about top-heavy recommendations.[16] Cameron, Lightfoot and Gepp were strong advocates of continuing in office and they had strong support in a letter from Piddington. They argued that the Executive should carry on rather than resign, their view being that if the Bill, even in a modified form, could be supported, it could possibly be improved by amendments during its passage through the House or even by amending legislation later on. They argued also that if they all resigned the Government might drop the Bill altogether and so put back Commonwealth interest in research indefinitely.

Masson remained uncompromising about his resignation since he adhered to the view that the Bill was so inadequate that it constituted a danger to a proper and fruitful development of scientific research under the aegis of the Commonwealth Government. He declined the invitation of the other members of the Executive to withdraw his resignation and join with them in salvaging what they could from what he must have regarded as the wreck of their earlier hopes.

The hopeful attitude of the Minister, Massy Greene, who believed that although the Institute had to begin in a small way it could grow later on, gave Gepp grounds for optimism, and he had other grounds which emerged during the discussion. He said, 'I am prepared to say that if the Government can get the man it is after the job will go well.' This cryptic statement indicated that some individual in whom Gepp had great confidence was under consideration by the Government as Director.

The Executive was partly reassured by the report from the subcommittee which had interviewed the Minister, and was partly persuaded also by the view put by Piddington that to continue to function might be in the best interests of scientific research in the long run. Gepp put this view most forcefully when he said: 'In view of the deliberate statement the Minister made I think it would be absolutely suicidal and perfect madness for any of you to do anything but to go on and shove hard.' He then moved and the motion was carried unanimously:[17]

that as a result of the interview with the Minister and in view of his assurance that a man of high scientific attainments and organizing ability will be appointed as sole director and in view also of the promise of

[16] The memory of the Prime Minister's statement made in 1915 that £500,000 would be made available if needed still echoed in the minds of many parliamentarians.

[17] Present at the meeting were Professor Lyle, Dr S. S. Cameron, D. Avery, H. W. Gepp, A. E. V. Richardson, G. Lightfoot.

the Minister to submit for favourable consideration for the Cabinet a recommendation for the inclusion of a clause providing for the appointment of advisory bodies, this Executive agrees to carry on.

The Executive Committee then made a final effort to try to persuade Masson to withdraw his resignation but the professor refused, saying that he had no faith in governments and that there was at present no undertaking that the amendments which he considered essential were to be incorporated in the Bill. So ended a phase in which Masson had been for four years and a half the dominant figure in the Advisory Council for Science and Industry.

Meanwhile at the Executive meeting on 20 July, Walter Kingsmill, M.L.C., of Western Australia, who was present by invitation, urged that everything should be done to see that the Forest Products Laboratory which had been planned as a joint venture between Western Australia and the Commonwealth should be established as early as possible. He was the chairman of a committee in Western Australia which looked after the forest products investigations and was most anxious that they should prosper. He thought the Executive should carry on and suggested that, even though the Bill was somewhat narrow in its powers, it could be given wider ones later. He considered that the promises made by the Minister to the deputation were very satisfactory and added that if the amendments were introduced they would enable much valuable work to be done.

Before the next meeting of the Executive the Minister had made good his promise to add an amendment providing for advisory boards in each State to be appointed by the Governor-General in Council, this amendment having been announced by Littleton Groom in his second reading speech.

At its meeting on 27 July the Executive pointed out that providing only for advisory boards in each State appeared to exclude a general advisory council so they asked the Minister to amend the Bill again in the Senate to include such a provision. This was done, and from 20 August Clause 6 of the Bill read 'the Governor-General may appoint a general advisory board and advisory boards in each State to advise the director with regard to (a) the general business of the Institute or any bureau thereof and (b) any particular matter of investigation or research.'

No change was made to increase the directors from one to three, and indeed the Executive itself was not as staunch in pressing for this change as Masson had been. Only two of the Executive, in addition to Masson, finally resigned, the others who had previously resigned allowed their resignations to be withdrawn after the various interviews with the Minister since they now felt that the Government was going as far as it could to meet their requirements.

The new Bill did not suffer the delays nor give rise to so much debate as the earlier one. In his second reading speech Massy Greene had a good deal of useful ammunition to hand in support of the measure. He was able to quote a long list of organizations in Australia, both primary and secondary, which had passed and sent on to him resolutions supporting the development of the Institute. With an eye on the Opposition no doubt, he quoted a resolution of the American Federation of Labor which had urged the Federal Government of the United States to support scientific research both pure and applied. The resolution read:

> Resolved by the American Federation of Labor and Convention assembled, that a broad programme of scientific and technical research is of major importance to the national welfare, and should be fostered in every way by the Federal Government and that the activities of the Government itself in such research should be adequately and generously supported in order that the work may be greatly strengthened and extended.[18]

The Minister stressed the point that although the earlier Bills sponsored by Littleton Groom for a Bureau of Agriculture had been concerned with primary industry only, this Bill would be concerned with both primary industry and secondary industry.

Dr Earle Page supported the Bill strongly, quoting the fact that friendly co-operation in research existed in Canada between the Dominion and the Provincial Governments. He also quoted the report of the Dominions Royal Commission in support of such co-operative research.

Opposition to the Bill followed familiar lines. There were such matters as cost, State opposition because of supposed overlapping, and even the impractical nature of scientists themselves. To these F. G. Tudor added the fact that Professor Masson had resigned and inferred that such a resignation from a person of such high standing must reflect adversely on the measure itself. J. E. Fenton opposed the Bill on the grounds that scientists were not likely to do any good for industry in any case! T. J. Lavelle put his opposition to the Bill in the form of an amendment 'that all the words after "now" be left out and the following substituted':

> withdrawn until information is furnished to this House as to the probability of harmonious co-operation between the institute proposed to be established and existing State activities, and more particularly, until proof is furnished that the measure will not lead to a great increase of the already heavy burden of taxation by unnecessary duplication of institutions.

This amendment was negatived by 27 votes to 16.

[18] Quoted from *The Times*, 28 July 1919, page 13.

The Government members were now all united in support of the Bill; they had the numbers and the Bill passed. The Bill with amendments was assented to on 14 September 1920, so that, from its beginnings at the conference of 5 January 1916, the proposed Institute had taken four years and eight months to be established under its own Act of Parliament.[19]

The Executive held two meetings the day the Bill was passed, one to consider scientific and general matters and the other to discuss its attitude to the directorship of the Institute. Concerning the directorship two decisions were made:

1. that the Executive would not proffer advice to the Government officially in regard to filling the office of director.
2. that the Minister be asked to receive an unofficial visit from members of the Executive to talk over the question of filling the office of director.

The critical matter of the directorship had been raised earlier at discussions between Cameron, Richardson, Lightfoot and Gepp and the Minister, Massy Greene, at their meeting on 10 July and at that time it would appear that the Government had in mind a man who later declined the office. Dr Cameron said, 'I stressed the point that this alteration (from three directors to two) would only be acceptable when one director possessed all the necessary qualifications such as scientific training, proved business ability and experience in organization'. The Minister then said, 'It was such a man that the Cabinet contemplated appointing'. Cameron reported also that the Minister had then stated that he had sought from the Cabinet permission to disclose to certain people in confidence the man it had in mind but the Cabinet was against that course. A clue to the meaning of these comments and Gepp's remark quoted earlier may be gained from a letter written by A. E. Leighton, the General Manager of the Australian Arsenal, to the Minister for Defence, Senator Pearce.[20] The letter had to do with possible liaison between the Defence Department and the Institute of Science and Industry, and Leighton himself had a place in both camps since he was at the time a member of the Executive Committee of the Institute, having been appointed to that office in June 1919. The letter read in part: 'Some time ago it was assumed by the Executive Council of the Institute that the Director of the Institute of Science and Industry would be Sir John Monash . . . it now appears however that Sir John will not be available for the position.'

Sir John Monash was appointed General Manager of the Victorian

[19] For copy of 1920 Act, see Appendix 14.
[20] A. E. Leighton to Senator Pearce, 3 August 1920. CSIRO records.

Electricity Commission in October of that year. It appears highly probable that he had been approached about the position of Director of the Institute in May or June and the conversations with the Minister in early July appear to bear this out. It seems that Monash had been the Cabinet's first choice, had been approached about the directorship but had, between the beginning of July and the middle of August, decided to take the post of General Manager of the Electricity Commission instead.

However this may be, the Executive Committee, at its meeting in mid-September, must have believed that the position was then open again and still under discussion. As mentioned they decided to seek a private unofficial meeting with the Minister about the directorship but there is no record of such private discussion having taken place and no hint of their purpose in seeking the meeting.

In January 1921, the position of Director of the Institute was advertised in the *Commonwealth Gazette* and some two months later it was announced that George Knibbs, the Commonwealth Statistician, had been appointed to the vacancy.

6

THE COMMONWEALTH INSTITUTE OF SCIENCE AND INDUSTRY, 1921-1926

THE *Commonwealth of Australia Gazette* of 19 March 1921 carried the notice that George Handley Knibbs, C.M.G., Commonwealth Statistician, had been appointed Director of the Institute of Science and Industry as from 18 March 1921. The appointment was for five years at a salary of £2,000. Thus he and the Solicitor-General were the highest-paid public servants in Australia.

Knibbs was a man of great erudition and catholicity of interests. Born and educated in Sydney, he took up the profession of surveying and served for twelve years in the Trigonometrical and General Survey office of New South Wales. In 1889 he joined the teaching staff of the Department of Engineering at the University of Sydney. He was appointed acting Professor of Physics in 1905 but relinquished this post in 1906 to become Commonwealth Statistician in the newly created Bureau of Census and Statistics. Throughout his long career in the Public Service, Knibbs held many appointments outside his full-time posts and some of these gave him the opportunity to gain wide experience during travel overseas. As a member of the New South Wales Royal Commission on Education he went overseas for the first time in 1902, when he visited the United States, Canada, New Zealand, Great Britain and most other European countries[1] to inquire into their educational systems and facilities. In 1909 he visited Great Britain and the Continent again this time as a delegate of the Commonwealth Government to no fewer than five international congresses,[2] and in 1919 he was sent abroad by the Commonwealth Government to argue against the imposition of double taxation on Australians living in London, and to attend a Conference of the Statisticians of the British Empire.

As Commonwelath Statistician he enjoyed high international

[1] The exceptions were Spain, Portugal, Greece and Turkey.

[2] The International Congress on Life Insurance, Vienna; a meeting of the Special Committee for the revision of Nomenclature of Diseases, Paris; the International Congress of the International Materials Testing Association, Copenhagen; the International Geodetic Conference, London and Commonwealth Delegate to the International Institute of Statistics, Paris.

standing mainly through his monumental work, the *Commonwealth Year Book,* hailed as a masterpiece of statistical presentation and recording. In science he was equally well known, and had been honoured at one time or another with high honorary office in most of the leading Australian scientific societies.[3]

His appointment as Director had come as a surprise to many people, not because of any question about his qualifications but because he had seemed so firmly entrenched as Commonwealth Statistician as to exclude him from being thought of as a possible contender. Moreover he was sixty-two years of age.

One man in particular must have viewed the appointment with some misgiving. Gerald Lightfoot, the Chief Executive Officer of the Institute, had, since Gellatly's death, subject to the direction of the Executive Committee, been in full administrative control of the Institute but now found himself back under the control of his former chief. Whatever his private feelings may have been (since he could have felt that the post should have been given to him) it is to Lightfoot's credit that in the ensuing years he supported Knibbs to the utmost, and it was not through want of endeavour or allegiance on his part that the Institute under Knibbs failed to develop satisfactorily.

Apart from the challenge such a post presented and the attractive salary he received, Knibbs had been influenced into accepting it through dissatisfaction with some elements in the tenure of his own position and through the persuasiveness of the Prime Minister.[4] Like most others associated with it he had believed that, now the Act had been passed, the Institute would be provided with the necessary staff and resources to enable it to meet its statutory functions.

More than half a year had passed since the Minister who had been in charge of the Advisory Council had agreed to provide a suitable Director for the Institute, and it is likely that after the approach to Monash had failed it had been increasingly difficult to find an adequate replacement for Gellatly. In securing the services of Knibbs, Hughes had extracted himself from a difficult situation, in which he may have had some misgivings about the wisdom of having only a single Director.

[3] He was President of the Royal Society of N.S.W., 1898-9; Institute of Surveyors, 1892-3; N.S.W. Section of British Astronomical Association, 1897-8; Sydney University Engineering Society, 1897-8; Australasian Association for the Advancement of Science, 1923-4; and acting President of the Australian National Research Council, 1924.

[4] In a letter to Sir Mark Sheldon on 4 May 1921 Knibbs stated he would have remained as Statistician had the Government been prepared to give the Bureau proper independence by making the Statistician removable only by the votes of both Houses of Parliament and removing the control of the office from the Public Service Commissioner. The Statistician, he felt, should be free to criticize affairs and openly declare the meaning of statistical results.

Knibbs started work on 1 April 1921 at the headquarters of the Institute, then on the fifth floor of the Danks building in Bourke Street, Melbourne. This accommodation was shared with the Bureau of Commerce and Industry, another wartime creation of Hughes.[5] It so happened that at this time the Interstate Commission was disbanded, making available the erstwhile headquarters of the Advisory Council at 314 Albert Street, East Melbourne, and the month after Knibbs's appointment the Institute returned to those premises.

Knibbs took the chair for the first time at a meeting with members of the Executive Committee on 5 April and was congratulated by them on his appointment. He told them that technically they had become defunct with his appointment as Director, but in less official vein he asked them to remain as advisers pending the development of a definite programme of work for the Institute and the establishment under the Act of a general advisory council. The members present willingly accepted this invitation to give continuing service, but regrettably they were called together for only one more meeting with Knibbs, on 20 March 1922, when only three members, Cameron, Richardson and Avery, attended. At the meeting the members pointed out that, without knowing more of what was happening week by week, they could give no assistance to the Director. They thought moreover that the Government had not shown enough enthusiasm for the Institute to make it a success and unless it gained greater financial support it would remain more or less moribund. On that mournful note the direct association of the Advisory Council and the members of the Executive Committee with the Institute of Science and Industry came to an end.

The Director closed the meeting by saying that he hoped a general advisory council would soon be established under the Act and would be able to meet frequently enough to follow the drift of affairs. The State Committees, too, agreed to carry on as before, pending the establishment of state advisory boards as provided in the Act; but they likewise were allowed to fade into oblivion. An erroneous impression could be gathered in the two annual reports issued later by the Institute that both groups were continuing to act on a provisional basis at the time when the reports were issued, but in point of fact they had long since ceased to function. Under the Act the provision of a general advisory council and state advisory boards to advise the Director were permissive and not

[5] The Institute's association with the Bureau of Commerce and Industry was unfortunate. Because of the similarity of names and the same address, the Institute was frequently confused with the Bureau and its activities to which there was open hostility from many sectors of industry. More often than not the Institute was referred to as the Bureau of Science and Industry, and much of Knibbs's time during the next five years was spent rectifying this misconception.

mandatory appointments by the Governor-General; Knibbs made frequent attempts through the responsible Minister to have them constituted, but without success, so he worked in lonely isolation. It is probable, however, that the non-appointment of advisory bodies caused him no undue feeling of embarrassment since he regarded both groups as being essentially advisory and to be used only to help him to implement an expanded research programme for the Institute and not to advise him on the actual research work. As the declining fortunes of the Institute were financial in nature and came within his administrative province as Director, Knibbs seems to have resisted offers of organized assistance in this respect.[6] Primarily an individualist, he was self-centred enough to think that to accept organized assistance in his approach to the Government for extra money would amount to personal failure, and in adopting this attitude he may have made his biggest error in this new situation where allies were essential to success.

Whereas the relationship between Knibbs and the Government was almost wholly confined to problems of finance, research, which should have been of prime importance, tended to become a secondary consideration and the struggle for funds paramount. For Knibbs, who had been head of a Commonwealth department the work of which was highly regarded, it must have been galling indeed to find himself at the head of an Institute almost devoid of money, scientific staff and research facilities. The temporary Council operating before the passing of the Act was of necessity limited in its programme of activities but with the passing of the Act better things had been expected.

Even with its limited resources the Advisory Council had started research work and had made progress with some problems notably prickly pear and paper pulp[7] but, since it had received only a total of £66,200 in grants during all its four years and a half of existence and since it operated without the authority of an Act of Parliament, no more could have been expected of it. It had but two technically qualified officers on its headquarters staff, Gerald Lightfoot and a

[6] The Australian National Research Council in 1922 formed a special committee to publicize the needs of the Institute. Knibbs was appointed chairman and the other members were T. R. Lyle and A. C. D. Rivett. The committee never reported to its executive and there is no evidence that it was ever convened by Knibbs.

[7] The Advisory Council of Science and Industry showed interest from its earliest years in the possibility of a pulp and paper industry in Australia. The Institute of Science and Industry subsidized to some extent the successful pioneering research work by I. H. Boas and L. R. Benjamin in Western Australia, work which helped to set the stage for the huge pulp and paper industry of today. See Advisory Council of Science and Industry Bulletin No. 11, 1919 *Paper Pulp, Possibilities of its Manufacture in Australia* by G. Lightfoot, and Institute of Science and Industry Bulletin No. 25, 1923 *The Manufacture of Pulp and Paper from Australian Woods* by L. R. Benjamin.

science abstractor, and with the exception of prickly pear no annual grant of more than £1,000 had been made for any one investigation.[8]

Its achievements had been possible only through the devoted work of the members of the Executive Committee, with the assistance in most cases of the State Committees and of research committees composed of suitable experts drawn from the universities, from Commonwealth or State departments and from industry. Seldom could the Executive itself appoint scientific staff to inquire into or conduct research into urgent and pressing problems of national importance. Members of all the committees gave their services gratuitously and most of those engaged in research work conducted it in their spare time, in their own laboratories and used their own apparatus, since the temporary Institute had none of its own.

At the time of Knibbs's appointment some fifty Special Research Committees and five Standing Committees had been appointed throughout Australia and were either carrying out or in some cases had completed investigational work into subjects ranging from the production of power alcohol to cattle tick eradication.[9] This honorary system of research, while producing remarkable results in the circumstances, had two important drawbacks. Once started, the Executive Committee had virtually no control over the course of an investigation, and this had led in isolated instances to criticism from State departments when the results of work by their own officers undertaken at the suggestion of the Executive Committee had been claimed as work of the Advisory Council.

Knibbs would have nothing to do with this method of undertaking research; he firmly believed that it was the Government's responsibility to ensure that the Institute was sufficiently endowed and staffed to make it independent of the need to seek gratuitous assistance and this principle he adhered to throughout his term as Director even in spite of the financial strangulation from which his Institute suffered.

The first report of the Director to the responsible Minister, Massy Greene, dated 21 April 1921, was an eight-page document devoted to the change-over of existing policies and work adopted by the temporary Institute to a form which, he considered, would enable the permanent Institute to meet its statutory obligations. A diagram attached to the report showed the Director at the head of a pyramid with four chiefs of research divisions under him in charge of bureaux of agriculture, industries, information and standards.[10] Subsidiary

[8] Details of appropriation and actual expenditure, 1916-1925. Appendix 5.

[9] List of research projects and investigations. Appendix 6.

[10] Although Knibbs has been given credit for this conception, it is so similar to a plan prepared by Lightfoot in December 1916 for the information of W. G. Spence that it must be assumed that Lightfoot had a hand in its preparation. The plan appeared in both the first and second annual reports of the Institute. See also Appendix 6.

units devoted to particular branches of science stemmed from the bureaux. Advising the Director were a general advisory council and the state advisory boards.

Warning the Government that large sums of money would be necessary to implement this scheme, and that this in any case could only be done in piecemeal fashion over a number of years, Knibbs stressed in his report:

(a) It will be impracticable at the outset to cover anything like all branches of scientific industrial research.
(b) To deal adequately and comprehensively with any single branch of scientific industrial research, such, for example, as the Forest Products Investigations, a sum considerably in excess of the total vote available in the past for the temporary Institute would be required.
(c) If the permanent Institute is to fulfil at all adequately and even on a very restricted scale, the scope of functions contemplated by the Act, it will require a very largely increased annual vote.
(d) The scale of operations of the future Institute and the adoption of a definitive programme of work must depend primarily on the amount of the votes to be made available from year to year.
(e) The scheme of organization of the Institute, involving such questions as the creation of the Bureau of Agriculture and the Bureau of Industries provided for in the Act, unequivocally depends on the funds to be made available.

Giving an indication of the likely financial requirements for the first full year of operation Knibbs indicated that if the two Chiefs of the Bureau of Agriculture and the Bureau of Industries were to be appointed immediately at least £35,000 would have to be provided in the 1921-22 Estimates, but that if these two appointments were held in abeyance only £25,000 would be required.

These sums he stressed were minimum requirements and merely provided for a modicum of new projects in association with a continuation and development of researches already begun by the temporary Institute and to which the permanent Institute was committed.

It must have been with some surprise that Massy Greene received from the Director on 5 May estimates of expenditure totalling £50,000 for the operation of the Institute for the financial year 1921-22. This sum, Knibbs specified, was the minimum requirement and provided £30,000 for new investigations and £20,000 for salaries, contingencies and investigations already in progress. He urged that the 'Minister and Director be untrammeled in regard to the scheme of application of the money'. Two days later Knibbs again wrote to the Minister, this time as a result of a conversation he had had with the Treasurer, Sir Joseph Cook, on the subject of the estimates for the Institute. In the letter Knibbs said:

The Treasurer advises me that a very moderate expenditure for the Institute of Science and Industry is necessary because of the likelihood of political opposition . . . if public and parliamentary opposition is to be expected, and is allowed to effect the vote, the proposed appointments will wreck the whole concern.[11]

With the estimates in a state of flux, Knibbs departed on a tour of those States in which the Institute had a vested interest—Queensland, New South Wales and Western Australia—to inspect projects in the course of investigation by the Institute, promote co-operation between the State scientific departments and the Institute and ascertain problems which might be investigated in the future. During his stay in Western Australia Knibbs felt the first pangs of angina which was to leave him in declining health for the remainder of his term as Director and which was finally to bring about his retirement in December 1925 before his five-year term had been completed.

During the Director's absence Lightfoot sent to the Minister the Works Estimates of the Institute for 1921-22: a sum of £75,000 was requested for the construction and equipment of laboratories the nature of which had yet to be determined. Within a month, Massy Greene had received requests totalling no less than £125,000 from the Institute so he sent the document back with the curt minute: 'This expenditure must stand over. Meanwhile action is to be taken to co-operate with the defence research laboratories which I understand the Minister of Defence is anxious to promote.'

Lightfoot immediately replied with a counter-proposal, sanctioned by the absent Knibbs, that a sum of £10,000 be provided for buildings and equipment on the Works Estimates but on Knibbs's return in July he was informed by Massy Greene that no money would be provided under the Works Estimates and that in all probability his general Estimates would need to be heavily reduced.[12] In anticipation of the Treasurer's pruning knife, Knibbs forwarded a compromise proposal for a programme of work which involved an expenditure by the Institute of only £28,000. He pointed out that this amount would enable the Institute to enter into co-operative projects with the States, which had promised to provide £12,000 for such projects. This proposition was of no avail.

In an urgent memorandum received by way of the acting Comptroller-General of the Department of Trade and Customs from the Treasury, Knibbs was informed that his original Estimates of £50,000 for running the Institute needed to be cut by £35,000, thus reducing

[11] The appointments he was referring to were the Chiefs of the Bureaux of Agriculture and Industries. Both positions by this time had already been advertised, and thirty applications had been received for the former position and sixty-nine for the latter.

[12] In actual fact £4,062 was eventually provided on the Works Estimates.

the vote of the Institute to £15,000, the identical level of the year 1920-21. This meant that no new researches could be started, no co-operative ventures as arranged by the Director with the States during his visit could be undertaken, no new staff could be appointed, no industrial research fellowships or studentships could be awarded and no grants in aid of pure scientific research could be made.

In submitting the revised Estimates, Knibbs protested, first to the Minister, then to the Treasurer. In a warning that was to be constantly repeated he said:

(a) The present condition is one of retrogression and not of progress.
(b) The Institute, so far from being able to co-operate actively with the State agricultural and other technical departments, as has always been intended, is actually unable to meet the requests for co-operation made by these departments.
(c) Though valuable progress has been made in certain investigations the Institute is quite unable to follow up results.
(d) The Institute, through lack of funds and facilities for carrying on its statutory functions effectively even on a moderate scale is losing its power and influence.
(e) The sympathy of the large number of leading scientific and industrial men throughout Australia who have for several years actively and enthusiastically supported the Commonwealth Government's proposal to establish the Institute is being dissipated.[13]

As with most of his other memoranda to Ministers, no action was taken and the Estimates remained at £15,000, an amount, as he often pointed out insufficient to undertake thoroughly one major line of research, let alone run an Institute expected to cover almost every branch of applied science in both primary and secondary industry.[14]

In a major reshuffle of portfolios in December 1921 the Institute acquired a new Minister, A. S. Rodgers, appointed Minister for Trade and Customs in place of Massy Greene, while another significant change was the appointment of S. M. Bruce as Treasurer. Rodgers from the outset got a full account from Knibbs and Lightfoot of the difficulties facing the Institute. Letters and reports outlined the whole history of the Institute and showed how, through financial starvation, it had been unable to fulfil its statutory functions; they listed the great number of researches needing investigation and gave information about the amounts other countries spent on scientific research. Knibbs's representations were not confined to written statements; he made personal approaches also to members of Parliament when the House was in session. Rodgers, however, required no urging; he was

[13] Although these same warnings were given to both Governments during the five year period while Knibbs was Director, he was unable in spite of the force of his arguments to change the situation.

[14] A further £1,007 was subsequently appropriated.

sympathetic towards the needs of the Institute and agreed to support, to the limit of his powers, an increased appropriation for it.

In the Estimates for 1922-23 Knibbs asked for £66,550, of which £41,000 was for new investigations.[15] True to his word, Rodgers attempted to influence the Treasurer into acceding to this request and brought Knibbs into the discussions to support him but neither was able to make any headway, and it seemed to be a foregone conclusion that the Estimates would again be heavily reduced. Having apparently nothing to lose Knibbs gave vent to his feelings in a vigorous letter to Bruce. This read in part:

> Your attitude—as I understand it—to the whole question of a reasonable provision for the Institute's work, has made me feel that the intrinsic nature of the institution is really not apprehended by the Government. Not all parsimony is economy, and, so far as the future of Australia is concerned, to so treat the Institute as to practically ensure its failure would—I submit—be a mistake which must react unfavourably on a national destiny, for it lies in these things. The hesitation to commit the country to a small expenditure for 1922-23 or to carry out the provisions of the Institute's Act requiring the creation of Bureaux of Agriculture and Industries within the Institute discloses the fact that the earnest of success is absent, and that of failure imminent.[16]

Conscious of his own inability to persuade the Treasurer, Rodgers suggested to Knibbs on 13 July that he should form a deputation composed of eminent scientists to wait on Bruce to plead the case for the Institute. Rodgers further suggested that as the Estimates were to be decided soon no time should be lost in making these arrangements, for which he gave his official sanction.

In what must have been a state of desperation, Knibbs wrote to Sir Thomas Lyle informing him of what had transpired, and asking for his advice as to the constitution of the deputation, which he suggested should consist of the provisional General Advisory Council, the provisional Victorian State Advisory Board, and Professor Masson if he would consent to come. Lyle replied through the same messenger who brought him the letter to the effect that Masson was a 'must' on such a deputation, that the provisional General Advisory Council could make up the remainder and that he himself would attend if his health permitted. Because of the urgency, the members were approached by telephone and Knibbs was able to secure for his deputation Lyle, Avery, Delprat, and also Masson who agreed to act as spokesman.

At the ensuing interview with Bruce on 1 August Masson displayed all his old fire; a two-year absence from the intimate affairs of the

[15] Knibbs to Rodgers, 21 March 1922. CSIRO records.
[16] Knibbs to Bruce, 12 June 1922. CSIRO records. The letter was marked unofficial.

Institute had not changed his viewpoint. According to the record of the interview as prepared by Knibbs, Masson:

urged the necessity of liberal endowment and the removal of the Director and the Institute from every form of departmental interference and intrusive control, and that the functions and possibilities of the Institute were justly expressed by the Prime Minister originally. He urged that the Director should receive liberal support and be allowed the proper freedom.

The remaining speakers either reiterated Masson's arguments or spoke on the pressing problems confronting Australia and needing investigation. In reply Bruce is reported to have said:[17]

There was no doubt whatever that the Institute was a necessity from the national standpoint, that it needed larger endowments than it was receiving and could not hope to be successful in paltering with the thing in a small way, and being virtually turned into a departmental function; that it ought to reflect an effort on the part of the whole of Australia and have State backing as well as Commonwealth support, and that only in this way could it be free from any form of departmental control other than that necessary merely for receiving Government endowment and subsidy and only in this way, excepting in so far as it was necessary for Government control in dealing with public moneys, could it hope to be really successful. That, however, was a matter for the Cabinet to decide and he could not commit himself to opinion.

The net result of the deputation was a reduction in the Institute's Estimates to £20,907 for the year 1922-23.[18] The usual protestations to the Minister followed and all met with the usual negative results. In one of his letters an embittered Knibbs turned his attention from the Treasurer to the Treasury officials.

May I point out that Secretaries of departments, even of the Treasury, are not entitled to set at nought the provisions of an Act specifically requiring certain things to be done. To admit that they may do so would be to vest power in a Secretary instead of in Parliament; both Parliaments and Ministers would virtually be in the hands of the official.[19]

The first annual report of the Director, covering the period 18 March 1921 to 30 June 1922, was presented to Rodgers on 25 September 1922. It presented the all-too-familiar story of how little the Institute was able to do with limited finance and what it might do with more generous grants. Only one further 'annual' report was issued by the Director. It covered the period 1 July 1922 to 31 December 1923 and was presented to the then responsible Minister,

[17] Knibbs's report of meeting. CSIRO records.
[18] In the Works Estimates £10,000 was asked for and £3,700 was provided.
[19] Knibbs to Secretary of Treasury, September 1922. CSIRO records.

Austin Chapman, on 1 February 1924. This second 'annual' report was in great measure a repetition of the first but painted an even blacker picture of the Institute's sorry state.

After a general election on 16 December 1922 a new Government took office in February 1923. Hughes, who had been singularly quiet during the sallies between his Ministers and Knibbs, ceased to be Prime Minister when the Nationalist Party, unable to command a clear majority, was forced into forming a coalition with the Country Party; so Hughes, unacceptable to the Country Party, resigned. S. M. Bruce became Prime Minister in the new Government; Earle Page, leader of the Country Party became Treasurer; Austin Chapman was given the portfolio of Trade and Customs.

Hughes was now relegated to the rank of an ordinary member of Parliament, and so the Institute lost its main political link within the Government. When one looks back over the troubled history of the Institute and the Advisory Council which preceded it, Hughes would appear to deserve great credit for his part in the development of the idea of scientific research at the national level, even if the bodies he had brought into being had stagnated for almost seven years because of financial starvation.

Wielding the great power he undoubtedly possessed during the war, he had established almost single-handed the Advisory Council of Science and Industry and, in the face of opposition which would have daunted most men, he managed to get his Bill of 1920 setting up a permanent Institute of Science and Industry through Parliament. The vision of science wedded to industry solving the problems which retarded development remained with him. He had failed, however, to provide the funds needed to bring the organization to vigorous life. During the post-war years his slender political majority could well have been the principal reason for that neglect.[20] In the turbulent political climate of the times he may not have felt secure enough to advocate better grants for science and may have been forced to bow before adverse political winds.

When the future of the Institute was discussed early in the life of the Ninth Parliament the Prime Minister, addressing the House of Representatives on 3 March 1923, intimated that it was intended to place on the agenda for the next conference of State Premiers an item dealing with the duplication of activities between the Institute and the State scientific departments.[21] On learning of this unexpected move, Knibbs wrote letters of protest to Bruce, Earle Page and Austin Chapman pointing out forcibly that there was no duplication of

[20] G. Sawer, *Aust. Federal Politics & Law 1901-1929* page 187.

[21] Earle Page in his policy speech before the December general election pledged himself to prevent overlapping of activities between the Commonwealth and the States. G. Sawer, loc. cit., page 223.

activities between Commonwealth and States and that practically all the Institute's investigations in any case were carried out in co-operation with the States. In an interview with Earle Page, Knibbs managed to change the general tenor of the inquiry from duplication to co-operation, but the fact that the Institute's future was at stake could not be disguised. As a result of the interview a monumental report was prepared for the conference covering the whole field of possible co-operation between the States and the Commonwealth on all matters affecting scientific research in relation to national development. The report was too long for conference purposes and a condensed version was prepared entitled *Application of Science to Industry,* duly printed and circulated as an item on the agenda for the conference.

The scope of co-operation suggested is reflected in the main subject headings of the document:

Agricultural and Pastoral Problems,
Forest Products and Timber-using Industries,
The Economic Mineral Resources of Australia,
Technological Development of Manufacturing Industries,
Investigations of Water Power Resources and the Economic Utilization of Fuel Resources and Production of Liquid Fuels.

A set of definite proposals for co-operation between the Institute and the States completed the document; on their acceptance or rejection by the State Premiers might hang the fate of the Institute of Science and Industry:

(i) That the State Premiers be invited to concur generally in co-operation between the Commonwealth Institute of Science and Industry and the respective State Government departments concerned on the lines indicated above.

(ii) That the State Premiers be invited to concur in particular in:
(a) The preparation and publication by the Institute of Science and Industry of a series of appropriate bulletins dealing with the natural resources of Australia.
(b) The preparation and carrying into effect of co-operative schemes for the control and eradication of diseases, pests, and parasites affecting the agricultural and pastoral industries, and especially for the eradication of the cattle tick pest.
(c) The preparation and carrying into effect of co-operative schemes for the solution of problems concerning forest products.
(d) The preparation and publication by the Institute in co-operation with the State Geological Survey Departments of a series of bulletins dealing with the economic mineral resources of Australia.
(e) The preparation and carrying into effect of co-operative schemes for the investigation of problems affecting manufacturing industries.
(f) The preparation and publication by the Institute in co-operation

with the State departments concerned of a bulletin on the water-power resources of Australia.

(g) The preparation and carrying into effect of co-operative schemes for the investigation of fuel problems.

(iii) That insofar as the State Premiers, or any of them, approve of the above proposals, they be invited to instruct their respective State officers accordingly.

(iv) That the whole expense of the bulletins referred to in paragraphs (a), (d), and (f) above be borne by the Institute but that insofar as the cost of any co-operative research work is concerned (paragraphs (b), (c), (e), and (g) above) the State Premiers be asked to concur generally in the principle that the co-operating States will contribute with the Institute on a basis to be agreed upon. The total sum thus contributed by the States may be limited to a definite amount. The general concurrence suggested would ordinarily be subject to specific approval by the State Ministers controlling the departments concerned in each particular scheme.

When the Premiers met in conference on 21 and 22 May to discuss the items on the agenda for the forthcoming conference of Commonwealth and State Ministers, they were wary of the motive behind the Commonwealth's proposals for co-operation in scientific work believing that the Commonwealth was endeavouring to develop the Institute to the detriment of their own scientific departments. Their decision, handed to the conference in the form of a proposal, was that the Premiers believed the States themselves should be responsible for co-ordination of their activities. This meant that if the Institute was to be preserved there would have to be strong argument on the part of the Commonwealth representatives to effect a change of heart in the State Premiers.

The Commonwealth was represented at the conference by the Prime Minister, Bruce, and the Treasurer, Earle Page,[22] while the six States were represented by their Premiers together with a contingent of senior Ministers from all States except Queensland and Western Australia.

The item came up for discussion on 26 May, and Bruce in his opening address attempted to alleviate the fears of the States by saying: 'In the proposals we are making—they are very moderate—there is no suggestion of creating a Bureau to overwhelm the States' activities. We merely propose that the Commonwealth should act with the States in certain matters.' Sir Arthur Robinson, the Victorian Attorney-General, led the case for the States with a bitter attack on what he called the 'Bureau' of Science. Like the Prime Minister he had fallen into the error of calling the Institute a

[22] Littleton Groom was also to have represented the Commonwealth but was unable to be present.

Bureau; but not only had he confused the title, he had also confused the activities of the Institute with those of the Bureau of Commerce and Industry, and it was not until this was brought to his notice by Bruce that he realized his mistake. When he did finally turn his attention to the Institute itself, the fire had gone out of his attack but he still made it clear that he was not in favour of the Commonwealth's proposals. William Hague, the South Australian Treasurer, was the only other speaker to adopt this positive opposition to the Institute. C. W. Oakes, the Premier of New South Wales, spoke at length on the woodborer as it affected New South Wales and said that, if the Federal Government could assist with information on subjects such as this, his State would co-operate. Both the Premier of Queensland, E. G. Theodore, and the Premier of Western Australia, Sir James Mitchell, supported the proposals but the Premier of Tasmania, J. B. Hayes, sounded a note of caution in referring to the Institute's existing staff. He said:

It would be no use to give the work to a statistician who would merely put facts and figures together. I do not know what may be the intentions but it occurs to me that if beneficial results are to follow from the proposal, there must be a full staff of technical experts attached to the Bureau.

Hayes was eventually given an assurance by Bruce that 'we do not propose that any scientific problem shall be handled by clerks!' The acting Premier of Victoria, Sir William McPherson, asked whether it was intended that the Institute should build up a large and expensive staff of experts. Bruce replied:

If we were to say the Bureau is established and therefore the Commonwealth will undertake all this work, all the inherent vices of such a scheme would come to the surface at once; we might build up a large and expensive staff, without first having obtained evidence that the Bureau was doing efficient work. Our proposal is to reverse that procedure by ascertaining if the Bureau can do useful work before we proceed any further.

After a further question by McPherson, Bruce threw the future of the Institute on the mercy of the States. He said:

Under present conditions the Commonwealth Bureau of Science and Industry is not doing anything like the work that it should do, and, I think, if no other course be suggested the Commonwealth will have to decide that the Bureau must go out of existence, and the States must get along as best they can. Before coming to such a decision we wish to submit a proposal which will not mean the creation of a great department with a large and costly staff. We are trying to keep the

Bureau in existence, but it will not continue indefinitely unless its work justifies its existence, so that we can prove to the States from time to time that it is assisting in the solution of big national problems.

The scheme was then put to the vote of the conference. Oakes said that New South Wales would support the proposal, and there was an affirmative vote by McPherson of Victoria. The Commonwealth's proposals were then agreed to without further discussion or dissent and the Institute lived on after this second direct attack from the States.[23]

The conference brought into sharp relief the salient fact that the Commonwealth Government now saw the role of the Institute as a co-ordinating body rather than as a great national scientific institution solving Australia's research problems on its own account as envisaged by Hughes, and it was on that basis the State Premiers had given their approval to the Commonwealth proposals.

Knibbs had submitted his General Estimates of expenditure for the financial year 1923-24 to the responsible Minister on 13 April and, undaunted by his previous lack of success, had asked for £74,134, which again included provision of £41,000 for new investigations. In the Works Estimates an additional £21,000 was sought, this amount including provision for the equipment of a Bureau of Standards, a Fuel Research Station, a Forest Products Laboratory and the fittings for a Technological Museum of Australian Raw Materials and Intermediate and Finished Products. No reference was made to the buildings that would necessarily house this equipment: presumably they were to come later.

When Earle Page brought his first budget down at the July session of Parliament any notion which Knibbs may have entertained that the new Treasurer would be more generous towards the Institute than his predecessors was quickly destroyed.[24] Despite encouraging statements by the Minister that the Institute would not be starved financially the vote appropriated by Parliament was a niggardly £21,356.[25]

Again the protests flowed from the Director's office and again long reports were prepared outlining the depressing history of the Institute and stating what funds were needed to rejuvenate it. The despair of the Director is reflected in an exchange of letters with a Treasury official who had received one of these dispatches. The official wrote:

If exception can be taken to anything in the memorandum it is the low salaries proposed to be paid to investigators and assistants whose

[23] Press reports of the conference in most leading newspapers said the proposals had been rejected, but the official records prove otherwise.

[24] This in spite of fact that Country Party policies were largely dictated by farmers' organizations which had always been sympathetic towards the Institute.

[25] This amount included £2,000 for the Pan-Pacific Science Congress. The appropriation for the Works Estimates was £3,342.

scientific work will be paid for at a lower rate of wage than a bricklayer, and in some cases his labourer, receives.

Knibbs replied:

As regards your criticism re proposed salaries, I quite agree that they are distinctly on the low side. However, we have had so much difficulty in the past in getting funds that I cut everything down to the lowest figure.[26]

Knibbs's protests were of no avail and the small grant for the Institute stood.

To give effect to the proposals agreed to at the Premiers' Conference, Knibbs had written on 3 August 1923 to the Secretary of the Prime Minister's Department informing him that the Instiute would require £12,100 to enter into co-operative agreements with the States. As there was no provision on the Institute's Estimates for this special expenditure, he had asked if provision could be made to meet it either by way of supplementary Estimates or from the Treasurer's Advance. No reply was received to this memorandum at the time and its fate remained unknown until 18 October when the acting Comptroller-General of the Department of Trade and Customs informed Knibbs that the Prime Minister's Department had referred the letter to his department and had asked that it take action to obtain additional funds. He asked whether, in view of Knibb's greatly reduced Estimates and the considerable amount of money involved, it was desirable to apply to the Treasury for this expenditure. This was like a red rag to a bull. Ignoring the acting Comptroller-General, Knibbs wrote on 28 November to Chapman and Earle Page, acting Prime Minister during the absence abroad of Bruce, submitting definite proposals for implementing the Premiers' Conference agreement. The scheme, which was of a restricted nature, provided that the Institute should undertake the following investigations:

I. *Agricultural and Pastoral*
   A. Plant Diseases
   1. Citrus Fruit Diseases
   2. Maize, Millet, etc. „
   3. Potato and Tomato „
   4. Stone Fruit „
   B. Animal Diseases
   1. Buffalo Fly Pest
   2. Kimberley Horse Disease

II. *Forest Products*
   1. Timber Tests
   2. Timber Seasoning

III. *Economic Mineral Resources*
   1. Preparation and Publication of Bulletins

IV. *Manufacturing Industries*
   1. Pottery and Glazes from Australian raw materials.
   2. Paints and Varnishes.
   3. Miscellaneous.

V. *Fuel Research*
   1. Liquid Fuel from Australian raw Materials.

[26] Knibbs to J. C. Cerutty, 21 December 1923. CSIRO records.

Knibbs, giving the cost of these investigations, adhered to his original estimate of £12,100 and pointed out that of this figure only £5,500 would be required till the end of the financial year. Three further letters were sent on the subject by Knibbs and finally, having had no reply and with his patience finally exhausted, he wrote on 1 February 1924 to Chapman, asking 'would you very kindly let me know whether my recommendations are approved and whether the money is, or is not, to be made available.' A reply soon came not from Chapman but from the Treasury. It read:

> In connection with your application for certain funds, I am directed to state that the amount which it seemed necessary to expend was provided on the Estimates, and the Treasurer thinks that all essential expenditure should be arranged out of the vote already granted by Parliament.

This put an end to any hopes Knibbs had for co-operation with the States on some basis of sharing the costs. Except for a small sum made available to undertake investigations into the buffalo fly pest in Western Australia no other money was provided for co-operation with the States on the basis of the agreement reached at the Premiers' Conference.[27] The Government's reasons for withholding finance were revealed in an interview between Knibbs, Earle Page and Sir Littleton Groom on 12 February 1924. In a hand-written record of the conversation (CSIRO Records) Knibbs wrote: 'Sir Littleton Groom reaffirms necessity for Institute being responsible only for matters in which it advises: money not to be given in name of Institute otherwise.' This repeated the attitude expressed by Bruce at the Premiers' Conference and made it perfectly clear that the duty the Government expected of the Institute was that of a co-ordinator and not a prosecutor of scientific research. In his submissions Knibbs had not adopted those principles since all his proposals required that the Institute itself should carry out the investigations and this was clearly not the type of co-operation the Prime Minister expected of it. The proposals of the Premiers' Conference did require the Institute to undertake some lines of inquiry, but investigations in the main were to be co-operative ventures.

Knibbs was not willing or not able to adjust to the political climate existing in Commonwealth-State relationships at that time; the Institute survived, but only in a state of suspended animation.

Because of Knibbs's failing health and a renewed interest in the field of statistics, the administrative burdens of the Institute fell increasingly on the shoulders of Lightfoot, so that by the end of

[27] The Western Australian Government had promised £1,000 a year for three years for co-operative work. Of all the States Western Australia was the most enthusiastic about the Institute.

1923 most of the memoranda issuing from the Institute over the Director's signature were either prepared or written by him. But Knibbs continued to exercise his over-riding authority by personally signing all important correspondence on matters of policy.

Although Lightfoot's authority became so much the greater, it is of interest to note that he was not strictly an 'officer' of the Institute since he was still on loan from the Public Service and therefore subject to the provisions of the Commonwealth Public Service Act.[28] Section 14 (2) of the Institute of Science and Industry Act, which specifically provided exemption from the Commonwealth Public Service Act for 'officers' employed by the Institute, had no application to him. To rectify this situation Knibbs had recommended first to Rodgers and then to Chapman that Lightfoot be appointed as 'Technological and General Assistant to the Director' for a period of three years from 1 July 1922. No reply was received to either of these memoranda.

When Lightfoot got wind that the Public Service Commissioners were, at the instigation of the Department of Trade and Customs, blocking his appointment to the position recommended by the Director he took steps at once to clarify the position. A letter signed by Knibbs was sent on 27 November 1923 to the acting Solicitor-General asking his opinion on the Institute's standing in the following matters:

(a) That the Institute is in no sense a branch of the Department of Trade and Customs.
(b) That all persons and officers employed by the Institute are not subject to the Commonwealth Public Service Act and are not in any sense officers of the Department of Trade and Customs.
(c) That all attempts by any person whatsoever to treat the Institute as if it were a branch of the Public Service are contrary to the Act itself.

It so happened that draft regulations necessary to give effect to certain undefined provisions in the Institute's Act were sent almost simultaneously by the Department of Trade and Customs to the acting Solicitor-General for final drafting. These regulations had been sent to Massy Greene by Knibbs as early as 13 September 1921, but only after persistent reminders was this action taken by the Department of Trade and Customs in November of that year.

In reply to the Institute's letter, the acting Solicitor-General stated *inter alia*:[29]

[28] He had been on the staff list of the Bureau of Census and Statistics but because of his long absence, had been recently transferred to the unattached officers' list.
[29] Acting Solicitor-General to Director, 11 January 1924. CSIRO records.

(a) There is no authority for assuming that the Institute is a branch of the Department of Trade and Customs. The fact that the Institute is shown in the Administrative Arrangements of 14 March 1923 as being a matter dealt with by the Department does not in my opinion, give that Department any control not contemplated by the Institute of Science and Industry Act.

(b) Section 14 of the Institute of Science and Industry Act 1920 provides *inter alia* that officers employed under the Act shall not be subject to the Commonwealth Public Service Act 1902-1918 but shall be engaged for such periods and shall be subject to such conditions as are prescribed.

Officer is defined as meaning, unless the contrary intention appears, any person, employed by the Director under the Act.

No express power is given to the Director to employ officers. I incline to the opinion, however, that, in view of the above definition and of the discrimination in Section 14 between officers appointed by the Governor-General and officers employed under the Act, the Act contemplates a class of officers who will be engaged by the Director 'for such periods and for such conditions as are prescribed'.

I have not been able to find any regulations prescribing the periods and conditions of employment of those officers, and, in the absence of such regulations, I think it is extremely doubtful whether the power to employ can be exercised.

(c) As regards officers engaged by the Director under sub-section (2) of Section 14 of the Institute of Science and Industry Act 1920, the Commonwealth Public Service Act 1922 does not apply.

Lightfoot, whose special circumstances were not covered by this opinion, found himself in an invidious position, and again an attempt was made by Knibbs, through the Minister to have him appointed for a period of three years from 1 July 1923 as Chief of the Bureau of Information. Like previous recommendations this one was unsuccessful.

The apparent inability of the Director to appoint staff, as expressed in the opinion from the acting Solicitor-General, was a matter of major concern and it had now become necessary to get regulations containing the necessary provisions approved by the Executive Council so that they could be acted upon. When the regulations were received in final form from the acting Solicitor-General,[30] they proved an immediate embarrassment to the responsible Minister, Chapman, who by this time had also received the memorandum of opinion from the acting Solicitor-General.

Through the acting Comptroller-General of Trade and Customs the Minister received additional information about the status of the Institute; information which could not have pleased him as the

[30] Draft regulations, Institute of Science and Industry Act 1920. Appendix 7.

instigator of the inquiries. Amongst other things the letter advised him:

1. That Sir Littleton Groom was consulted by the acting Solicitor-General and assents that the Institute is not a part of Trade and Customs.
2. That it has the status indicated.
3. That the whole question of regulations was exhaustively studied by the acting Solicitor-General, and the regulations as submitted to you are as drawn by him.
4. That Sir Robert Garran agrees with the views stated.
5. That the Act leaves no option.[31]

The Regulations never became operable, no reasons were advanced by the Minister, and it can only be assumed that the Minister, and presumably the Government, in keeping with their restrictive policy towards the Institute sought to keep the powers of the Director to an absolute minimum by failing to provide regulations under which he could take effective action. Throughout his term Knibbs remained subject to the directions of the Minister as laid down in Section 11 of the Institute of Science and Industry Act 1920 and, what was more frustrating, 'subject to the regulations' which were never promulgated. This, as Knibbs was to say later,[32] was the Act's greatest defect; it not only nullified the provisions granting the Institute independence but in the absence of regulations placed the Institute virtually under political control.

From the first days of its operation the Advisory Council of Science and Industry and its Executive Committee had made clear to the Government that they and the Institute to follow needed free access to the Minister without the intervention of departmental officers. This principle had been agreed to and observed by all the responsible Ministers until Massy Greene, the only link with a department being with the Department of Trade and Customs, which did the accounts work of the temporary body, having taken over those duties from the Prime Minister's Department in July 1918. Since this arrangement had worked with reasonable efficiency, there seemed to be no occasion for the permanent Institute to make any attempt to look after its own accounting requirements, since the extra work would only be an unnecessary expense on an already tight budget. This was to prove a false economy, since this was to be a major factor leading towards control by the Department.

Because of their inability to provide enough money for the Institute, and the consequent frequent requests and protests from Knibbs and Lightfoot, the Ministers responsible for the permanent Institute used the acting Comptroller-General as a buffer between themselves

[31] Acting Comptroller-General to Minister, 25 January 1924. CSIRO records. The letter was headed 'Status of the Institute'.

[32] Knibbs to Sir Frank Heath 4 November 1924. CSIRO records.

and the Institute. At first this affected only minor matters of routine but later major matters of policy were concerned and Knibbs was always at a loss to know which of his communications ever reached the eyes of the Minister. This procedure had become so well established by the end of 1923 that the Institute had tended to be regarded as a satellite of the Department of Trade and Customs and in effect operated as a branch of that Department.

Therefore when the opinion of the acting Solicitor-General was received that the Institute was in no sense a branch of the Department, the Director was like a child with a new toy. The opinion was brandished before Commonwealth departments, and with a particular flourish before the Department of Trade and Customs, while anyone else who had cause to be in regular correspondence with the Institute was advised of it.

This did nothing to help the main problem of direct access to the Minister, but was temporarily a great morale booster for a very disillusioned Director. Determined to free himself from departmental control Knibbs made an abortive attempt to have himself appointed as a certifying and authorizing officer preliminary to the Institute taking over the payment of its own accounts. This expedient failed, so he tried to by-pass the Department by corresponding directly on matters of policy and finance with other departments, using as his reason the opinion that the Institute was in no sense a branch of the Department of Trade and Customs. This course of action eventually brought censure from the Cabinet in the form of an instruction from the Prime Minister that all communications between the Director and the Government must be sent direct to the Minister for Trade and Customs.[33]

The opinion of the acting Solicitor-General had another effect concerned with the control exercised by the Public Service Board over government employees. Public Service Board control had been strongly resisted by the Executive Committee of the Advisory Council when the Act was first under consideration on the grounds that:

(a) The Directors know that their own success and that of the Institute is absolutely dependent on their choice of officers.
(b) It should be in the power of the Directors immediately to rectify any mistake they make on their selection of officers.
(c) Officers work with the highest degree of efficiency when they know that their efforts are closely supervised by those who have full control over their appointment, continuation of employment, remuneration and future advancement.

[33] The offending instance was occasioned by a letter to the Prime Minister's Department asking for funds for investigation of cold storage of fruit.

(d) Practically all the officers of the Institute would have to possess qualifications and experience of a scientific or technical nature and the Directors would be in a much better position to select and control a special staff of this nature than the Public Service Commissioner.[34]

Against the advice of the Public Service Board the Government had respected these arguments and made provision for exemption in the Act.

On learning of the opinion of the acting Solicitor-General that the Director had no power to employ staff in the absence of regulations, the Public Service Board informed the Government that the exemption under Section 8 of the Public Service Act 1922 for 'persons employed in a technical or scientific capacity by the Institute' was not legal, and that they would not continue the exemption after 30 June 1925.

To add further to the worries of the Institute, towards the end of 1923 it was strongly rumoured in the Press that Knibbs would soon resign and the Institute be merged with the Bureau of Commerce and Industry, the Director of which would then be in charge of both. Although there was no foundation for the first of these rumours there was more than an element of truth in the second.

At that time the Board of Trade, which, with the Institute of Science and Industry and the Bureau of Commerce and Industry, formed part of a tripartite scheme established by Hughes during the war for the organization of Australian trade and industry, was, at the request of the Government, undertaking a critical review of the activities of the Bureau. Knibbs, acting in his dual capacity as Director of the Institute and as a Member of the Board of Trade,[35] informed the Minister for Trade and Customs that he was not responsible for the rumours and that they were entirely false. Much to Knibbs's dismay, Chapman informed him that he was favourably inclined towards a merger and that he had discussed such a possibility with a number of people after reading the articles. Fortunately Knibbs was able to convince the Minister that such a course was undesirable and the matter was dropped.

Some small progress was made by the Institute during 1923 when for the first time it was able to secure a laboratory of its own.[36] This had been made possible by an offer from the Council of the Brunswick Technical School to make available 2,500 square feet of floor space in a new wing intended originally for the vocational training of returned service men. The offer had been made conditional on

[34] Masson to Senator E. J. Russell 2 November 1918. CSIRO records.

[35] Knibbs was appointed to the Board on 5 May 1921.

[36] It is true that the stables at the Institute's headquarters had previously been converted into a workshop for undertaking tests on carburettors for the use of various liquid fuels in internal combustion engines.

the Institute continuing its investigational work into pottery and ceramics then nearing completion at the School of Mines in Ballarat. The offer was accepted and a five-year lease was secured at a nominal rental of £50 a year from 1 January 1923, but it took twelve months from that date before laboratories were equipped.

In addition to the work on ceramics the laboratory was used to house the tanning investigations which up to that time had been conducted in a temporary laboratory at the Customs House, Perth, and the paper pulp investigations, also transferred from Western Australia.[37]

When Knibbs had prepared his Estimates for the financial year 1924-25, instead of submitting them to the Minister he sent them direct to the Department of the Treasury, on 30 April 1924. However, apparently having second thoughts, Knibbs sent a duplicate copy a week later to Chapman. It was his last official communication with Chapman since within a fortnight he had resigned his portfolio because of ill health. For a few weeks the Institute, to its great pleasure, found itself temporarily administered by Littleton Groom, who had never failed to keep in touch with it from its early beginnings. This interlude was all too short and H. E. Pratten was appointed to replace Chapman. In spite of the strongest representations by Knibbs to Pratten the General Estimates were cut from £76,755 to £24,755.[38] While this figure represented a slight increase over the previous year's appropriation, it contained provision for the payment of a grant of £5,000 to the Commonwealth Engineering Standards Association, thereby reducing the vote to almost the same level as the previous year. As usual Knibbs's protests about the drastic reduction met with no response.

At this period, during the winter months of 1924, when the fortunes of the Institute were at a low ebb, powerful voices were raised in its support. The Press, fed with a flow of press releases from the Institute,[39] condemned Government apathy towards it, and the universities which until this time had remained aloof from the Institute's troubles, spoke out in favour of giving it the resources with which to fulfil its proper national functions.

The universities had expected that the Institute would play an important part in assisting university research, but in fact the Insti-

[37] The transfer of both investigations to Victoria met with strong oppostition from the Western Australian State Government which had been campaigning since 1919 for the Commonwealth Government to erect the Forest Products Laboratory in Western Australia. A site and limited finance had been offered by Western Australia for such a laboratory.

[38] In addition £22,250 had been sought on the Works Estimates but the amount appropriated was only £747.

[39] Many were devoted to the 2nd Annual Report of the Institute which was tabled in the House of Representatives on 22 May 1924.

tute had been able to do nothing in this matter. With no money to award research studentships, no money to make grants in aid of pure scientific research and no money to sponsor or enter into co-operative projects, the Institute was powerless to change this situation. Although inability to help the universities had led to some criticism, and in some quarters there existed a belief that the Government could best spend its money directly on the universities rather than on the Institute, most academics favoured the Institute being given a fair trial.

At the two-yearly conference of the Australasian Association for the Advancement of Science in Adelaide in August 1924 Sir John Monash and Professor A. C. D. Rivett spoke strongly in favour of the Institute being given adequate support by the Government. In his presidential address to the Conference, referring to the Institute and to Knibbs (who was the retiring President of the Association) Monash said:

> The short-sighted neglect of successive Governments to make financial provision even for the bare statutory functions of the Institute have falsified the hope that under such able guidance it would become a source of varied and useful output of scientific knowledge and an inspiration to our scientific workers. We can but hope that, in course of time, a more educated public opinion will bear fruit in an adequate endowment by the State in this and in other fields of that pursuit of science which is, beyond dispute, the greatest social force in modern civilization.

Rivett, in his presidential address to the Chemistry Section of the Conference, spoke of the need for all chemists to educate their countrymen to a greater realization of the need for organized national research. He said:

> The most practical path to this was undoubtedly through a national institute adequately equipped and financed. The deplorable position of the Commonwealth Institute of Science and Industry was a grave misfortune and the Treasury provision for its vast tasks was nothing less than contemptible. No more urgent immediate practical task lay in front of Australian scientists than the creation in the country at large, and in its political leaders, of a strong and intelligent realization of the vital importance of national research of the type originally in view when the department was founded during the war. To get the Commonwealth Institute placed on a sound basis would be one of the greatest possible achievements of scientific men at this stage of their national development.

These evidences of public and academic opinion led to a promise by Pratten to examine in detail the affairs of the Institute. A mass of material was prepared and collected by Knibbs for this examination, but no sooner had it started than Pratten was advised by the

Prime Minister that ministerial responsibility for the Institute would in future be under the care of Senator R. V. Wilson, an Honorary Minister. In a letter from Pratten dated 11 December Knibbs was informed that this arrangement would operate forthwith and it was left for Wilson to continue the examination started by Pratten. In January 1925 a new Department of Markets and Migration was established and Wilson was given the new portfolio as well as retaining responsibility for the Institute.[40]

The reason for this change of ministerial responsibility was soon to be revealed to the Institute and was to be a turning point in Commonwealth-sponsored scientific and industrial research. On 17 April Wilson, in an announcement to the Press, said that a conference composed of business leaders, university representatives, and State officials would be convened by the Government in May to discuss the reorganization of the Institute and how best it could be made increasingly useful to the industries of the Commonwealth.

Since assuming office in 1923 both Bruce and his Ministers had accepted the idea that Australia's development depended greatly on her ability to apply scientific methods to industry and accepted also the view that it was the duty of the Commonwealth Government to assist in bringing about this application. They doubted, however, whether their own agency, the Institute of Science and Industry, a legacy from the previous Government, was, under its existing charter and administration, capable of carrying out the type of scientific application they considered both desirable and necessary. The Prime Minister's letter of invitation to the May conference indicated his attitude to the Institute:

> Experience (extending over four years) of the working of the Institute of Science and Industry Act has led to the conclusion that, having regard to the very wide field of possible investigations on the one hand, and to the relatively undeveloped state of scientific research in Australia on the other, the scheme provided for in that Act is too ambitious and is lacking in definitiveness.
>
> Whilst the Government fully realizes the importance of scientific research to the welfare of Australia and to the development of its industries, it considers that it is impracticable to undertake immediately the creation of an Institute on such a scale that it can deal at all effectively in the first few years of its development with all, or even with very many of the various branches of work which require investigation.
>
> The Government is, therefore, desirous of obtaining suggestions as to what steps should be taken to reorganize the Institute so as to enable it to concentrate its efforts on certain fields of research and to work closely in co-operation with existing State Departments and other

[40] The Institute's accounting arrangements were transferred from the Department of Trade and Customs to the new Department.

institutions which either are already carrying on investigations in these fields, or would be intimately concerned in such investigations. It is hoped that in this way it will be possible to adopt a concentrated or co-ordinated policy which will permit of rational development and of continuity of effort.[41]

One of the influences which had led to Bruce's decision to reorganize the Institute was the Imperial Economic Conference held in London in October and November 1923. On that occasion Bruce was accompanied by Senator Wilson, as the other representative of Australia, and it was this circumstance which probably influenced him to appoint Wilson to replace Pratten as the Minister responsible for the Institute, since Wilson shared his own interest in reorganizing the Institute.

At the conference Imperial scientific co-operation was discussed at length and a resolution was adopted 'that all possible steps should be taken to encourage the exchange of scientific and technical information between the various parts of the Empire, and the co-operation of the official and other organizations of common interests'.[42]

Bruce, always strongly in favour of Imperial co-operation, felt that the Australian Institute had not developed this side of its activities as much as he thought desirable and he was so much attracted by the possibilities of Imperial co-operation in science that he[43] discussed with Lord Balfour the possibility of Sir Frank Heath, the Secretary of the British Department of Scientific and Industrial Research, visiting Australia to promote further scientific co-operation with Britain. The fruits of this discussion were to come later. Two other resolutions, both sponsored by Bruce and adopted by the conference, were to have an important bearing on Imperial co-operation in scientific research. One requested the British Government to increase its tariff preferences for certain Empire foodstuffs and the other suggested the formation of an Imperial Economic Committee.

Before either of these resolutions could be put into effect, the Conservative Government was defeated by Labour at the general election of December 1923. The Labour Government, which held free trade views, refused to implement the tariff preferences and was also averse to setting up the Imperial Economic Committee.[44] Nine months later the Conservatives were back in power and Baldwin proceeded to put into effect two of his election pledges; first to implement the

[41] Bruce to those invited to conference 5 May 1925. CSIRO records.

[42] Imperial Economic Conference, 1923. Record of Proceedings and Documents. Cmd.2009, page 491.

[43] Gepp, who was in England as Australian Commissioner at the Wembley Exhibition and who was a member of the Provisional Advisory Council, says in unpublished memoirs that he was also present with Bruce at an interview with Balfour.

[44] The Labour Government's reason for not setting up this Committee was that Canada had dissented.

resolutions of the Imperial Economic Conference concerning tariff preference and secondly not to impose taxes on foodstuffs. The two pledges were incompatible, so in lieu of the tariff preferences the Government promised to make a grant of £1,000,000 a year to the Dominions to assist them in efficient production and marketing of primary products. The Prime Minister announced the grant in the House of Commons on 17 December and at the same time promised that an Imperial Economic Committee would be constituted immediately to recommend how the money could be most usefully spent.[45]

When the Committee was set up, Sir Mark Sheldon, Chairman of the Australian Bank of Commerce, and F. L. McDougall, who had been one of the business advisers to the Australian delegation at the conference, were appointed as Australia's members.

H. W. Gepp who, with Sir Alfred Ashbolt, the Agent-General for Tasmania, had discussed these developments with the Secretary of State for the Colonies, returned to Australia in February 1925, and communicated his views on Imperial scientific co-operation and on the £1,000,000 grant to J. A. Lyons, Premier of Tasmania.

Early in April 1925 Lyons informed Bruce that he understood the Imperial Government was proposing to allocate £1,000,000 a year for research work on new industries in the Dominions and that he intended, subject to Bruce's approval, to cable his Agent-General, asking him to confer with the Australian High Commissioner so that representations be made to the Australian members of the Imperial Economic Committee to ensure that at least £100,000 would be allocated to Australia. Lyons further added that Gepp would be getting in touch with him to support the proposal.

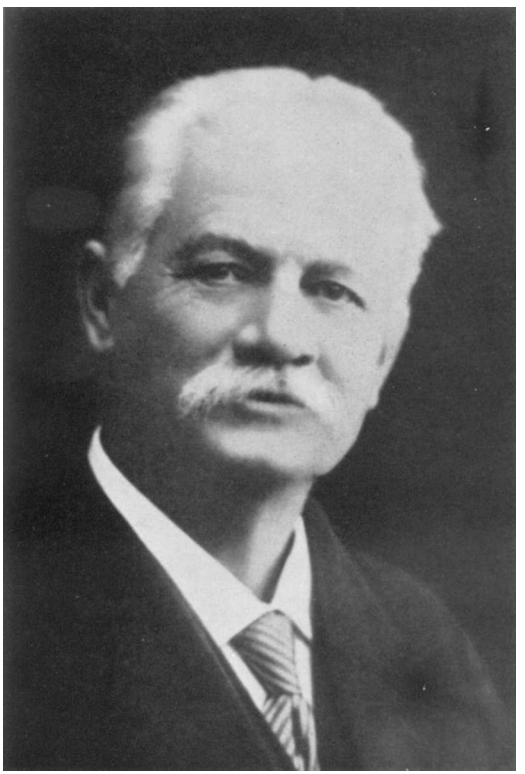
By the time this letter arrived Gepp had already been in touch with the Prime Minister and to use his own words 'was called on to assist and advise the Government on both the subject of imperial scientific co-operation and the reorganization of the Institute.'[46] On 8 April Bruce informed Lyons that he had no objection to his cabling the Agent-General, but asked that the matter be given no publicity as it was already listed for discussion with the Imperial authorities.

Bruce realized that if Australia was to get a share in the £1,000,000, only portion of which would be for scientific research, his Government would have to get its own scientific Institute into better shape;

[45] The Imperial Economic Committee recommended (Cmd.2493 1925) that 65 per cent of grant be for publicity for Empire foodstuffs, 25 per cent for research and 10 per cent for special schemes. Later the Government on the recommendation of the Imperial Economic Committee established the Empire Marketing Board to administer the grant.

[46] Gepp unpublished memoirs.

G. LIGHTFOOT



G. H. KNIBBS

F. M. GELLATLY

S. M. BRUCE

the Institute's history of frustration through lack of Government support was only too well known in Britain.[47] It is not suggested that this was the main reason that prompted Bruce to reorganize the Institute; co-operation with the States and the desirability of changing from one-man control were other contributing reasons; but it seems likely that his hand was hastened by this development.

On the same day that Wilson announced that a conference would be called to reorganize the Institute, Bruce sent a cable to Sir Joseph Cook, the Australian High Commissioner in London, in the following terms:[48]

Government at present going into whole question of improving methods of scientific and industrial research and most anxious to co-operate with British action in this direction. Would greatly appreciate if British Govt. would permit Sir F. Heath to visit Australia with a view to arranging fullest possible measure of co-operation. Please advise as soon as possible if British Government will consent, when he can come and whether British Govt. would send him or would prefer Australia invite him.

The matter was kept confidential by the Government for the time being and, after an exchange of cables between Cook, Bruce and the Secretary of State for the Colonies, it was finally arranged on 10 July that Heath would visit Australia.[49]

It is not known whether Knibbs received prior warning that a conference was to be convened to discuss the reorganization of the Institute or whether his first inkling of it was Wilson's announcement in the public Press. In either event Knibbs took umbrage at the Government's decision. In a letter to Wilson on 21 April he let him know with some asperity what he thought of the Government's intention to hold the conference:

I am not at all clear what is the proposed scope of the Conference. If it is, as to the *proper organisation of the Institute,* then the Government, who submitted the proposals to Parliament, already had the advice of the ablest scientific and practical men in the community, but the Government has never provided the necessary funds to carry it out.

If on the other hand the present Government proposes to depart from the original idea, then it is desirable that the Director be informed explicitly what the scope of the Conference is intended to be and that his advice be sought in regard thereto for as much as he is aware of the scope of similar institutions in Europe and America.

If it be merely as to suggestions for the immediate future activity of

[47] See Annual Reports of Department of Scientific and Industrial Research London: 1922-23 and 1923-24.

[48] Bruce to Cook 17 April 1925. Commonwealth Archives.

[49] It is of interest that in the actual exchange of cables it was Imperial co-operation in scientific research which was advanced as the reason for the invitation to Heath. At that stage the reorganization of the Institute was not specifically mentioned.

the Institute then I think the aim could be met calling together the *original Advisory Council,* viz., the following persons: D. Avery, M.Sc., S. S. Cameron, D.V.Sc., G. D. Delprat, C.B.E., H. W. Gepp, Professor Sir T. R. Lyle, M.A., Sc.D., F.R.S., A. B. Piddington, K.C., A. E. V. Richardson, M.A., D.Sc., and Professor Sir David Orme Masson, K.B.E., F.R.S., etc., and W. R. Grimwade, B.Sc., who had resigned because the Government did not give effect to the scheme advised.

If this Council is discredited by the Government then I have considered a list which might be substituted.

In a further letter to Wilson of the same date he wrote:

My experience has satisfied me that the Government was well advised when it decided that the Institute of Science and Industry was to be a corporation sole and not in any sense a branch of some department. It ought to be scientifically and not politically directed and, though a Minister is the instrument of ensuring its responsibility to Parliament, the making of its activity, subject to ministerial rather than scientific direction is ill-advised, and is not in keeping with the terms of the Act which relegate advice to the Director, the Advisory Council and State Advisory Boards. This ensures the questions being examined on their intrinsic merits. Is the Conference to be under a political or a scientific chairman? If the latter I think it should be under the chairmanship of the Director of the Institute.

Knibbs's complaints and suggestions about the conference were ignored. The Government intended to reorganize the Institute in its own way and nothing he could say or do had now any influence on events.

He was to suffer a further indignity before the conference met. He had written to the Prime Minister's Department saying: 'I presume that inasmuch as the whole matter of the conference originated with the Prime Minister you are making provision for the necessary expenditure in that connection.'

The reply came not from the Prime Minister's Department but from the Department of Markets and Migration advising him curtly that the Minister had directed that expenditure in connection with the conference was to be borne by the Institute itself.[50]

Knibbs had the last laugh (although it is doubtful if his feelings about it would have permitted him even a wry smile) since the Institute, in spite of the Minister's directive, had no funds to meet the modest costs of the conference and the money had to be paid from the Treasurer's Advance.

[50] On 13 May Knibbs submitted Estimates for the financial year 1925-26 the last to be prepared by him. In a final effort to get financial means to develop the Institute he asked for £75,700 of which £40,000 was for new investigations In addition he asked that £22,250 be provided for capital works on the Works Estimates. Since reorganization was pending the estimates were cut back to allow only essential activities then current to be financed.

7

THE CONFERENCE OF 1925 TO THE PASSING OF THE 1926 ACT

THE CONFERENCE called by the Prime Minister, S. M. Bruce, which met in May 1925 followed the pattern of the earlier conference of January 1916 both in the categories of people invited and in the form which the discussion took. It was made up of leading scientists from universities, leaders of industry and commerce, and agriculturalists from State departments.[1]

Some of the members of the conference had been members of the old Advisory Council of Science and Industry and some, notably Masson, Cameron, Grimwade and Lightfoot, had figured prominently at the earlier conference of January 1916.

Just as the Prime Minister, Hughes, presided at the earlier conference and gave a notable address, so the Prime Minister, Bruce, presided at the opening of this conference and gave a notable address. In 1916 there were twenty-nine persons present at the opening session and in 1925 there were thirty. In each instance the first speaker after the Prime Minister was Sir David Masson and in both instances he was also chairman of a sub-committee appointed to consider policy. In 1916 it was Masson's scheme of organization which, with some minor modifications, was adopted by that conference and in 1925, notwithstanding the intervening five years after his resignation from the Advisory Council, it was again essentially his scheme which was adopted by the conference.

The speeches of the two Prime Ministers provided a sharp contrast in style but only partly in content. Hughes's speech in 1916 had been full of fire with even a little wartime brimstone; he had given his imagination full rein as he forecast the tremendous potential of science if it could be harnessed fully in the service of the nation. He had announced that he and his Government were ready and anxious to get an organization going which would bring science to the assistance of the people of Australia. He had declaimed:

They were met today for the purpose of applying science to industry. Spiritual truth was the living force that turned the face of man towards

[1] List of those attending conference, Appendix 8.

the towering peaks of a true civilization: science the lamp by which he could guide his feet towards this distant goal.[2]

Bruce spoke more soberly but equally impressively when he addressed the 1925 conference:

It is unnecessary for me, in addressing a gathering of this sort, to stress the necessity for us in Australia taking action on a national basis in the endeavour to ensure that we shall progress with the times and bring to the assistance of all our industries most modern scientific methods and make available to them, through the research which we shall carry out, that measure of assistance which under modern conditions it is essential to give to the industries of any country . . . We have established for ourselves a very high standard of living which we are determined to maintain, and have created social conditions which are incomparably better than those which exist in other countries of the world. We must, however, recognize that if we want to maintain that standard of living and those social conditions, we can do it only by adopting the most modern and efficient methods in the conduct of the whole of the industries of our country.[3]

His belief in the potential of science was as strong as Hughes's if not so flamboyantly expressed. Benefitting by the experience of the preceding nine years he was setting out to build a new road to reach the same objective to which Hughes had aspired. He showed his sincerity in this very significant commitment:

We are perfectly prepared as a Government to take this question up seriously, and to provide the necessary finances in order to make the Institute a really effective instrument for the promotion of greater efficiency in Australia, and to ensure the investigation of some of those great problems which we must overcome if we are not to be handicapped in our national development. But this must be done down the line of making of the Commonwealth Institute a great co-ordinating authority for the whole of the efforts being made in Australia today, and not on the line of superimposing another great structure upon all those already existing.[4]

Before calling the conference the Prime Minister had prepared the way for State co-operation by getting the Premiers to agree to join with the Commonwealth in the work of the Institute of Science and Industry and he took great pains both in his statement to the conference and in his speech on the Bill in Parliament later to emphasize

[2] Verbatim report of Conference of 5 January 1916. CSIRO records.
[3] Verbatim report of Conference of 30 May 1925. CSIRO records.
[4] Speaking to the Bill in the House of Representatives in the following year, Bruce again emphasized his point when he said: 'It is not contemplated that research work will be carried out by the Institute, but that it will be undertaken wherever the best facilities exist.'

the point that the Commonwealth had no intention of establishing an organization which would only duplicate work already going.

Bruce had believed all along that the Commonwealth had a role to play in research as an instrument of national development, but during the early years of the Advisory Council under the Hughes Government, and in Bruce's own time as Prime Minister since 1923, the Institute had not been given the funds with which it could become effective. Explaining this to the conference he said that in wartime, the national effort was so great for a small nation that the Government could not face in addition such large demands as research would undoubtedly have made on the economy, and immediately after the war, during the five-year period of the Institute's existence, the country had been recovering from wartime financing, so that an increased expenditure then was too difficult to arrange. He added:

> The Act which was passed in 1920 was probably the most all-embracing Act dealing with a question of this character ever put through the Parliament of any country; an aim which we then had was far more ambitious than any older country with its greater resources had ever attempted. I suggest therefore that the proposals were a little too wide, they were a little too big . . . I can tell you from my own experience both as Treasurer and as Prime Minister . . . if we had attempted to carry out the Act as it was framed it would have involved an expenditure quite beyond the possibilities of our financial situation at the time.

He gave comfort and great reassurance to his audience when he added:

> I reiterate that the Government regards this question as probably one of the greatest importance that we are faced with today. We are prepared to find the necessary financial assistance to carry it into effect.

Having explained away the failure of the earlier Advisory Council and the Institute of Science and Industry to develop as had been hoped, Bruce went on to suggest a possible form of organization for the new Institute based upon that of the British Department of Scientific and Industrial Research. He asked that the conference should consider two things, first the best organization for the future development of the Institute, and second the most important problems that should be first investigated, with an estimate of the costs involved. He then left the meeting in charge of Senator Wilson, who immediately called upon Sir David Masson, whom he described as 'the Chairman of the first Committee', to address the meeting.

Although Masson wasted little time talking about the past, he could not resist the temptation to complain about how in his view the original Advisory Council had been let down by the then Prime

Minister, a matter which still rankled with him. Speaking of that time he said:

Finally we secured an absolute promise that there should be a representation of both those specialized trainings in the directorate, which should consist of three, and of those three, two were to be scientific men, seeing that the whole work of the Institute was really of a scientific kind, while the third was to be a man of trained and proved ability in organization and business management. He probably would have been Chairman. That was absolutely promised, but the promise was apparently forgotten because we carried on for four years, we were not allowed to see the draft of the Bill before it came before the House, and when it did we found that the system provided for was a one strong-man government.

Again having in mind that early experience, he said sardonically:

I hope the term 'Advisory Council' will not be used, because it is known to everybody that an Advisory Council is a body which starts with great enthusiasm, spends a great deal of time and gives a great deal of advice which is promptly pigeon-holed and never referred to again.

His main interest was, however, to see that, if a new Act were to be brought down to replace the old, the resulting organization should have the best possible conditions for doing effective research work.

He made no concession to the idea that the organization should be merely 'a great co-ordinating authority for the whole of the efforts being made in Australia today', as suggested by Bruce, but said flatly:

Its work, I take it, is to consist of systematic organized scientific experimental research, but, if so, it must have laboratories of its own and it must have laboratories that are up to date, thoroughly well conceived and designed and equipped, and those laboratories must be fully and properly staffed by highly trained scientific investigators and research men. It seems to me hopeless, and it has been all along hopeless, to expect the Institute to achieve any really great results, even fully to justify its existence, unless it has such laboratories and such a trained scientific research staff. There is of course the alternative that has been talked of and suggested, and that some perhaps may favour, but to my mind it is not really workable, and that is that the Institute should depend upon the research work done in the university laboratories and in other laboratories already existing. Undoubtedly it should be in touch with all that work; it should work harmoniously with existing research establishments and laboratories in the universities and in State departments; there would be no conflict of effort but it cannot depend wholly upon the work being done in institutions not under its own control. If it is granted that the Institute has to have its own research laboratories and research staff, and I feel so strongly on this subject

that I should lose all hope for and faith in the future of the Institute if that were not to be the case . . .

He brought cries of dissent from his university colleagues when he said 'For what do universities exist primarily? Primarily for the education of students'. In spite of the protests of the university people, he ploughed on:

I do not really think there is any room for differences of opinion on that point. The universities do exist primarily for that purpose. Research is one of their functions, but they are not much in touch with the industries of the country. Their efforts in research tend rather towards the realm of what is perhaps not too happily called 'pure science' as opposed to applied science.

He spoke strongly in favour of direct access to the Minister and freedom from departmental interference; both these things had troubled him in his earlier days on the Advisory Council. He said:

What hampered us and worried us more than anything else was the fact that we were never really able to get into direct touch with the Minister —I am speaking now of the provisional body before the passing of the Act. It seems to me that the Council, if there is to be such a Council, must be granted direct contact with the Minister, of course through its channel, because I do not mean that the Minister should be bothered every day by certain people waiting upon him, but there must be no intermediary, the Institute must not be hung as a subordinate appendage upon some department so that all its recommendations and proposals which have to go to the Minister are compelled to go through various intermediary hands. It is perfectly impossible that men especially selected for their capabilities to deal with this particular class of work should be asked to allow their recommendations to go through the hands of government officials unknown to them, whose abilities and training, however great, are of quite a different character, and that recommendations adopted after mature deliberation by men especially trained and selected for the purpose should be subject to be turned down on the advice of somebody who really knows far less about it.

In this short but significant address Masson firmly charted the course the research organization should follow in order to be effective. He bluntly brushed aside hopes held by many State officials, university men and State politicians that the Commonwealth would merely subsidize and strengthen existing institutions so that they themselves could tackle research problems more vigorously. Having experienced the difficulties and frustrations of depending on other institutions to do research work for the Commonwealth and the difficulties inherent in working with elaborate patterns of co-operation, he came out emphatically for a Commonwealth organization

which could work on research problems in its own way, in its own well equipped laboratories with its own highly qualified scientific staff.

H. W. Gepp, general manager of the Electrolytic Zinc Company of Australasia Ltd., spoke next. He was a man with a strong conviction about the part research could play in national development and was well known to Bruce, with whom he discussed many problems of national development. He had spent some time in England the year before the conference, had made himself familiar with the working of the Department of Scientific and Industrial Research in England and had made the acquaintance of Sir Frank Heath, the head of that department.[5]

He spoke of his interest in the British scheme and then said:

For the purpose of discussion and purely with that object, I move that the scheme (outlined by the Prime Minister) be adopted by the Conference as a recommendation to the Commonwealth Government and that the details thereof be referred to a committee to be appointed by a later resolution.

Senator J. D. Millen seconded the motion which was carried.

J. D. Millen, not to be confused with E. D. Millen who had for a period been Chairman of the Advisory Council and had introduced the ill-fated Bureau of Agriculture Bill of 1909, spoke in favour of the proposed reorganization and advocated adequate salaries for scientists, who in his view were grossly underpaid.

Professor B. D. Steele of Queensland hastened to disagree with Professor Masson's statement about the role of universities as primarily teaching institutions and pleaded for more financial support for universities so that they could take what he considered to be their proper place in research. He supported strongly, however, the government of the Institute by a Council rather than by one man.

A lively exchange occurred between George Valder, Under-Secretary for Agriculture in New South Wales, who had been an early supporter and later a keen critic of the Commonwealth Institute of Science and Industry, and the chairman, Senator Wilson. Valder declared that one cause of the failure of the Institute had been the tardiness of the Commonwealth Government in voting funds for co-operative work between the States and the Commonwealth even when the States involved had readily agreed both to co-operate and to meet their share of the costs. He said this had happened with prickly pear, with cattle tick and with bunchy-top of bananas.

Senator Wilson countered by claiming that the States' case had sometimes been inadequately presented and the Commonwealth had

[5] Gepp's role as an unofficial advisor to Bruce had been the subject of bitter comment by Knibbs.

been asked to contribute funds without sufficient information about how they were to be used.

Valder replied that not only were the Commonwealth authorities very tardy in answering correspondence but sometimes letters were not answered at all! Since, however, he had all along supported the Commonwealth's doing scientific research, he now supported in general terms the proposals made by the Prime Minister for a reorganization.

Professor H. G. Chapman of Sydney urged that existing institutions be used and extended with Commonwealth money rather than that new laboratories should be built for the use of the new organization. In regard to the proposal to erect laboratories for the new scheme he said: 'Nothing is likely to bar the success of this scheme of reorganization so much as the suggestion of building their own laboratories'. Clearly his views were diametrically opposed to Masson's.

Professor H. A. Woodruff of Melbourne also argued for the greater use of existing laboratories. He said: 'Speaking on the investigation of stock diseases it would be a mistake to attempt to build or equip new laboratories other than those which are at present in existence'. He added that since veterinarians had to be trained at universities there should be Commonwealth support for research in veterinary institutions at the universities to assist not only in solving national problems of stock but also in training research workers in veterinary science.

Professor E. J. Goddard of Brisbane argued very reasonably that in some instances, where suitable laboratories existed and were available, they should be backed by the Commonwealth with money and with research workers, but when no suitable laboratories existed the Commonwealth might well build and staff its own. He commended the Commonwealth role in securing co-operation between the States saying:

> It appears to me that one of the very big things that a Commonwealth Institute of Science and Industry can do is to bring about effective co-operation where two States are concerned. I happen to be associated with the bunchy-top investigations and, as we all know, the tackling of that problem was rendered possible only by the stepping in of the Commonwealth authorities. Until that actually happened there was no concentrated effort on the problem which was as much a Queensland problem as a New South Wales one.

At this point Sir John Monash suggested to the conference that it should divide up into two committees, one committee to consider the actual scheme of reorganization, and the other to consider the branches of work to be concentrated upon and the finance involved.

The committees were then appointed and met separately to discuss their several problems.[6]

The committee for projects and finance found that the task of determining priorities was too difficult to complete in the limited time at its disposal, so it set out a list of problems previously tackled by the Advisory Council and Institute, and also prepared an estimate of financial needs for the first year of the reorganized Institute. In presenting the report on projects and finance to the full conference Senator Millen, chairman of the committee, first made the point that time was really inadequate for serious consideration of priorities or even of particular projects, and then submitted lists under the general headings: forest products, liquid fuels, cold storage, stock pests and diseases, plant pests and diseases, forest pests and diseases, miscellaneous animal pests (rabbits, etc.), agricultural problems (soils survey, etc.). There was a further major heading 'Secondary Industry Problems', but problems under this head were not submitted in detail. The committee recommended grants-in-aid for postgraduate research and finally presented an estimate indicating that for the first year's work about £100,000 would be required.

The projects and finance committee's report when presented to the full conference was adopted with little discussion.

When the committee on reorganization met it had become at once apparent that members felt free to put forward any scheme they thought fit irrespective of its similarity or dissimilarity with that of the Prime Minister. In the light of Gepp's motion Lightfoot, however, did not consider such liberty of action permissible and, since he could not support any scheme inconsistent with the Prime Minister's, he prepared a minority report of his own. The committee had then gone on to prepare 'the best scheme they could devise' for submission to conference as its majority report.

The majority report presented to the conference by Masson, bore the marks of his own unwavering views about how the Institute should be governed and run, views which he had held ever since the first conference in January 1916. It recommended that there should be three full-time directors all with 'scientific qualifications and experience and selected with due regard to their practical experience and their administrative and executive ability'. The

[6] The members of the committee on reorganization were: Sir David Masson (chairman), Dr S. S. Cameron, R. H. Cambage, H. W. Clapp, E. H. Flack, H. W. Gepp, W. R. Grimwade, G. Lightfoot, Sir John Monash, C. S. Nathan, Dr A. E. V. Richardson, Professor B. D. Steele, George Valder, W. E. Wainwright, Professor H. A. Woodruff.

The committee on problems to be tackled and finance required, comprised: Senator J. D. Millen (chairman), E. J. Horwood, P. C. Holmes Hunt, G. A. Julius, Sir George Knibbs, C. E. Lane-Poole, Professors W. E. Agar, H. G. Chapman, E. J. Goddard, A. J. Perkins, A. D. Ross, E. W. Skeats and R. D. Watt.

directorate, moreover, should have direct access to the Minister. Masson recorded 'a strong expression of opinion' from his committee that they were 'absolutely opposed to the idea of a single director'. The report recommended that there should be State committees each of seven members who would, subject to the directors, organize the work special to their own States. The Council itself was to consist of the three directors plus two nominees of the Commonwealth Government and two delegates from each of the State Committees. It should meet not less than three times a year to discuss policy and procedure and once a year report to the Minister on the monies to be provided for the forthcoming year. Major investigations were to be carried out under the direct control of special committees responsible to the directors.

Before a full discussion could take place on this majority scheme Lightfoot's minority report was given a hearing. Lightfoot claimed that the committee had adopted a scheme which was inconsistent with that which the Prime Minister had outlined and which, he said, had been approved unanimously by the conference before being passed on to the committee to fill in the details. He added:

Moreover I do not think that the scheme is as simple and effective as it might be. What has been said by Professor Masson, Mr Gepp and Professor Steele must necessarily amount to a condemnation of the scheme of organization of the Department of Scientific and Industrial Research of Great Britain.

Professor Goddard supported the minority report saying, 'I rise now to support the minority report inasmuch as I would argue most strongly that the report is really *ultra vires*'.[7]

Senator Wilson from the chair said quietly:

As Mr. Gepp's motion was of a general character and as we are all met here with the one object of doing the very best for the Institute, I do not think it is necessary to raise the question of whether the committee went outside the scope of their powers.

This ruling from the chair brought attention back to the majority report, and Goddard, frustrated in his support of the minority report, now attacked the first recommendation of the majority report. He argued that three directors should not be recommended, saying that that particular recommendation had not appealed to the Govern-

[7] Referring to the scheme outlined by the Prime Minister in his speech Gepp said: '*For the purpose of discussion and purely with this object* I move that the scheme be adopted by the Conference as a recommendation to the Commonwealth Government and that the details thereof be referred to a committee to be appointed by resolution.' Taking only the words following 'I move' as the resolution, Goddard and Lightfoot regarded the majority report as being in conflict with it. Gepp himself, a strong supporter of the majority report must have regarded the preamble as part of the motion and the majority report as being in order.

ment in the past and should not be put forward now. He thought it would be just as difficult or even more difficult to get three suitable people as it would be to get one, and that running the Institute would be even more difficult under three men than under one. In a final thrust he said: 'I do not consider that the suggestions which have been made for the appointment of three directors are in any way a contribution to the furtherance of economic and scientific research in Australia'.

Senator Wilson gave some support to the minority report when he suggested that the Federal Council should consist of one man from each State selected from a panel of three to deal with research policy and finance, and a single director who would report to the Council concerning the researches and make arrangements for the decisions of the Council to be implemented. He put forward a twelve-point scheme on his own behalf but the conference preferred to concentrate on the scheme suggested by its own committee.

Sir John Monash stoutly defended the majority report claiming that a full-time working executive of three would be much more effective than a council with general power to decide priorities and research projects and a single administrative director to implement the decisions. He agreed that the suggestions in the majority report did in some measure amount to committee control, but the Executive Committee would be small, and the members well qualified in different branches of science and industry; and since the Executive would be working full time, a council with such an executive would be more effective than a larger council meeting at long intervals. The full council envisaged by the majority report was admittedly rather large, he said, but he saw its main function as effecting close liaison with the States and not in any sense controlling research work. He concluded by saying:

I again emphasize the fact that a number of us think very strongly that government by a general council drawn from all States meeting comparatively rarely is doomed to failure and that what is wanted is a strong central administration with representatives from the States as may be required and a method by which once a year the programme and the financial requirements of the Institute may be determined.

Senator Millen and Professors Skeats and Goddard, all of whom had been members of the projects committee and so had not heard the arguments on the committee for reorganization, spoke against the proposal that there should be a directorate of three. They were concerned about the high cost of the proposal and the difficulty of efficient management under a triumvirate.

Professor Steele defended the proposal for three directors and com-

mented on an earlier statement by Professor Goddard about university administration[8] to illustrate the danger of one man control. 'The universities,' he said, 'are afraid to appoint principals, not so much because men are not available, but because there is a terrible risk in putting an autocrat in control of a university. You might get the wrong autocrat.' Professors, he must have felt, could be trusted with autocratic power to run their departments but those appointed to administer universities or large research organizations could not. Professor Watt supported the majority report, giving instances from abroad of how various organizations with more than one director worked successfully.

Since argument was so strong on the first clause of a report which had been moved as a whole, the chairman suggested that the motion to pass the report as a whole be withdrawn in order to allow discussion on each separate clause. This was agreed to, the original motion was withdrawn and the conference adjourned for lunch. When it reassembled Professor Masson moved the first clause of the report which provided for three full-time directors.

An amendment was moved by Professor Woodruff:

That the Institute shall be under the control of a council which shall advise the minister as to policy and finance and there shall be a chief executive officer and not less than two full-time highly qualified technical advisers, one on the biological and one in the physico-chemical side responsible to the council for the execution of the programme.

This amendment was negatived.

Another amendment was moved by Gepp, 'That the following words be added to Professor Masson's motion: "Failing this being acceptable to the Government the directorate shall consist of a chairman and not less than two part-time directors . . ."'

This amendment was negatived also and the original motion was agreed to; so Masson's motion for a directorate of three had now been endorsed by the full conference.

When the minutes of the meeting were received by members they found the amendment by Professor Woodruff now appearing in another form. According to the official record it was then *resolved* after Masson's motion had been carried (no mover named in minutes although movers of the other resolutions were named), 'That in the event of the motion as agreed to not being acceptable to the government, the conference recommends the adoption of the scheme contained in the amendment previously moved by Professor Woodruff'.

[8] Professor Goddard had said earlier in the conference, 'Most of the universities for instance are requiring Principals. They recognize that there should be some such body but they do not appoint them simply because they are afraid to do so . . . they feel that they cannot take the risk!'

This resolution was challenged by Gepp in a letter to the Minister when he received his copy of the minutes.[9]

Professor Masson was profoundly upset when he saw the minutes containing this resolution and wrote immediately to the Minister, who had chaired the meeting, claiming that such a resolution could not have been passed since he knew nothing of it having been presented at the meeting and would certainly have opposed it strenuously if it had been put forward.

Masson appears to have got no satisfaction in this matter from the Minister and he felt so strongly about it that he aired his point of view in the Press.[10] Sir George Knibbs in a letter to Senator Wilson on 9 June defended the authenticity of the minutes which, he claimed, 'were reported verbatim by Mr Sholl.'

Apart from the furore at the time the resolution in question had no effect on events.

The report of the conference contained an important recommendation about relations with the Public Service. Masson had moved, 'That the government be requested to exempt the Institute from the provisions of the Commonwealth Service Act', and this was strongly supported by Knibbs who argued that 'the whole mechanism of the Public Service is inconsistent with the kind of work that ought to be done by the Institute—there is a direct analogy between the Institute and an organization like the University'. This motion was agreed to without opposition. The conference had concluded with a statement by Senator Wilson:

> Personally I am very anxious that the Institute shall be put to full capacity because I feel the Government can do more for Australia by this means than by anything else it has in hand. If I can help you at any time I shall be only too ready to do so. You may leave Melbourne with the assurance that you have the personal interest of the Prime Minister with you in your desire to make the Institute successful and that he will always be ready to help you in every way possible.

After the conference the Minister for Markets and Migration circulated to members of Cabinet the scheme of reorganization recommended by the conference, and in the same memorandum four other schemes which could be considered at the same time.[11]

In keeping with his policy of making thorough preparation for the reorganization of the Institute, Bruce appointed a sub-committee of Cabinet consisting of the Treasurer, the Minister of Defence and

[9] Gepp to Senator Wilson 13 June 1925. Commonwealth Archives.

[10] *Argus* (Melbourne) 6 June 1925.

[11] These were (1) scheme suggested by Prime Minister, (2) scheme suggested by Senator Kingsmill, (3) second scheme suggested by the conference if scheme (1) not acceptable, (4) scheme suggested by the Minister.

the Minister for Markets and Migration to advise him on all matters touching the Institute, and on the preparation of material for the amending Act. He had already invited Sir Frank Heath to visit Australia to inquire into and report on Imperial co-operation in scientific industrial research work. Although the stated purpose was Imperial co-operation the fact seems to be that the invitation was intended to get further expert advice on the reorganization of the Institute itself which could be expected to co-operate with any Imperial arrangement that might be made. No decision could be made about any of the schemes outlined by the Minister until Heath's report was available.

Heath arrived in Australia in the first week of October 1925 and submitted his report to the Prime Minister under cover of a letter dated 27 January 1926. During his four months in Australia he visited all the States to acquaint himself with problems of primary and secondary industry and to exchange views on research with leading men in State politics, on the land, in business, in State services and in the universities. As Dr Gellatly had done five years before he addressed meetings of interested people in every State, stressing the value of scientific research for the development of the country. He was well received throughout Australia, his breadth of understanding coupled with his warm personality generated friendly relations with all kinds of people. His explanation of what he thought the proper organization and objectives of research ought to be, and his insistence on the need for co-operation between States and Commonwealth helped no doubt to disarm some of the suspicions of Commonwealth intentions still held by some State officers and politicians.

In December, while Heath was preparing his report, Senator Wilson sought advice from him about carrying on the Institute in the meantime until legislation could be prepared to amend the existing Act. On 18 December Heath replied to Wilson's request in a memorandum, with a covering letter saying that it would be better to await the passing of a new Act before stepping up activities in the existing research programme, and that the most urgent matter at the moment was to remedy the shortage of trained scientific research workers in Australia.[12] He recommended that a trust fund of £100,000 be established to provide scholarships for advanced training of scientists in fields directly related to Australian research problems, and that three men of high scientific attainment be appointed by the Commonwealth *forthwith* to form the nucleus of an Advisory Council which he intended to recommend in his report.

[12] Heath to Wilson, letter and memorandum of 18 December 1925, Commonwealth Archives.

These three men should select the first batch of scholars even before the amended Act had been passed.

Of the three men recommended by Heath to form the Executive Committee of a Council to be established later, under the Act, one he suggested, should be an engineer, one a chemist, and one a biologist. They would be in a position not only to select scholars, but to advise the Minister on any matter which might arise in the meantime and especially to advise concerning the form of the Bill to be presented to Parliament to amend the 1920 Act.

Knibbs, who was now on pre-retirement leave, asked the Minister for a copy of Heath's preliminary report (referring no doubt to his memorandum of 18 December) in order to comment on it as might be required. This request was granted, and in a memorandum to the Minister, Knibbs expressed himself generally in favour of Heath's recommendations except that he considered the appointment of the three members of the projected Advisory Council was not needed at that time since the selection of scholars 'could readily be done by the Institute as constituted at present'. In justification of the administration of the Institute under his direction, Knibbs commented: 'I may point out that Sir Frank Heath's report does not include any matters which have not already been thoroughly studied and dealt with by the Institute.'[13]

The fact that Heath could recommend confidently the appointment of what was later to be the Executive Committee of the Council for Scientific and Industrial Research at this early stage before the amending Act had been passed by Parliament, is an indication of his confidence both in the genuine intention of the Government to amend the Act, and its ability to do so. The ground work necessary to assure the passing of the Bill had been well done, so the Government expected no opposition from the States, nor in Parliament. Accordingly the appointments were made: G. A. Julius, a consulting engineer of Sydney; W. J. Newbigin, an engineer of Sydney; and Professor A. C. D. Rivett, Professor of Chemistry at the University of Melbourne.[14]

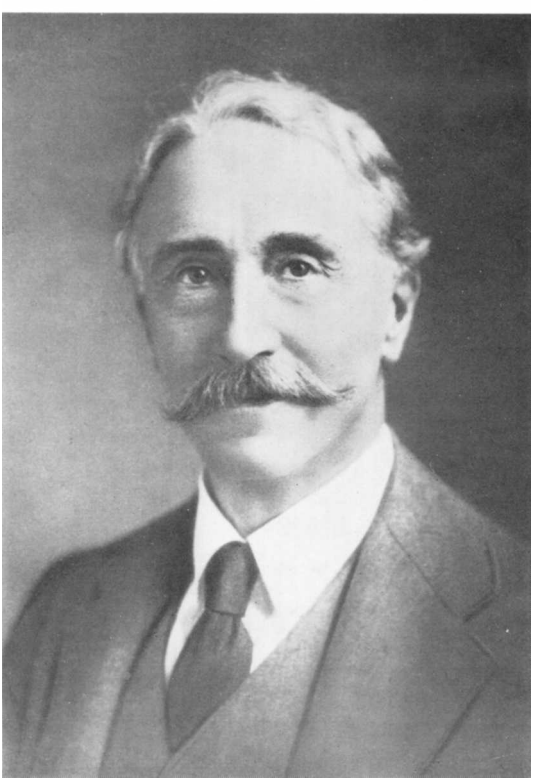
The appointment of an Executive Committee by Bruce before the Act of 1926 had been passed had an earlier parallel in 1918 when Hughes appointed Dr Gellatly Director of the Institute of Science and Industry in April 1918 some two years before the Act which set up the Institute had been passed. There were differences in the

13 Knibbs to Minister for Markets and Migration, 18 January 1926. Commonwealth Archives.

14 Newbigin died in 1927 and was replaced by Dr A. E. V. Richardson. Sir George Julius served until 1946 as Chairman of the Council. Sir David Rivett was Chief Executive Officer until 1946, Chairman of Council 1946-49. List of staff of Institute as at March 1926, Appendix 9.

H. W. GEPP

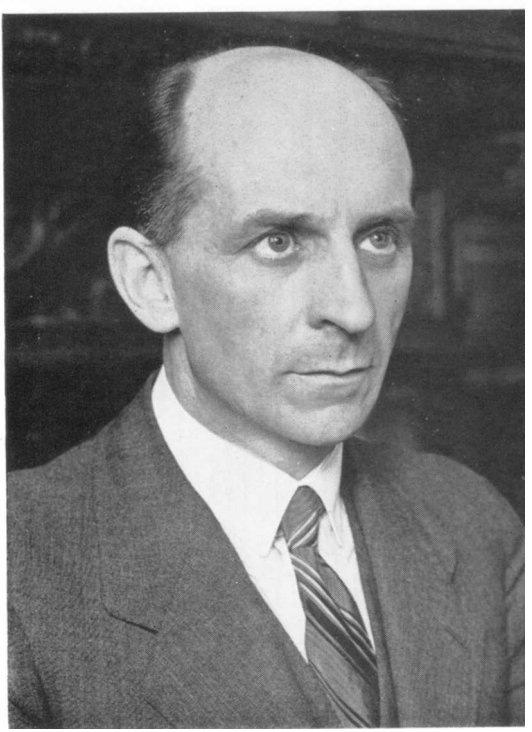
R. V. WILSON



F. HEATH

G. A. JULIUS

W. J. NEWBIGIN



A. C. D. RIVETT

circumstances of the two appointments, and these offer further examples of the difference in temperament between the two Prime Ministers and differences in their methods. Hughes made the appointment even when he was aware that considerable opposition to the development of the Institute was likely to come from the States, also that there could be opposition inside the Federal Parliament itself. Bruce made his appointments only after the greatest care had been taken to remove possible opposition by the States and after he had consulted influential opinion in Australia. He acted also on the specific advice of Sir Frank Heath, whose standing in the organization of scientific research was unchallenged by any responsible group.

The appointment by Hughes was ill-fated because of the death of Gellatly in the influenza epidemic of 1919. The appointment of the three-man executive by Bruce led at once to a thorough consideration of the amending Bill before submission to Parliament and to rapid decisions on matters which had been in abeyance pending establishment of new authority.

Heath's official report was presented to the Commonwealth Parliament by Command on 22 March 1926 and ordered to be printed on 25 March.[15] It consisted of just over two pages of recommendations and nearly six pages of explanatory notes and, since Heath was very experienced in such matters, he made his recommendations 'in a form convenient to the parliamentary draughtsmen entrusted with preparing an amending Bill to the present Commonwealth Institute Act.'

The Ministerial committee appointed by the Prime Minister to advise concerning the running of the Institute and the contents of the new Bill had been unable to deal with any of the matters referred to it so they were referred in turn to the newly appointed Executive Committee. It found itself faced at its first series of meetings with over forty items of Institute business passed on from the Ministerial committee, with the task of examining the amending Bill in detail, with the duty of initiating the fellowship scheme and starting to lay the foundations of a new and more spacious order.

The Executive held its first formal meeting on 13 April and continued on the three following days. Before the Bill was assented to on 23 June they had held sixteen meetings and given advice on the contents of the Bill itself, had made vital decisions on future policy, had selected a number of scientists for overseas study, had prepared estimates of cost for the ensuing year, and had decided on certain courses of action to be put into effect immediately the Bill should become law. In their deliberations about the Bill the Executive Com-

[15] Heath's Report, Appendix 10.

mittee had the report of the 1925 Conference and all the various schemes which had preceded the Heath report to consider as well as the report itself. In the final upshot the recommendations of the Executive Committee had a big influence on the contents of the Bill, which was an amalgam of the recommendations of the Heath report and of the conference of 1925.

In April the Executive Committee recommended to the Cabinet that the new organization to be set up under the Act should be called the 'Council for Scientific and Industrial Research', the word 'Institute' being dropped; the Cabinet approved and the new name was written into the Bill.

The Executive considered this the most suitable title because it was explicit, it would not be confused with that of any other organization, and it was similar to the titles of corresponding organizations in England (the Department of Scientific and Industrial Research) and Canada (the Honorary Advisory Council for Scientific and Industrial Research).

Under the new Act, control was to be vested in the 'Council', but for continuity of policy and action an 'Executive Committee' of three members of the Council would carry all the powers and functions of the Council between meetings of that body.

The single Director of the Institute under the 1920 Act was thus to be replaced by the three-man Executive, so the principle for which Masson had striven since 1916 was to be adopted at last.

The Bill for an Act to amend the Institute of Science and Industry Act 1920 was brought down in the House of Representatives by Bruce on 26 May 1926 and read for a first time.[16] In his first reading speech Bruce stressed the point that the Council under the new Act would avoid over-lapping with State activities, and said that he believed the Institute in the past had tried to do too much with too little money and so had been less effective than it might have been. He claimed, however, a considerable measure of success for the Institute, through its work particularly in the control of prickly pear, bunchy-top of bananas and the development of paper pulp from Australian eucalypts. Asked if the State Governments had assured the Commonwealth of their support for the Bill, and what distinct provisions had been made to prevent overlapping with State activities, Bruce replied that he did not think there was any question about State support, and that State committees were provided for and this would prevent overlapping. To reassure those who still feared opposition from the States he said, 'It is not contemplated that

[16] *Commonwealth Debates*, vol. 3, p. 2330. See also Appendix 15 for copy of 1926 Act.

research will be carried out by the Institute but that it will be undertaken wherever the best facilities exist'. As events turned out the best facilities for many research projects could exist only where the Commonwealth itself provided them.

E. A. Mann, member for Perth, who had been one of the members of the first Executive Committee in 1916, brought up an interesting point which had been dealt with already by Littleton Groom in his memorandum presented to the Government in 1908. Mann asked 'which of the powers under Section 51 of the Constitution is the Government using to establish the Industry and Research Bureau? He was answered by Sir John Latham in terms very similar to those quoted by Sir Littleton Groom in his memorandum of 1908, which appears as an Appendix to this paper. The powers quoted were in Sections 51 and 81 of the Constitution.[17]

The second reading of the Bill was marked by general support from both sides of the House and it went on to its third reading without amendment.

In the Senate on 28 May Senator Pearce, then Minister for Home and Territories, and from the earliest days in 1916 a consistent supporter of research by the Commonwealth, moved the first reading of the Bill and, as the Prime Minister had done in the House of Representatives, reassured members who might still fear overlapping with State activities. 'It is not intended', he said, 'to establish central laboratories but to use existing State facilities as much as possible'.

Senator Kingsmill of Western Australia said that he agreed meanwhile that there should be no overlapping, but said prophetically: 'In future the Commonwealth will more and more do the research'. He said that the Heath report was in line with what he himself had recommended a year earlier at the request of certain Ministers. He added that when the earlier Bill was before the Senate in 1918-20 there was a great apathy towards it, but in 1926 'everyone is interested now in science'. Commenting on the appointment of the new Executive Committee, which had been announced by Senator Pearce, he said he would like to stress the point that two of them were engineers, and added, 'engineering is a most practical side of science.' Apparently he had greater faith in the applied than in the pure scientists as managers of an organization.

Senator E. Needham came out strongly in support of the Bill: 'The Institute, established by the Act of 1920,' he said, 'had not come up to expectations mainly through lack of finance. In relation to the management we have had experience of one-man control of the Institute and I hope we shall profit by the lesson it has taught us.'

[17] Statement by Littleton Groom in memorandum of 1908, Appendix II.

Then he spoke in the strongest terms in support of adequate money for research. 'The amount of £350,000[18] is trivial, I would welcome earmarking a much larger sum. What would a million a year be in a country such as Australia for the encouragement of the application of science to industry?'

There was little further discussion and no opposition to the Bill which was returned to the Senate on 19 June without amendment.

This easy passage of the Bill in just under a month was in sharp contrast with the slow progress and painful changes suffered by the 1920 Act which had taken two years between introduction and assent. It was not only the careful preparations by Bruce and consistent support by Earle Page and his Country Party which speeded the 1926 Bill through Parliament but there were influences widely dispersed in the country which assisted its passage.

Since 1919 Australia's population had grown from about five millions to six and the economic situation had become more stable. The Bruce-Page Government had made national development a central part of their policy and scientific research was recognized as a necessary element in development of both primary and secondary industry. Moreover, as Senator Kingsmill had said in the debate on the new Bill, 'everyone was now interested in science whereas in 1918 there had been apathy'.

The members of this first Executive Committee were all appointed part-time in the first instance. Julius and Newbigin, being consulting engineers, were able to devote time at their discretion to the work, and Rivett was granted leave of absence for a year from his Chair at the University of Melbourne to try out the new post.

Under the new Act, State advisory committees, which had not functioned under the 1920 Act, were to be revived and the chairman of each State committee was to be an ex-officio member of the Council.[19] In order that the Council should be constituted, a suitable chairman had to be appointed for each State. The Executive Committee worked with such success that the chairmen had been appointed in time to attend a meeting of the Council called for 22 June the day after the Bill had received Royal Assent.

The Chairman of the Council[20] had invited the Prime Minister to

[18] He referred, no doubt, to the Trust Fund of £250,000 for 'investigations' mentioned in the Bill in addition to the Trust Fund of £100,000 set aside as an endowment for the training of scholars.

[19] In full reorganization of Institute, four schemes compared. Appendix 12.

[20] Members present at first meeting of Council (CSIR) 22-25 June 1926 were: Executive Committee, G. A. Julius (chairman), W. J. Newbigin and Professor A. C. D. Rivett; chairman of State Committees: Professor R. D. Watt (N.S.W.), Sir David Masson (Vic.), Professor H. C. Richards (Q.), Professor T. Brailsford Robertson (acting) (S.A.), B. Perry (W.A.), P. E. Kean (Tas.); co-opted members, Professor E. J. Goddard (Q.) and Professor H. A. Woodruff (S.A.); secretarial, G. Lightfoot (acting secretary) and G. A. Cook.

open the first session of the Council, and in an opening address, Bruce first paid a tribute to Senator Sir Victor Wilson of whom he said:

Senator Wilson has done everything in his power to put the application of science to industry on the best possible basis and the fact that the Commonwealth has recently reconstituted the Institute is to a great extent due to the work he has done.

He then informed the Council that it would be under the direct care of the Prime Minister, but that the Minister who would handle the day-to-day affairs of the Council would be the Vice-President of the Executive Council, Senator Pearce. After commenting that there was now general recognition of the role of scientific research in the development of both primary and secondary industries he went on to stress again the function of the Council as a co-ordinating body:

I want to stress very much to you that behind the Government's mind in the action it is taking is the desire to bring about a real co-operation between all those bodies who are endeavouring to bring scientific research to the assistance of the nation. I want to stress the fact that the Government has no desire to superimpose another great structure upon all the activities that are going on in this Country. It does desire however to bring about a real co-ordination of all such efforts, and to give some assistance to the universities and other bodies that are trying to do something with regard to scientific research in the direction of making it applicable to industry. We want to develop methods of bringing about this co-ordination, and we do not wish to create another great body to duplicate work being undertaken at present.

He spoke of the work done under great difficulties by the old Institute, saying that the Government believed that a great deal of excellent work was done, and he indicated that its main difficulties lay in being over-centralized and that 'its efforts were unquestionably defeated by the lack of the necessary financial facilities'.

Again stressing the need for wide co-operation he said:

One thing we want to achieve is a real co-operation with the States. The Commonwealth has no facilities of research to place at your disposal, but in all the States we have the universities where research work has been going on for many years. The Government's greatest desire is that by this Council we should bring about a real system of co-operation with the States.

He suggested that each of the State Committees might well be made responsible for the work in its own State.

The Chairman of the Council thanked the Prime Minister for his address and for the interest and good will it showed, and the Prime

Minister left them to four days of intensive work, during which they came to grips with the many problems that faced them.

Even although the Prime Minister's expressed view at the time was that the organization should be a co-ordinating body rather than a system of laboratories equipped and staffed by the Commonwealth, his sincere belief in the value of the application of science to industry had led him to provide enough money and wide enough powers to allow the new organization both the means and the room to grow. Above all, however, he had appointed men of outstanding quality to the Executive Committe and thus had set the stage for the great performance which was to follow.

* * * * *

The perspective given by the fifty years of growth, achievement and public acceptance which has made the CSIRO the great organization it is today tends to enhance rather than detract from the credit due to those who carried the burden of the frustrating years up to 1926.

In the atmosphere of suspicion of Federal intentions by the States and uncertainty by the Federal Government itself about its responsibility and powers in this new field which the Constitution had neither suggested that it should enter nor debarred it from entering, the times were not yet ready for the lusty growth of the infant organization. Nevertheless the start in 1916 was timely and imaginative, and such was the quality of the men who served on the Advisory Council and more particularly on its Executive Committee that many of the policies and some of the practices inaugurated by them have stood the test of time.

It is remarkable how very many of Australia's greatest men in many walks of life as well as in science and in politics contributed to the early development of the Federal involvement in scientific research. It was exciting for the authors to discover the significant but hitherto unrecognized parts played by the Victorian State Minister Hagelthorn and the University of Melbourne professor, W. A. Osborne, by influencing Hughes to address the University audience in December 1915 and to announce then the intention of the Federal Government to set up an organization for scientific research.

In the field of Federal politics much credit must go to Littleton Groom who worked persistently for Commonwealth involvement in scientific research from the first years of federation; to Hughes whose bold and imaginative action led to the establishment of the Advisory Council in 1916 and to the Act of 1920; and to Bruce who prepared the ground so effectively for the Act of 1926, and who not only provided in the Act the means of development but also appointed

men of quality on the Executive Committee to implement that development.

Of scientists the contribution made by Sir David Orme Masson to the development of scientific research under the Commonwealth in ten years to 1926 was outstanding. Through his massive work for the Advisory Council, his lofty ideals for scientific research and his contributions to the early legislation from 1916 to 1920 and to the contents of the Act of 1926, he laid foundations for scientific research to be carried out in the atmosphere of eager endeavour, scientific integrity and free inquiry which has characterized the work of the Organization ever since.

It was fitting, too, that it was Sir David Rivett, a student and colleague of Masson's, who was to give form and expression to a similar philosophy for science during more than twenty years' service in the organization which followed the Act of 1926; but that is another story.

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APPENDIX 1

SCHEME FOR THE ORGANISATION AND DEVELOPMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

1. There is a strong consensus of opinion among persons engaged both in science and in industry that a special need exists at the present time for new machinery and for additional State assistance in order to promote and organise scientific research with a view especially to its application to trade and industry. It is well-known that many of our industries have since the outbreak of war suffered through our inability to produce at home certain articles and materials required in trade processes, the manufacture of which has become localised abroad, and particularly in Germany, because science has there been more thoroughly and effectively applied to the solution of scientific problems bearing on trade and industry and to the elaboration of economical and improved processes of manufacture. It is impossible to contemplate without considerable apprehension the situation which will arise at the end of the war unless our scientific resources have previously been enlarged and organised to meet it. It appears incontrovertible that if we are to advance or even maintain our industrial position we must as a nation aim at such a development of scientific and industrial research as will place us in a position to expand and strengthen our industries and to compete successfully with the most highly organised of our rivals. The difficulties of advancing on these lines during the war are obvious and are not under-estimated, but we cannot hope to improvise an effective system at the moment when hostilities cease, and unless during the present period we are able to make a substantial advance we shall certainly be unable to do what is necessary in the equally difficult period of reconstruction which will follow the war.

2. The present scheme is designed to establish a permanent organisation for the promotion of industrial and scientific research.

It is in no way intended that it should replace or interfere with the arrangements which have been or may be made by the War Office or Admiralty or Ministry of Munitions to obtain scientific advice and investigation in connection with the provision of munitions of war. It is, of course, obvious that at the present moment it is essential that the War Office, the Admiralty, and the Ministry of Munitions should continue to make their own direct arrangements with scientific men and institutions with the least possible delay.

3. It is clearly desirable that the scheme should operate over the Kingdom as a whole with as little regard as possible to the Tweed and the Irish Channel. The research done should be for the Kingdom as a whole, and there should be complete liberty to utilise the most effective institutions and investigators available, irrespective of their location in England, Wales, Scotland or Ireland. There must therefore be a single fund for the assistance of research, under a single responsible Body.

4. The scheme accordingly provides for the establishment of :—

(*a*) A Committee of the Privy Council responsible for the expenditure of any new moneys provided by Parliament for scientific and industrial research ;

(*b*) A small Advisory Council responsible to the Committee of Council and composed mainly of eminent scientific men and men actually engaged in industries dependent upon scientific research.

5. The Committee of Council will consist of the Lord President, the Chancellor of the Exchequer, the Secretary for Scotland, the President of the Board of Trade, the President of the Board of Education (who will be Vice-President of the Committee), the Chief Secretary for Ireland, together with such other Ministers and individual Members of the Council as it may be thought desirable to add.

The first non-official Members of the Committee will be :—

THE RIGHT HON. VISCOUNT HALDANE OF CLOAN, O.M., K.T., F.R.S.,
THE RIGHT HON. ARTHUR H. D. ACLAND, and
THE RIGHT HON. JOSEPH A. PEASE, M.P.

The President of the Board of Education will answer in the House of Commons for the sub-head on the Vote, which will be accounted for by the Treasury under Class IV., Vote 7, "Scientific Investigations, &c."

It is obvious that the organisation and development of research is a matter which greatly affects the public educational systems of the Kingdom. A great part of all research will necessarily be done in Universities and Colleges which are already aided by the State, and the supply and training of a sufficient number of young persons competent to undertake research can only be secured through the public system of education.

6. The primary functions of the Advisory Council will be to advise the Committee of Council on—

(i) proposals for instituting specific researches;

(ii) proposals for establishing or developing special institutions or departments of existing institutions for the scientific study of problems affecting particular industries and trades;

(iii) the establishment and award of Research Studentships and Fellowships.

The Advisory Council will also be available, if requested, to advise the several Education Departments as to the steps which should be taken for increasing the supply of workers competent to undertake scientific research.

Arrangements will be made by which the Council will keep in close touch with all Government Departments concerned with or interested in scientific research and by which the Council will have regard to the research work which is being done or may be done by the National Physical Laboratory.

7. It is essential that the Advisory Council should act in intimate co-operation with the Royal Society and the existing scientific or professional associations, societies and institutes, as well as with the Universities, Technical Institutions and other Institutions in which research is or can be efficiently conducted.

It is proposed to ask the Royal Society and the principal scientific and professional associations, societies and institutes to undertake the function of initiating proposals for the consideration of the Advisory Council, and a regular procedure for inviting and collecting proposals will be established. The Advisory Council will also be at liberty to receive proposals from individuals and themselves to initiate proposals.

All possible means will be used to enlist the interest and secure the co-operation of persons directly engaged in trade and industry.

8. It is contemplated that the Advisory Council will work largely through Sub-Committees reinforced by suitable experts in the particular branch of science or industry concerned. On these Sub-Committees it would be desirable as far as possible to enlist the services of persons actually engaged in scientific trades and manufactures dependent on science.

9. As regards the use or profits of discoveries, the general principle on which grants will be made by the Committee of Council is that discoveries made by institutions, associations, bodies, or individuals in the course of researches aided by public money shall be made available under proper conditions for the public advantage.

10. It is important in order to secure effective working that the Advisory Council should be a small Body, but it is recognised that even if full use is made by the Council of its power to work through reinforced Sub-Committees, its membership may be found inadequate to do justice to all the branches of industry in which proposals for research may be made or to the requests of other Government Departments for assistance. It is therefore probable that it will be found necessary to strengthen the Council by appointing additional Members.

The first Members of the Council will be:—

THE RIGHT HON. LORD RAYLEIGH, O.M., F.R.S., LL.D.
MR. G. T. BEILBY, F.R.S., LL.D.
MR. W. DUDDELL, F.R.S.
PROF. B. HOPKINSON, F.R.S.
PROF. J. A. M'CLELLAND, F.R.S.
PROF. R. MELDOLA, F.R.S.
MR. R. THRELFALL, F.R.S.

With SIR WILLIAM S. M'CORMICK, LL.D., as *administrative Chairman*.

11. The Advisory Council will proceed to frame a scheme or programme for their own guidance in recommending proposals for research and for the guidance of the Committee of Council in allocating such State funds as may be available. This scheme will naturally be designed to operate over some years in advance, and in framing it the Council must necessarily have due regard to the relative urgency of the

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problems requiring solution, the supply of trained researchers available for particular pieces of research, and the material facilities in the form of laboratories and equipment which are available or can be provided for specific researches. Such a scheme will naturally be elastic and will require modification from year to year; but it is obviously undesirable that the Council should live "from hand to mouth" or work on the principle of "first come first served," and the recommendations (which for the purpose of estimating they will have to make annually to the Committee of Council) should represent progressive instalments of a considered programme and policy. A large part of their work will be that of examining, selecting, combining, and co-ordinating rather than that of originating. One of their chief functions will be the prevention of overlapping between institutions or individuals engaged in research. They will, on the other hand, be at liberty to initiate proposals and to institute inquiries preliminary to preparing or eliciting proposals for useful research, and in this way they may help to concentrate on problems requiring solution the interest of all persons concerned in the development of all branches of scientific industry.

12. An Annual Report, embodying the Report of the Advisory Council, will be made to His Majesty by the Committee of Council and laid before Parliament.

13. Office accommodation and staff will be provided for the Committee and Council by the Board of Education.

ARTHUR HENDERSON.

23rd July 1915.

APPENDIX 2

Conference convened by the Prime Minister to consider the question of the establishment of a National Laboratory, 5 January 1916

PRESENT

The Prime Minister:
Hon. W. M. Hughes

State Ministers for Agriculture:
Hon. F. Hagelthorn, Victoria.
Hon. C. Goode, South Australia.
Hon. W. Lennon, Queensland.

Representatives of State Universities:
Sydney, Professor Sir Thomas Anderson Stuart;
Adelaide, Professors Sir Douglas Mawson and Kerr Grant;
Melbourne, Professors Masson and Baldwin Spencer;
Brisbane, Professor Gibson and Dr Richards;
Hobart, Dr Glasson.

Interstate Commissioners:
Mr A. B. Piddington, Hon. G. Swinburne

President, Associated Chambers of Commerce of Australia:
Mr W. T. Appleton.

President, Associated Chambers of Manufactures of Australia:
Mr W. W. Forwood.

Messrs W. C. T. Goodman (South Australian Tramways), E. W. Knox (Colonial Sugar Refining Co.), A. De Bavay, W. Russell Grimwade, W. S. Robinson, G. D. Delprat, C. F. Courtney, J. Winter-Irving, J. M. Higgins, W. P. Wilkinson (Federal Analyst), Griffith Taylor, G. H. Knibbs (Commonwealth Statistician), Dr S. S. Cameron (Director of Agriculture, Victoria).

The Ministers for Agriculture of New South Wales, Western Australia and Tasmania, representatives of the University of Western Australia and Messrs B. T. McKay, of Queensland, and Jas. Alex. Smith, of Melbourne, were invited but unable to be present.

APPENDIX 3

Resolutions of Advisory Council submitted to Hughes, 11 July 1917

The resolutions presented to the Prime Minister were: The Council approved and adopted the Report of the Executive Committee on the Organization and Work of the Permanent Institute.

In addition the following resolutions were passed:

1. That the Advisory Council is of the opinion that the immediate establishment of the permanent Institute is a matter of urgency, as the financial and executive powers of the temporary organization are wholly inadequate to the purposes in view.

2. That in the work of the future Institute provision be made for co-operation between the Commonwealth and State Governments. It is suggested that this might be effected by arranging for the estimates of expenditure of the Institute to be discussed at the Premiers' annual conference.

3. That the following representations be made to the Prime Minister:

(a) That the various State Governments are at present anxious to undertake a number of investigations with a view to developing industries of importance to their respective States and in some instances are already taking steps in that direction.

(b) That the initiation of such researches will overlap the work of the proposed Commonwealth Institute.

(c) That in many cases the State Governments are holding their hands pending the organization of the Commonwealth enterprise. Thus the proposals for a Commonwealth Institute are retarding rather than stimulating scientific research in Australia.

(d) That this position is felt to be very unsatisfactory by the State Governments who in some instances intend to proceed on their own account unless the Commonwealth proposals are quickly materialised. Such action will limit the usefulness of the Institute and prevent a favourable opportunity being availed of to obtain the co-operative assistance of the State Governments.

(e) That on these grounds the permanent Institute should be established at once.

4. That the Council strongly supports the recommendations made by the Executive Committee to the Commonwealth Government that conferences of (a) wheat experts and (b) authorities on technical education be held at an early date and urges the Government to give effect to these recommendations.

5. That in the unanimous opinion of the Council the new Institute cannot be satisfactorily worked as an adjunct to any existing Federal Government Laboratories.

APPENDIX 4

LIST OF PUBLICATIONS 1916-25

A. Bulletins published under the authority of the Executive Committee of the Advisory Council of Science and Industry and of the Preliminary Institute of Science and Industry.

Bulletin No.	*Name*	*Author*	*Year*
1.	The Cattle Tick in Australia	Special Committee	1917
2.	Worm Nodules in Cattle	Special Committee	1917
3.	Alunite Deposits in Australia	Special Committee	1917
4,	Gold Deposition in the Bendigo Goldfield Part I	Special Committee	1917
5.	Wheat Storage	Special Committee	1917
6.	Power Alcohol	Special Committee	1918
7.	Agricultural Research in Australia	Report of Conference	1918
8.	Gold Deposition in the Bendigo Goldfield Part II	Special Committee	1918
9.	Ferro-alloys and Alloy Steels	Special Committee	1918
10.	Substitutes for Tin-plate Containers	Special Committee	1919
11.	Paper-pulp. Possibilities of its Manufacture in Australia	Gerald Lightfoot	1919
12.	The Prickly Pear in Australia	W. B. Alexander	1919
13.	The Cattle Tick Pest	Special Committee	1919
14.	Marine Fibre of Posidonia Australis	John Read and H. G. Smith	1919
15.	Welfare Work	Staff of Institute	1919
16.	Gold Deposition in the Bendigo Goldfield Part III	Special Committee (E. W. Skeats, Chairman)	1919
17.	Industrial Co-operation in Australia	Staff of Institute	1920
18.	Wheats of Australia	Seed Improvement Committee	1920
19.	Wood Waste	I. H. Boas	1921
20.	Power-Alcohol. Reprint of Bulletin No. 6 Addendum by	Gerald Lightfoot	1921
21.	The White Ant Pest in Northern Australia	Gerald Hill	1921

B. Bulletins published under the authority of G. H. Knibbs, Director, Institute of Science and Industry.

Bulletin No.	*Name*	*Author*	*Year*
22.	Barleys of Australia	Seed Improvement Committee	1922
23.	Oats of Australia	Seed Improvement Committee	1922
24.	The Production of Liquid Fuels from Oil, Shale and Coal	R. E. Thwaites	1923
25.	The Manufacture of Pulp and Paper from Australian Woods	L. R. Benjamin	1923
26.	Wheats of Australia. (Revision of Bulletin No. 18)	Seed Improvement Committee	1923
27.	Australian Clays in White Pottery Wares	R. C. Callister	1924
28.	Problems of the Viticultural Industry	A. V. Lyon	1924
29.	Natural Enemies of Prickly Pear and their Introduction into Australia	W. B. Alexander	1925

C. Reports published under the authority of the Executive Committee of the Advisory Council of Science and Industry.

Organization of Scientific Research Institutions in the United States of America	G. Lightfoot	1916
Report and Recommendations on the Organization and Work of the Permanent Institute of Science and Industry	D. Orme Masson and G. Lightfoot	1917
Annual report of Advisory Council of Science and Industry		1916
Annual report of Advisory Council of Science and Industry		1917

D. Reports published under the authority of G. H. Knibbs, Director, Institute of Science and Industry.

First Annual Report of Director Institute of Science and Industry	1921-2
Second Annual Report of Director Institute of Science and Industry	1922-3

E. Circulars issued by the Advisory Council of Science and Industry and of the Preliminary Institute of Science and Industry.

Weevils in Wheat Stacks and How to Deal with them	Special Committee	1918
A Forest Policy for Australia	C. E. Lane-Poole	1919
Cotton: Its Cultivation in Australia	G. Lightfoot	1919
The Water Hyacinth	E. Mackinnon	1919
Towns and Industry	E. Howard	1919
Scientific Road Making: Need of Local Research	G. Lightfoot	1919

F. Circular issued by the Institute of Science and Industry.

New Tanning Materials	H. Salt	1922

G. Monograph issued as No. 1 of the Advisory Council of Science and Industry.

The Australian Environment especially as controlled by Rainfall	Griffith Taylor	1918

H. Monthly Journal of Science and Industry.

Volume I, Nos 1 to 8	1919
Volume II, Nos 1 to 12	1920

APPENDIX 5

INSTITUTE OF SCIENCE AND INDUSTRY

Particulars of Votes and Expenditures therefrom, from Date of Inception. APRIL 1916, to 30 JUNE 1925

Financial Year	*Vote*	*EXPENDITURE*			
		Head Office, Administrative Expenses, etc.		*Investigations*	*Total Expenditure*
		Salaries	Other		
	£	£	£	£	£
1915-16			291	250	541
1916-17	6,700	1,035	1,704	1,279	4,018
1917-18	10,500	1,581	2,049	3,807	7,437
1918-19	20,000	3,069	3,051	5,535	11,655
1919-20	14,000	3,309	3,981	5,819	13,109
1920-21	15,000	3,601	3,164	9,277	16,042
1921-22	16,007	4,747	1,298	11,156	17,201
1922-23	20,907	4,961	1,343	16,287	22,591
1923-24	21,356	5,090	1,281	16,308	22,679
1924-25	24,755	5,175	1,378	18,243	24,796
	149,225	32,568	19,540	87,961	140,069

Figures for 1925-26 not available. £6,530 was made for salaries and contingencies. Appropriations for investigations were made through Treasurer's Advance pending amending Act.

APPENDIX 6

Principal Enquiries and Investigations undertaken by the Advisory Council of Science and Industry and the Temporary Institute of Science and Industry

Investigations

1916

Chemicals
Ferro-Alloys
Standardization of Designs for Scientific Apparatus
Mode of Occurrence of Gold in Quartz
Life History of the Cattle Tick
Alunite
Yeasts and Bread-making
Nodule Disease in Cattle
Marine Biological Economics of Tropical Australia
Damage by Insects to Grain in Store
Electrical Sterilization of Milk
Soil Survey of Australia

1917

Tanning Properties of Queensland Mangroves
Tanning Investigations, W.A.
Means of Transmission of Worm-Nodule Parasite
Control of Sparrow Pest
Power Alcohol
Classification of Imports of Chemicals
Tanning Methods, N.S.W.
Posidonia Fibre
Grass-tree Resin
Tuberculosis in Stock
Shipbuilding
Manufacture of White Lead
Mechanical Cotton Picker
Paper Pulp
Utilization of Phosphatic Rocks
Wheat Weevil, Purification by Quick Lime
Tin Plate Substitutes
Commercial Utilization of Kelp
Indigenous Grasses and Fodder Plants
Seed Improvement
Cold Storage Problems
Metric System and Decimal Coinage
Utilization of Waste Timbers, W.A.
Plant Acclimatization

1918

By-Products of Wool Scouring Industry
Sheep Blow-fly Investigations, Qld.
Nitrogen Requirements of Australia
Pottery Clays, W.A.
Production of Hydrogen
Engineering Standardization
Investigations of Timbers for Defence Purposes
Castor Beans
Importation of Carrion Birds to combat Blow-fly Pest
Pottery and Ceramics Investigations, Vic.
Sheep Blow-fly Investigations, N.S.W.
White Ant Pest
Cattle Tick Dips
Flax Cultivation
St. John's Wort
Macrozamia

1919

Cattle Tick Eradication, W.A.
Road Investigations
Weights and Measures
Fuel Economy (Low temperature distillation)
Weed Pests, Qld.
Weed Pests, S.A.
Defects in Australian Leather
Cotton Growing in Australia
Cattle Tick Eradication, Qld.
Commonwealth Meat Inspection
Viticultural Investigations, Mildura
Contagious Abortion in Cattle
Kimberley Horse Disease

1920

Condenser Tube Corrosion
Cement Standardization
Australian Coal for Navy Services
Prickly Pear Investigations

Principal Enquiries and Investigations undertaken by the Permanent Institute of Science and Industry

Continuing

Engineering Standardization
Viticultural Investigations, Mildura
Prickly Pear Investigations
Cattle Tick Dips

Seed Improvement
Power Alcohol
Tanning Investigations
Paper Pulp
Pottery and Ceramics Investigations
Contagious Abortion in Cattle

1921 - 6

Carburettors and Liquid Fuels
Buffalo Fly
Bunchy Top Disease
Citrus Investigations
Gas Cylinders Enquiry
'Squirter' Disease in Bananas

General Scheme of Research submitted by Knibbs to Minister on 21 April 1921

Agricultural and Pastoral

1. Plant Genetics: The breeding and testing of new varieties of plants, etc., especially in relation to drought-resistant and disease-resistant types. Crop acclimatisation. Investigation of fibre plants. The introduction of new plants from other countries, e.g., fodder grasses, sorghum, cotton and other plants for industrial purposes.
2. Plant Pathology, Entomology, etc.: Insect and fungoid pests. Remedial measures for diseases of plants, fruits, etc., and for weeds and pests. Entomological and mycological investigations. Insecticides and fungicides, (e.g., rusts, smuts, blights, spots, scabs, etc.).
3. Soil Fertility and Bio-chemistry: The improvement of soils by the use of fertilisers and appropriate cultural methods. The treatment of alkaline soils. The utilization of natural phosphates. Maintenance of soil fertility. Causes of unproductive soils and means for their improvement. The application of electricity to plant culture.
4. Animal Husbandry: The breeding and feeding of stock. Investigations of meat and animal food-products, of stock rations, and of metabolism in relation thereto. Silage investigations and the conservation of fodder generally.
5. Animal Pathology: The control and eradication of diseases of stock whether parasitic or other. Investigations on immunisation. (e.g., sheep blow-fly, braxy, contagious abortion, animal tuberculosis, cattle-tick pest, nodule disease, etc.)

Forestry

1. Timber seasoning and preservation. Investigations on kiln seasoning. Preservation of timbers against attack by white ants and decay by organisms.
2. Tanning Agents: Utilization of barks, kinos, etc., and manufacture of tanning extracts.

3. Destructive distillation for manufacture of new products and of products now used in industry.
4. Utilization of wood-waste.

Mining and Metallurgy

1. Improved methods. Electrolytic and flotation processes. Manufacture of alloys.
2. Development of new mineral industries.

Manufacturing Industries

1, New industries. Investigations on natural resources and processes for the establishment of new industries. (e.g., phosphatic fertilisers, paper-making, liquid fuels, pottery and ceramics, leather and tanning, gums and resins).
2. Elimination of scientific and technical difficulties encountered by manufacturers.
3. Cold storage problems and other problems involving combined research in more than one branch of applied science. The correlation of industrial effort, with a view to the elimination of waste of material or energy. The development of by-products, etc.

Standardization Work

1. Engineering standardization. (Elaboration of scheme for establishing an Australian Engineering Standards Association.)
2. The testing and standardization of instruments of precision for use in industries (e.g., pyrometry and temperature control in industries, involving elaboration of scheme for utilising existing technical institutions.)
3. The testing and standardization of materials used in industry and by the Commonwealth and State Governments.
4. The testing and standardization of electric lamps, apparatus and machinery. The efficient control of imports by the Trade and Customs Department.
5. The creation of a metrological section and the standardization of scientific apparatus and instruments required in industry and generally.

Bureau of Information

1. Cataloguing and indexing of information in scientific and technical journals, in English, German, French and Italian at least.
2. Dissemination of information likely to be useful to persons engaged in the various primary or secondary industries.
3. The application of existing knowledge, and advice and information in response to specific requests and otherwise.

APPENDIX 7

STATUTORY RULES.

1924 No.

REGULATIONS UNDER THE INSTITUTE OF SCIENCE AND INDUSTRY ACT, 1920.

I, the Governor-General in and over the Commonwealth of Australia, acting with the advice of the Federal Executive Council, hereby make the following Regulations under the Institute of Science and Industry Act 1920, to come into operation forthwith.

Dated this day of 1924.

Governor-General.

By His Excellency's Command.

Minister for Trade & Customs.

INSTITUTE OF SCIENCE AND INDUSTRY REGULATIONS.

Short Title

1. These regulations may be cited as the Institute of Science and Industry Regulations 1924.

Definition

2. In these Regulations, unless the contrary intention appears - "the Act" means the Institute of Science and Industry Act 1920 as amended from time to time.

Director responsible for Institute.

3. The Director shall be responsible for the working of the Institute and for all the business thereof and shall advise the Minister on all matters relating thereto.

Powers of Director in regard to expenditure

4. Subject to the necessary appropriation by Parliament, the Director shall have power to expend at his sole discretion sums not exceeding One hundred pounds in each case on any matters or subjects of investigation or on apparatus connected with the work of the Institute.

Salaries and periods of appointment of officers.

5.-(1). The salaries and periods of appointment of officers employed under the Act shall be -

(a) in the case of officers appointed by the Governor-General in pursuance of sub-section (1) of section fourteen of the Act - such salaries and periods as the Governor-General determines, and

(b) in the case of officers engaged by the Director under sub-section (2) of section fourteen of the Act - such salaries and periods as the Director determines: Provided that no person shall be engaged by the Director at a salary exceeding Five hundred pounds per annum nor for any period exceeding two years.

(2) All persons employed under the Act shall hold office subject to good behavior and compliance with these Regulations.

Increments

6. Where the terms of appointment of an officer do not provide for the payment of increments, such increments may be paid, subject to the necessary appropriation by Parliament, as the Minister, on the recommendation of the Director determines.

Application of Commonwealth Public Service Regulations.

7. The provisions of the regulations under the Commonwealth Public Service Act 1922 for the time being in force in regard to -

(a) Leave of absence,

(b) Travelling allowances,

(c) Attendance of officers,

(d) Performance of duties, and

(e) Overtime payment,

all apply to officers appointed under the Act, subject to the following modifications :-

(i) the powers and functions of the Public Service Board under those Regulations shall be exercised in regard to officers of the Institute by the Director, and the powers and functions of the Permanent Head and the Chief Officer shall be exercised by the Director or by such officer or

officers as the Director, in writing, appoints; and

(ii) in cases where the Director considers it desirable in the interests of the Institute, leave of absence may be accumulated for more than two years.

Bureau of Information

8.-(1) Upon the establishment of the Bureau of Information the Director may furnish advice and information either without charge or may charge such fees and make or agree to such conditions as he thinks fit.

(2) Moneys received in pursuance of this Regulation may be applied, in such manner as the Director thinks fit, for the benefit and advancement of the work of any Bureau of the Institute or for the general purposes of the Institute.

Duties of Advisory Council

9. The duties of the General Advisory Council shall be-

(a) to meet at least once a year and at such other times as the Director deems fit,

(b) to advise the Director in regard to any question remitted by him to them,

(c) to draw attention of the Director to any matter or question relating to possible applications of Science to Industry, and

(d) to advise the Director generally in regard to the work of the Institute, and especially in regard to any research which it may appear to the Council should be undertaken.

Duties of Advisory Boards.

10. The duties of the State Advisory Boards shall be -

(a) to meet at such times as the Director deems fit and at least once a year,

(b) to advise the Director in regard to any question remitted by him to them, and

(c) to draw attention of the Director to any matter or question relating to supposed resources, to researches in connection therewith or to matters important to their State which can be dealt with by the Institute of Science and Industry.

Travelling expenses of members of Advisory Council.

11. The Director may pay travelling expenses to enable the members of the General Advisory Council to attend the meetings duly called, and in addition the cost of conveyance of the members to and from the meetings.

Chief of Bureaux

12.-(1) The Director may appoint an officer to act as Chief of each Bureau within the Institute and may assign such officers to assist with the work of each bureau as he thinks fit.

(2) The Chief of each bureau shall be responsible to the Director for the work of his bureau and for the efficiency and good behavior of the officers assigned to his bureau.

APPENDIX 8

Conference re Reorganization of the Commonwealth Institute of Science and Industry.

held at the Offices of the Institute on 30 May and 1 June 1925

MEMBERS OF CONFERENCE.

President

The Rt Hon. S. M. Bruce, P.C., M.C., M.P., Prime Minister.

Vice President

Senator the Hon. R. V. Wilson, Minister for Markets and Migration.

New South Wales

Mr G. Valder, Under-Secretary and Director, Department of Agriculture, N.S.W.

Professor R. D. Watt, M.A., B.Sc., F.C.S., Professor of Agriculture, University of Sydney.

Mr G. A. Julius, B.Sc., B.E., M.I. Mech E., M.I.E. Aust., Consulting Engineer, Sydney.

Mr R. H. Cambage, F.L.S., Hon. Sec., Australian National Research Council, Sydney.

Professor H. G. Chapman, M.D., B.S., M.B., Professor of Physiology, University of Sydney.

Victoria

Professor Sir David Masson, K.B.E., M.A., D.Sc., LLD., F.R.S., F.I.C. (Vic.), Emeritus Professor of Chemistry, University of Melbourne.

Mr W. R. Grimwade, B.Sc., Felton, Grimwade & Co., Melbourne.

Professor W. E. Agar, M.A., D.Sc., F.R.S., Professor of Zoology, University of Melbourne.

Dr S. S. Cameron, D.V.Sc., M.R.C.V.S. (Vic.), Director, Department of Agriculture, Melbourne.

Mr W. E. Wainwright, General Manager, Broken Hill South Ltd., Melbourne.

Professor E. W. Skeats, D.Sc., A.R.C.S., F.G.S. (Vic.), Professor of Geology, University of Melbourne.

Sir John Monash, G.C.M.G., K.C.B., B.A., D.C.L., LL.D., D.Eng., M.I.C.E., Chairman, State Electricity Commission of Victoria.

Mr Edwin H. Flack, Breeder of Friesian Stud Stock, William Street, Melbourne.

Mr P. C. Holmes Hunt, M.I.C.E., Consulting Engineer, Collins Street, Melbourne.

Sir George Knibbs, C.M.G., F.R.A.S., Hon. F.S.S., M.Int.Inst. of Statists, Hon. M. Amer. Stat. Assn., Hon. M. Stat. Soc. Hungary, Hon. M. Stat. Soc. Paris, Director, Institute of Science and Industry, Melbourne.

Mr Gerald Lightfoot, M.A., F.S.S., Institute of Science and Industry.

Mr H. W. Clapp, Chairman of Railways Commissioners, Victoria.
Professor H. A. Woodruff, M.R.C.V.S., M.R.C.S., L.R.C.P., Professor of Veterinary Pathology, University of Melbourne.
Mr E. J. Horwood, Broken Hill Pty. Co. Ltd., Melbourne.
Mr C. E. Lane-Poole, Commonwealth Forestry Officer, Melbourne.

Queensland

Professor B. D. Steele, D.Sc., F.R.S., F.I.C., Professor of Chemistry, University of Queensland.
Professor E. J. Goddard, B.A., D.Sc., Professor of Biology, University of Queensland.

South Australia

Professor A. E. V. Richardson, M.A., D.Sc., Director, Waite Agricultural Research Institute, South Australia.
Professor A. J. Perkins, Director, Department of Agriculture, Adelaide.

Western Australia

Professor A. D. Ross, M.A., D.Sc., F.R.A.S., F.R.S.E., F.Inst.P., A.M.I.E. Aust., Professor of Mathematics and Physics, University of Western Australia.
Mr C. S. Nathan, Managing Director, Chas Atkins & Co., Perth.

Tasmania

Senator J. D. Millen, Parliament House, Melbourne.
Mr H. W. Gepp, General Manager, Electrolytic Zinc Co. of Aust. Ltd., Melbourne.

Secretaries

Mr E. MacKinnon, B.Sc., B.A., Institute of Science & Industry, Melbourne.
Mr G. A. Cook, M.C., M.Sc., B.M.E., Institute of Science & Industry, Melbourne.

APPENDIX 9

Particulars of Staff, 15 March 1926

With Dates of Commencing Duty

Head Office and Administrative

Lightfoot, G., M.A., Acting Director, 25 September 1916
MacKinnon, E., B.Sc., B.A., Chief Science Abstractor, 8 July 1919
Cook, G. A., M.Sc., B.M.E., Science Abstractor, 19 April 1922
Archer, Miss E., M.Sc., Librarian and Investigator, 1 November 1918
Constable, R. W., Chief Clerk, 28 April 1916
Chadwick, H. T., Records Clerk, 6 August 1919
Crennan, H. A., Asst. Records Clerk, 3 March 1919
Polwarth, Miss M., Senior Typiste, 27 April 1922
Greenwood, Miss G., Typiste, 23 November 1925
Dimant, Miss A., Typiste, 15 March 1926
Thomas, Miss B., Junior Typiste, 16 April 1923
Bishop, Miss F., Telephoniste, 23 November 1925
Malthouse, V., Messenger, 8 October 1923
Hooper, J. F., Messenger, 31 August 1925
Bolwell, H., Caretaker, 20 May 1922
Johnson, Mrs, Cleaner, 1 June 1921
Bowden, Mrs, Cleaner, 1 June 1921

Research Laboratory, Brunswick

A. Tannin Survey

Coghill, D., Officer-in-Charge, 31 December 1921
Kilian, C. H., Lab. Assistant, 16 February 1925
Wright, A. E., Lab. Assistant, 6 October 1924

B. Paper Pulp Investigations

Benjamin, L. R., Officer-in-Charge, April 1920
Somerville, J. L., B.Sc., Chemist and Assistant, 26 September 1921
Hodgkinson, T., B.Sc., Chemist and Assistant, 8 February 1924

C. Pottery Investigations

Callister, R. C., Investigator, 24 April 1919

D. Laboratory General

Domec-Carré, P., Clerk, 1 June 1918
McMurtrie, T. L., Technical Assistant, 2 January 1924
Hoarey, Mrs D., Cleaner, 14 August 1923

Investigations in other States and in Victoria

E. Queensland State Committee

Todd, Miss H. F., Typiste and Clerk, 1 October 1917

F. Commonwealth Prickly Pear Board
(Not on staff of Institute)

Dodd, A. P., Officer-in-Charge
Hitchcock, L. F., Senior Asst. and Microbiologist
Lewcock, H. K., B.Sc., Mycologist
Mortensen, E., B.Sc., Assistant Entomologist
Roberts, F. H. S., B.Sc., Entomologist
Taylor, A. R., Field Assistant
Mundell, R. C., B.Sc., Entomologist
Mann, J. Field Assistant
Manuell, V., Field Assistant
Murrell, P. J. A., A.I.C.A., Secretary and Accountant
Todd, Miss H. F., Typiste and Records
Cole, T. A. Jnr., Field Assistant
Youitt, G., Field Assistant
Webster, J., Assistant
Allan, W. A., Messenger
Caretaker

G. Bunchy Top Disease in Bananas

Magee, G., B.Sc.Ag., Assistant, 6 May 1924
Collard, H., Assistant, 6 May 1924
Barnes, H., Secretary, 6 May 1924

H. Citrus Fruit Diseases

West, E. S., B.Sc., Investigator, January 1924

I. Viticultural Problems
(Not on staff of Institute)

Lyon, A. V., M.Agr.Sc., Investigator, January 1919
Vasey, A. J., B.Agr.Sc., Assistant, 7 January 1926

J. Buffalo Fly Pest

Murnane, D., B.V.Sc., Investigator, 24 August 1925

APPENDIX 10

RECOMMENDATIONS FOR THE RECONSTITUTION OF THE COMMONWEALTH INSTITUTE OF SCIENCE AND INDUSTRY.

I beg to submit the following summary of my recommendations for the re-organization of the Commonwealth Institute of Science and Industry with a view to increasing its usefulness and enabling it to co-operate with similar organizations in other parts of the Empire. Appended I also submit a series of notes on some of the principal recommendations in explanation and elucidation of their purpose.

I recommend that—

1. The amending Bill foreshadowed by the Government in the Governor-General's Speech should define the purpose of the re-organized Institute as follows :—

(1) It should provide for the training of young men and women in scientific research and for the encouragement of research workers who have already shown their capacity for original work.

(2) It should be responsible for the conduct of scientific investigations into problems of importance either (*a*) to the whole industrial activities of the Commonwealth, whether primary or secondary, or (*b*) to the interests of Australian consumers as a whole.

(3) It should encourage and assist under suitable conditions the solution of scientific problems of importance to particular States or groups of States, which, though urgent in themselves, do not affect the whole Dominion.

To these main functions three subordinate and derivative duties should be added—

(*a*) It should act as a clearing house of information on scientific matters affecting the industries of the country.

(*b*) It should act as the principal and official means of *liaison* between the Governments of the Commonwealth and those of the Homeland, and of other parts of the Empire in scientific matters, and

(*c*) It should become, as it wins the confidence of the worlds of industry and science in Australia, the adviser of the Government on the scientific aspects of policy.

2. The Institute should consist of the responsible Minister, and the Advisory Council to the Minister. The Council should consist of a chairman and eight members ; the chairman and two members to be appointed by the Governor-General for a term of six years in the first instance and thereafter on such a system of rotation as may be prescribed by the Governor-General. The remaining six members to be the chairman or their deputies of the State Advisory Committees referred to below.

The chairman and the two other members appointed by the Governor-General to be an executive committee of the Council with the powers prescribed below.

3. The Advisory Council shall hold two regular meetings each year so far as possible at equal six-monthly intervals.

4. All proposals for the initiation of new researches to be conducted or aided by the Institute shall, before they are undertaken, stand referred to the Advisory Council for consideration and report in their scientific aspect, and the Advisory Council may itself initiate proposals for the conduct of or assistance to researches by the Institute, subject to the powers of the executive committee. At one of the six-monthly meetings in each year to be held on a suitably appointed date, the Advisory Council shall prepare and submit to the responsible Minister a programme of work and estimates of its cost recommended to be undertaken in the following financial year.

5. The executive committee shall have power to exercise all the powers of the Advisory Council in the intervals between its ordinary meetings. They shall report to the next following meeting of the Advisory Council any action they have taken on behalf of the Council. The executive committee may, however, in their discretion either postpone consideration of any matter referred to them until the next ordinary meeting of the Council, or summon a special meeting of the Council to consider the matter and to report. The executive committee shall be responsible for recommending to the Minister, from income of the fund referred to below, the making of grants to students worthy of being trained in research andgrants for the assistance of research workers of proved capacity. The executive committee shall have power to make recommendations or to reach other decisions by a majority vote. The chairman shall have a casting vote.

6. Each State of the Commonwealth shall be invited to nominate for appointment by the Governor-General a State Advisory Committee whose duty it shall be to make recommendations to the Advisory Council for aid from the Institute towards the conduct of scientific researches or investigations bearing upon the industries of the State. It shall be the duty of a State Advisory Committee to exercise a general supervision over the aided researches or investigations conducted in the State and through their Secretary to disburse the funds both central and local provided to meet their cost, subject to general regulations as to expenditure to be made by the Institute.

7. Two or more State Advisory Committees may combine to propose a research or investigation and to exercise through a suitably constituted joint sub-committee general supervision of any research or investigation aided by the Institute and conducted within the borders of any one of the contributory States. Local funds provided by the Government of a State or from other local sources will constitute the State a contributory State within the meaning of this recommendation.

8. A State Advisory Committee shall include two members to be nominated by the State Government from among their scientific staff, two representatives of the State University to be nominated by the National Research Council after the State Government has made its nominations, and two representatives of the principal industries of the State to be nominated in such manner as the industries may determine in consultation with the responsible Minister of the Institute.

A State Advisory Committee may be selected from among the members of any existing development or advisory board connected with a State Government, subject to the approval of the responsible Minister of the Institute.

9. Within six months of the appointment of each State Advisory Committee, they shall elect one of their number to be chairman of the committee. The chairman and members of State Advisory Committees shall hold office for such periods as the responsible Minister may by regulation determine.

10. The Chairman of a State Advisory Committee shall be *ex officio* a member of the Advisory Council of the Institute unless he be in receipt of a salary from the Crown, in which case the State Advisory Committee shall nominate some other of their members not being a salaried officer of the Crown for appointment by the Governor-General to be a member of the Advisory Council during such period as the Chairman of the State Advisory Committee is disqualified from sitting.

11. The Governor-General may appoint a secretary of the Institute to be the chief executive and accounting officer to the Institute. The Secretary of the Institute shall also be Secretary to the Advisory Council. The Governor-General may appoint an officer in each State as members of the staff of the Secretary to the Institute, to be the Secretary of the State Advisory Committee of that State. The secretaries of State Advisory Committees shall be sub-accounting officers for the expenditure of Institute funds granted in aid of local researches and investigations.

12. The Institute shall establish under the charge of special scientific officers—

(*a*) An Agricultural Section, attached to which there shall in the first instance be formed a Dairy Research Institute.

(*b*) A Food Section.

(*c*) A Forestry and Forest Products Section.

(*d*) A Fuels Section.

(*e*) A Fisheries Section, and

(*f*) Such other Special Sections as the Governor-General may from time to time determine.

Such research institutes shall be attached to each section as the responsible Minister may from time to time determine.

13. The Institute to be constituted a body corporate as defined in the present Act, consisting of the Prime Minister for the time being and his Advisory Council, under the title of the Department of Research in Science and Industry, but that it shall not be a part of the present Prime Minister's Department.

14. The provisions of the present Act not affected by these recommendations to be retained *mutatis mutandis*.

15. Provision to be made either in the amending Bill or by charter for the establishment of a holding Trust (entitled " The Commonwealth Trust for the Encouragement of Research in Science and Industry "), to which will be paid the sum of £100,000, the income to be devoted in perpetuity to the training of promising young Australians in research and to the encouragement of research workers of proved capacity, in accordance with the directions of the responsible Minister. The Trustees should be empowered to receive gifts and bequests of real or personal property from private donors for purposes within the general scope of the Trust, and, subject to the conditions of the gift, to expend the capital or interest, or both, of such donations in accordance with the directions of the responsible Minister.

The Trustees to be three Commonwealth Ministers.

H. FRANK HEATH,
19th January, 1926.

APPENDIX 11

Extract from 'Memorandum on the Establishment of Australian Bureau of Agriculture', by the Hon. L. E. Groom, M.P., 1908

The question naturally arises whether the Commonwealth has power to establish an Australian Bureau of Agriculture. It is submitted that ample power is contained in the Constitution to enact the necessary measures. Our power in this respect is similar to that of the Congress of the United States. Under Section 51 of the Commonwealth Constitution, sub-section (ii.), "The Parliament shall, subject to this Constitution, have power to make laws for the peace, order, and good government of the Commonwealth with respect to—

Taxation; but so as not to discriminate between States or parts of States."

Section 81 provides:—"All revenues or moneys raised or received by the Executive Government of the Commonwealth shall form one Consolidated Revenue Fund, to be appropriated for the purposes of the Commonwealth in the manner and subject to the charges and liabilities imposed by this Constitution."

The Commonwealth Parliament has therefore power to raise revenue and to appropriate it "for the purposes of the Commonwealth"

In the United States, under Section VIII., sub-section 1., in the practice of government "appropriations have never been limited by Congress to cases falling within the specific powers enumerated in the Constitution, whether those powers be construed in their broad or their narrow sense." *Story* on the Constitution, paragraph 991.

The interpretation first placed on the clause by Secretary Hamilton in his report on Manufactures, in 1791, has prevailed. Speaking on the terms "general welfare" he says:—

"The terms 'general welfare' were doubtless intended to signify more than was expressed or imported in those which preceded; otherwise numerous exigencies, incident to the affairs of the nation, would have been left without a provision. The phrase is as comprehensive as any that could have been used, because it was not fit that the constitutional authority of the Union to appropriate its revenues should have been restricted within narrower limits than the general welfare, and because this necessarily embraces a vast variety of particulars which are susceptible neither of specification nor of definition. It is therefore of necessity left to the discretion of the national Legislature to pronounce upon the objects which concern the general welfare, and for which, under that description, an appropriation of money is requisite and proper. And there seems no reason for doubt that whatever concerns the general interests of learning, of agriculture, of manufactures, and of commerce, are within the sphere of the national councils, so far as regards an application of money. The only qualification of the generality of the phrase in question which seems to be admissible is this: that the object to which an appropriation of money is to be made must be general and not local, its operation extending in fact, or by possibility, throughout the union, and

not being confined to a particular spot. No objection ought to arise from this construction from a supposition that it would imply a power to do whatever else should appear to Congress conducive to the general welfare. A power to appropriate money with this latitude, which is granted in express terms, would not carry a power to do any other thing not authorized in the Constitution, either expressly or by fair implication."

Though this interpretation has been adversely criticised (See *Tucker,* Constitution of the United States, Vol. I., p. 476 *et seq.*), yet it has been adopted from the earliest times by the Congress and Governments of the United States.

As regards the Commonwealth power of appropriation, the words are in terms as general as those contained in the United States Constitution, and are accompanied by no specific words of limitation, the only condition being that the appropriation must be "for the purposes of the Commonwealth."

Moreover, the power to organize such a Department is incidental to the grant of the various specific powers under the Constitution. Under section 51, sub-sec. (i.), Parliament under its powers of trade and commerce may appoint officers to inspect both imports and exports of agricultural products and stock. Under sub-sec. (iii.), Parliament may grant bounties on the production or export of goods, and accordingly may appoint expert officers to give advice as to the growth and production of various agricultural and pastoral products. In pursuance of the power to deal with Quarantine (sub-sec. ix.), expert officers must of necessity be appointed. Under its Navigation law, the Commonwealth may make provision for the regulation of the carriage of stock and may also deal with other matters of a similar nature. The power to deal with meteorology includes the power to furnish special reports for the use of those engaged in the primary industries (sub-sec. viii.); and under the Post and Telegraph and Telephone Services (sub-sec. v.), the means of distributing this information are under the control of Parliament. Moreover, in the power to deal with mail contracts the Commonwealth may make provision for such matters as cold storage. The officers appointed to the Statistical Department (sub-sec. xi.) may collect information dealing with production and land settlement; and under sub-sec. (xxvii.) the power to deal with immigration implies the power to collect and furnish all such information of the industries of Australia as may be of assistance to induce immigrants to come to Australia. The power to deal with External Affairs (sub-sec. xxix.) enables the Commonwealth to appoint agents abroad who may act on behalf of the primary producers of the Commonwealth. Moreover, in connexion with the power to deal with Customs and Excise, necessary officers may be appointed to furnish such advice and information as may be required. Finally, the Commonwealth has complete power to legislate for territories under its control.

Possessed of all these different powers, the Commonwealth may organize the members of the Public Service into a department and utilize their services on behalf of those engaged in the primary industries of Australia.

APPENDIX 12

Reorganization of Institute. Three Schemes compared with amending Act.

Scheme 1 Suggestion by Prime Minister S. M. Bruce to Conference of May 1925.	*Scheme 2* Recommendations of the Conference of May 1925.	*Scheme 3* Recommendations in Report of Sir Frank Heath.	Amending Act 1926.
Control vested in: The Minister with a Council to advise *him.*	Three full-time directors with a Council to advise *them.*	The Minister with a Council advisory to *the Minister.*	The Council as a body corporate.
Administration: An Administrative and Chief Executive Officer with staff.	The three directors with staff.	An Executive Committee of the Chairman and two members of Council appointed by Governor-General in Council*	An Executive Committee of the Chairman and two members of Council appointed by Governor-General in Council.
Liaison with States: Through membership of Council.	Through State Advisory Committees.	Through State Advisory Committees.	Through State Advisory Committees.
Supervision of Investigations: A special committee of experts to control each major investigation.	A special committee of experts to control each major investigation. Staff not to be subject to provisions of the Commonwealth Public Service Act.	By expert staff appointed for research.	By expert staff not subject to provisions of the Commonwealth Public Service Act 1922-24.

* The part-time Executive Committee would have an administrative staff to carry the actual administrative load. This would consist of the Secretary, who would be the chief executive and accounting officer, and his staff.

1917-18.

THE SENATE.

Leave granted 25th September, 1918.

(*Presented pursuant to leave granted and read* 1°, 25*th September*, 1918.)

THE VICE-PRESIDENT OF THE EXECUTIVE COUNCIL, SENATOR RUSSELL.)

A BILL

FOR

AN ACT

No. 61

Relating to the Commonwealth Institute of Science and Industry.

BE it enacted by the King's Most Excellent Majesty, the Senate, and the House of Representatives of the Commonwealth of Australia, as follows :—

PART I.—PRELIMINARY.

Short title.

1. This Act may be cited as the *Institute of Science and Industry Act* 1918.

Parts.

2. This Act is divided into Parts as follows :—

Part I.—Preliminary.
Part II.—The Commonwealth Institute of Science and Industry.
Part III.—The State Advisory Councils of Science and Industry.
Part IV.—Powers and Functions of the Directors.
Part V.—Miscellaneous.

Definitions

3. In this Act, unless the contrary intention appears—

"Advisory Council" means an Advisory Council of Science and Industry established under this Act ;

"Director" means a Director of the Commonwealth Institute of Science and Industry ;

"Institute" means the Commonwealth Institute of Science and Industry;

"Officer" means any person employed by the Directors under this Act ;

"The Minister" means the Minister of State administering this Act.

[C.74]—715/25.9.1918.—F.5253.

PART

PART II.—THE COMMONWEALTH INSTITUTE OF SCIENCE AND INDUSTRY.

The Institute of Science and Industry.

4.—(1.) There shall be a Commonwealth Institute of Science and Industry which shall consist of three Directors and in each State an Advisory Council of Science and Industry. It shall be a body corporate with perpetual succession and a common seal and capable of suing and being sued.

(2.) All Courts, Judges and persons acting judicially shall take judicial notice of the seal of the Institute affixed to any document or notice, and shall presume that it was duly affixed.

(3.) The Institute shall, subject to this Act, have power to hold lands, tenements and hereditaments, goods, chattels and any other property for the purpose of and subject to this Act.

(4.) The Institute shall have power to acquire by gift, grant, bequest or devise, any such property for the purposes of this Act, and, in the absolute discretion of the Directors, to agree to any conditions of such gift, grant, bequest or devise.

(5.) The powers of the Institute under the last preceding sub-section shall, subject to the regulations and the approval of the Minister, be exercised by the Directors on behalf of the Institute.

Appointment of Directors.

5.—(1.) The Governor-General may appoint three persons to be Directors, of whom two at least shall be chosen on account of scientific attainments.

(2.) On the happening of any vacancy in the office of Director the Governor-General shall appoint a person to the vacant office.

(3.) The term for which any such appointment is made shall be five years, and every person so appointed shall, at the expiration of his term of office, be eligible for re-appointment.

(4.) In case of the illness, suspension or absence of any Director, the Governor-General may appoint a person to act as Deputy-Director during the illness, suspension or absence, and the Deputy shall, while so acting, have all the powers and perform all the duties of a Director.

The Chairman of Directors.

6.—(1.) The Governor-General may appoint one of the three Directors to be Chairman of the Directors, and on the happening of any vacancy in the office of Chairman of Directors the Governor-General shall appoint a person to fill that office.

(2.) In case of the illness, suspension or absence of the Chairman of Directors, the Governor-General shall appoint one of the other Directors to act as Chairman during the illness, suspension or absence.

Salaries and expenses of Directors.

7.—(1.) Each Director shall receive such salary as the Governor-General determines.

(2.) The salaries of the Directors shall be paid out of moneys appropriated by Parliament for the purpose.

(3.) Travelling

(3.) Travelling expenses as prescribed shall be paid to each Director on account of his expenses in travelling in the discharge of the duties of his office.

Suspension of Director.

8.—(1.) The Minister may at any time suspend a Director from his office for incapacity, incompetence or misbehaviour.

(2.) If a Director is so suspended the Governor-General may appoint a Board of Inquiry (consisting of three persons, one of whom shall be the Chairman of the Board, and any two of whom may exercise all the powers of the Board) for investigation and report upon the charge of incapacity, incompetence or misbehaviour preferred by the Minister.

(3.) If the Director does not admit the truth of the charge preferred against him, the Board of Inquiry shall inquire into the truth of the charge, and, after fully hearing the case, shall report to the Governor-General their opinion thereon.

(4.) If the charge is admitted or is found by the Board of Inquiry to be proved, the Governor-General may, if he thinks fit, call upon the Director to retire from his office, and he shall retire accordingly.

(5.) If the charge is found by the Board of Inquiry not to be proved, the suspension shall be immediately removed by the Minister.

(6.) Save as in this section provided, a Director shall not be removed from office during the term for which he was appointed.

Quorum of Directors.

9.—(1.) For the conduct of business any two Directors shall be a quorum, and shall have, subject to the next sub-section, all the powers of the Institute.

(2.) At a meeting of the Directors the decision of the majority shall prevail.

(3.) If, at any meeting of the Directors at which only two Directors are present those Directors differ in opinion upon any matter, the determination of the matter shall be postponed until all the Directors are present.

Directors to devote whole time to their duties.

10. The Directors shall devote the whole of their time to the performance of their duties, and no Director shall accept or hold any paid employment outside the duties of his office as a Director or be a director of a company.

Part III.—The State Advisory Councils of Science and Industry.

The Advisory Councils.

11.—(1.) An Advisory Council representing science and the principal primary and secondary industries shall be appointed in each State and shall advise the Directors with respect to the affairs of the Institute.

(2.) The members of the Advisory Council in each State shall be appointed by the Governor-General and shall receive fees and travelling expenses as prescribed for attendance at meetings.

12. One

Directors to confer with Advisory Councils.

12. One or more of the Directors shall meet and confer with each Advisory Council at least once a year.

PART IV.—POWERS AND FUNCTIONS OF THE DIRECTORS.

Powers and functions of Directors.

13.—(1.) The powers and functions of the Directors shall, subject to the regulations and to the directions of the Minister, be—

(*a*) the initiation and carrying out of scientific researches in connexion with, or for the promotion of, primary or secondary industries in the Commonwealth;

(*b*) the establishment and awarding of industrial research studentships and fellowships;

(*c*) the making of grants in aid of pure scientific research;

(*d*) the recognition or establishment of associations of persons engaged in any industry or industries for the purpose of carrying out industrial scientific research and the co-operation with and the making of grants to such associations when recognised or established;

(*e*) the testing and standardization of scientific apparatus and instruments, and of apparatus, machinery, materials and instruments used in industry;

(*f*) the establishment of a Bureau of Information for the collection and dissemination of information relating to scientific and technical matters; and

(*g*) the collection and dissemination of information regarding industrial welfare and questions relating to the improvement of industrial conditions.

PART V.—MISCELLANEOUS.

Arrangements with States.

14. The Governor-General may arrange with the Governor of any State for any of the following purposes:—

(*a*) the utilization for the purposes of this Act of State Research Departments and Laboratories and Experimental Stations and Farms;

(*b*) the co-operation in industrial and scientific research with State Government Departments, Universities and Technical Schools; and

(*c*) the co-operation with educational authorities and scientific societies in the Commonwealth with a view to—

(i) advancing the teaching of science in schools, technical colleges and universities where the teaching is determined by those authorities;

(ii) the training of investigators in pure and applied science and of technical experts; and

(iii) the training and education of craftsmen and skilled artisans.

Appointment of Officers.

15.—(1.) The Governor-General may, on the recommendation of the Minister, appoint such officers as he thinks necessary for the purposes of this Act.

(2.) Officers

(2.) Officers employed under this Act shall not be subject to the *Commonwealth Public Service Act* 1902–1917, but shall be engaged for such periods and shall be subject to such conditions as are prescribed.

(3.) An officer of the Commonwealth Public Service or of the Public Service of a State who becomes an officer under this Act shall retain all his existing and accruing rights.

Discoveries by officers.

16. All discoveries, inventions and improvements in processes, apparatus and machines made by officers of the Institute shall be vested in the Institute as its sole property and shall be made available under such conditions and payment of such fees or royalties or otherwise as the Governor-General determines.

Bonuses for discoveries by officers.

17.—(1.) The Directors may pay to successful discoverers or inventors working as officers of the Institute or under the auspices of the Institute such bonuses as the Governor-General determines.

(2.) Bonuses payable under this section shall be paid out of money appropriated by Parliament for the purpose.

Fees and agreements for special investigations.

18. The Directors may charge such fees and may agree to such conditions as they think fit for special investigations carried out at the request of any authority, institution, association, firm or person.

Annual report of Directors.

19. The Directors shall, once in every year, make a report to the Minister containing a summary of the work done and researches and investigations made and proceedings taken by the Institute during the preceding year.

Reports to be presented to Parliament.

20. The Minister shall cause the yearly report of the Directors to be laid before both Houses of the Parliament within thirty days after the receipt thereof if the Parliament is then sitting, and if not, within thirty days after the next meeting of the Parliament.

Power to publish information.

21. The Directors may publish such information relating to any matter investigated by them as they think fit, except where such publication would be contrary to conditions agreed to under section eighteen hereof.

Regulations.

22. The Governor-General may make regulations, not inconsistent with this Act, prescribing all matters which are required or permitted to be prescribed or which are necessary or convenient to be prescribed for carrying out or giving effect to this Act, and in particular for prescribing such additional powers and duties of the Directors as he deems desirable.

THE COMMONWEALTH OF AUSTRALIA.

INSTITUTE OF SCIENCE AND INDUSTRY.

No. 22 of 1920.

An Act relating to the Commonwealth Institute of Science and Industry.

[Assented to 14th September, 1920.]

BE it enacted by the King's Most Excellent Majesty, the Senate, and the House of Representatives of the Commonwealth of Australia, as follows:—

PART I.—PRELIMINARY.

Short title.

1. This Act may be cited as the *Institute of Science and Industry Act* 1920.

Parts.

2. This Act is divided into Parts as follows:—

Part I.—Preliminary.
Part II.—The Commonwealth Institute of Science and Industry.
Part III.—Powers and Functions of the Director.
Part IV.—Miscellaneous.

Definition.

3. In this Act, unless the contrary intention appears—

"Institute" means the Commonwealth Institute of Science and Industry;

"Officer" means any person employed by the Director under this Act;

"The Director" means the Director of the Commonwealth Institute of Science and Industry;

F.15929.—PRICE 3D.

PART

PART II.—THE COMMONWEALTH INSTITUTE OF SCIENCE AND INDUSTRY.

The Institute of Science and Industry.

4.—(1.) There shall be a Commonwealth Institute of Science and Industry, consisting of the Director, which shall be a body corporate with perpetual succession and a common seal and capable of suing and being sued.

(2.) All Courts, Judges and persons acting judicially shall take judicial notice of the seal of the Institute affixed to any document or notice, and shall presume that it was duly affixed.

(3.) The Institute shall, subject to this Act, have power to hold lands, tenements and hereditaments, goods, chattels and any other property for the purpose of and subject to this Act.

(4.) The Institute shall have power to acquire by gift, grant, bequest or devise, any such property for the purposes of this Act, and, in the absolute discretion of the Director, to agree to any conditions of such gift, grant, bequest or devise.

(5.) The powers of the Institute under the last preceding subsection shall, subject to the regulations and the approval of the Minister, be exercised by the Director on behalf of the Institute.

Constitution of Institute.

5. The Institute shall establish—

(*a*) a Bureau of Agriculture ;

(*b*) a Bureau of Industries ; and

(*c*) such other bureaux as the Governor-General determines.

Appointment of Advisory Council and Boards.

6. The Governor-General may appoint a General Advisory Council and Advisory Boards in each State to advise the Director with regard to—

(*a*) the general business of the Institute or any bureau thereof ; and

(*b*) any particular matter of investigation or research.

Appointment of Director.

7.—(1.) The Governor-General may appoint a Director of the Institute.

(2.) On the happening of any vacancy in the office of Director of the Institute the Governor-General may appoint a person to the vacant office.

(3.) The term for which such appointment is made shall be five years, and any person so appointed shall, at the expiration of the term of office, be eligible for re-appointment.

(4.) In case of the illness, suspension or absence of the Director, the Governor-General may appoint a person to act as Deputy-Director during the illness, suspension or absence, and the Deputy shall, while so acting, have all the powers and perform all the duties of the Director.

Salary and expenses of the Director

8.—(1.) The Director shall receive such salary as the Governor-General determines.

(2.) The

(2.) The salary of the Director shall be paid out of moneys appropriated by Parliament for the purpose.

(3.) Travelling expenses as prescribed shall be paid to the Director on account of his expenses in travelling in the discharge of the duties of his office.

Suspension of Director.

9.—(1.) The Governor-General may at any time suspend the Director from his office for incapacity, incompetence, or misbehaviour.

(2.) The Minister shall, within seven days after the suspension, if the Parliament is then sitting, or if the Parliament is not then sitting, within seven days after the next meeting of the Parliament, cause to be laid before both Houses of the Parliament a full statement of the grounds of suspension.

(3.) A Director who has been suspended shall be restored to office unless each House of Parliament within forty days after the statement has been laid before it, and in the same session, passes an address praying for his removal on the grounds of proved incapacity, incompetence, or misbehaviour.

Director to devote whole time to his duties.

10. The Director shall devote the whole of his time to the performance of his duties, and shall not accept or hold any paid employment outside the duties of his office as Director or be a director of a company.

Part III.—Powers and Functions of the Director.

Powers and functions of Director.

11. The powers and functions of the Director shall, subject to the regulations and to the directions of the Minister, be—

(*a*) the initiation and carrying out of scientific researches in connexion with, or for the promotion of, primary or secondary industries in the Commonwealth;

(*b*) the establishment and awarding of industrial research studentships and fellowships;

(*c*) the making of grants in aid of pure scientific research;

(*d*) the recognition or establishment of associations of persons engaged in any industry or industries for the purpose of carrying out industrial scientific research and the co-operation with and the making of grants to such associations when recognised or established;

(*e*) the testing and standardization of scientific apparatus and instruments, and of apparatus, machinery, materials and instruments used in industry;

(*f*) the establishment of a Bureau of Information for the collection and dissemination of information relating to scientific and technical matters; and

(*g*) the collection and dissemination of information regarding industrial welfare and questions relating to the improvement of industrial conditions.

12. The

12. The Director shall, as far as possible, co-operate with the existing State organizations in the co-ordination of scientific investigation, with a view to—

(*a*) the prevention of unnecessary overlapping ; and
(*b*) the utilization of facilities and staffs available in the States.

PART IV.—MISCELLANEOUS.

Arrangements with States.

13. The Governor-General may arrange with the Governor of any State for any of the following purposes :—

(*a*) the utilization for the purposes of this Act of State Research Departments and Laboratories and Experimental Stations and Farms ;
(*b*) the co-operation in industrial and scientific research with State Government Departments, Universities and Technical Schools ; and
(*c*) the co-operation with educational authorities and scientific societies in the Commonwealth with a view to—
(i) advancing the teaching of science in schools, technical colleges and universities where the teaching is determined by those authorities ;
(ii) the training of investigators in pure and applied science, and of technical experts ; and
(iii) the training and education of craftsmen and skilled artisans.

Appointment of Officers.

14.—(1.) The Governor-General may, on the recommendation of the Minister, appoint such officers as he thinks necessary for the purposes of this Act.

(2.) Officers employed under this Act shall not be subject to the *Commonwealth Public Service Act* 1902–1918, but shall be engaged for such periods and shall be subject to such conditions as are prescribed.

(3.) An officer of the Commonwealth Public Service or of the Public Service of a State who becomes an officer under this Act shall retain all his existing and accruing rights.

Discoveries by officers.

15. All discoveries, inventions and improvements in processes, apparatus and machines made by officers of the Institute shall be vested in the Institute as its sole property, and shall be made available under such conditions and payment of such fees or royalties or otherwise as the Governor-General determines.

Bonuses for discoveries by officers.

16.—(1.) The Director may pay to successful discoverers or inventors working as officers of the Institute or under the auspices of the Institute such bonuses as the Governor-General determines.

(2.) Bonuses payable under this section shall be paid out of moneys appropriated by Parliament for the purpose.

17. The

17. The Director may charge such fees and may agree to such conditions as he thinks fit for special investigations carried out at the request of any authority, institution, association, firm or person. Fees and agreements for special investigations.

18. The Director shall, once in every year, make a report to the Minister containing a summary of the work done and researches and investigations made and proceedings taken by the Institute during the preceding year. Annual report of Director.

19. The Minister shall cause the yearly report of the Director to be laid before both Houses of the Parliament within thirty days after the receipt thereof if the Parliament is then sitting, and if not, within thirty days after the next meeting of the Parliament. Reports to be presented to Parliament.

20. The Director may publish such information relating to any matter investigated by him as he thinks fit, except where such publication would be contrary to conditions agreed to under section seventeen hereof. Power to publish information.

21. The Governor-General may make regulations not inconsistent with this Act, prescribing all matters which are required or permitted to be prescribed or which are necessary or convenient to be prescribed for carrying out or giving effect to this Act, and in particular for prescribing such additional powers and duties of the Director as he deems desirable. Regulations.

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APPENDIX 15

THE COMMONWEALTH OF AUSTRALIA.

SCIENCE AND INDUSTRY RESEARCH.

No. 20 of 1926.

An Act to amend the *Institute of Science and Industry Act* 1920.

[Assented to 21st June, 1926.]

BE it enacted by the King's Most Excellent Majesty, the Senate, and the House of Representatives of the Commonwealth of Australia, as follows :—

Short title and citation.

1.—(1.) This Act may be cited as the *Science and Industry Research Act* 1926.

(2.) The *Institute of Science and Industry Act* 1920 is in this Act referred to as the Principal Act.

(3.) The Principal Act, as amended by this Act, may be cited as the *Science and Industry Research Act* 1920-1926.

Parts.

2. Section two of the Principal Act is amended—

(*a*) by omitting the words " Institute of Science and Industry " and inserting in their stead the words " Council for Scientific and Industrial Research " ;

(*b*) by omitting the word " Director " and inserting in its stead the word " Council " ; and

(*c*) by inserting before the words " Part IV.—Miscellaneous." the words " Part IIIA.—State Committees.".

F.9101.—PRICE 3D.

3. Section

Definitions.

3. Section three of the Principal Act is amended—

(*a*) by omitting the definition of "Institute";

(*b*) by omitting from the definition of "Officer" the words "by the Director";

(*c*) by inserting after the definition of "Officer" the following definition:—

"'The Council' means the Commonwealth Council for Scientific and Industrial Research."; and

(*d*) by omitting the definition of "The Director".

4. Part II., consisting of sections four to ten inclusive, of the Principal Act is repealed and the following Part and sections inserted in its stead:—

"PART II.—THE COMMONWEALTH COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.

Council for Scientific and Industrial Research.

"4.—(1.) There shall be a Commonwealth Council for Scientific and Industrial Research, which shall be a body corporate with perpetual succession and a common seal and capable of suing and being sued.

"(2.) All Courts, Judges and persons acting judicially shall take judicial notice of the seal of the Council affixed to any document or notice, and shall presume that it was duly affixed.

"(3.) The Council shall, subject to this Act, have power to hold lands, tenements and hereditaments, goods, chattels and any other property for the purpose of and subject to this Act.

"(4.) The Council shall have power to acquire by gift, grant, bequest or devise, any such property for the purposes of this Act, and to agree to any conditions of such gift, grant, bequest or devise.

"(5.) The powers of the Council under the last preceding sub-section shall be exercised subject to the regulations and the approval of the Minister.

"(6.) Any property which was, immediately prior to the commencement of this section, vested in the Commonwealth Institute of Science and Industry shall, upon that commencement, become vested in the Council.

Membership of Council.

"5.—(1.) The Council shall consist of the following members—

(*a*) three members nominated by the Minister and appointed by the Governor-General, one of whom the Governor-General shall appoint to be Chairman of the Council;

(*b*) the Chairman of each State Committee constituted under this Act; and

(*c*) such other members as the Council, with the consent of the Minister, co-opts by reason of their scientific knowledge.

"(2.) The

"(2.) The members appointed by the Governor-General on the nomination of the Minister shall hold office for a period not exceeding five years and shall be eligible for re-appointment.

"(3.) A member co-opted in pursuance of paragraph (*c*) of sub-section (1.) of this section shall hold office for the period specified at the time of his co-option.

Meetings of the Council.

"6.—(1.) The Council shall meet at such times and places as the Minister determines.

"(2.) Five members of the Council shall constitute a quorum for the transaction of the business of the Council.

Remuneration.

"7.—(1.) The Chairman and other members of the Council shall receive such remuneration and expenses as are fixed by the Governor-General.

"(2.) The Consolidated Revenue Fund is, to the extent necessary to provide for payment of the remuneration of members of the Council, hereby appropriated accordingly.

Executive Committee of the Council.

"8.—(1.) There shall be an Executive Committee of the Council consisting of the members of the Council appointed by the Governor-General on the nomination of the Minister.

"(2.) The Executive Committee shall have and may exercise, between meetings of the Council, all the powers and functions of the Council.

Casual vacancies in Council.

"9. Upon the death or retirement of any member of the Council during his term of office—

(*a*) in the case of a member appointed by the Governor-General on the nomination of the Minister—the Governor-General may on the like nomination appoint a person to hold the vacant office until the expiration of the term of the member who has died or retired; and

(*b*) in the case of any other member—the deputy Chairman (if any) of the State Committee shall hold the vacant office until the appointment of a Chairman of that Committee.

Deputies of members.

"10. In case of the illness, suspension or absence of a member of the Council the Governor-General may appoint a person to act as the deputy of the member during his illness, suspension or absence, and the deputy shall, while so acting, have and may exercise all the powers and functions of the member.

Suspension of member.

"10A. The Governor-General may at any time remove a member of the Council from his office for proved misbehaviour or incapacity.

Amendment of heading to Part III.

5. The heading to Part III. of the Principal Act is amended by omitting the word "Director" and inserting in its stead the word "Council".

6. Section

Powers and functions of Council.

6. Section eleven of the Principal Act is amended—

(*a*) by omitting the words "The powers and functions of the Director shall, subject to the regulations and to the directions of the Minister, be—" and inserting in their stead the following words :—

"(1.) The Council may make recommendations to the Minister as to—

(*a*) its policy and work ;

(*b*) the funds required for carrying out the work of the Council ; and

(*c*) the allocation of funds made available for carrying out that work.

"(2.) The powers and functions of the Council shall, subject to the regulations and to the approval of the Minister, be—" ;

(*b*) by inserting in paragraph (*b*) before the words "the establishment" the words "the training of research workers and" ;

(*c*) by inserting in paragraph (*e*) after the words "instruments, and" the words "the carrying out of scientific investigations connected with standardization" ;

(*d*) by omitting from paragraph (*f*) the word "and" (last occurring); and

(*e*) by omitting paragraph (*g*) and inserting in its stead the following words :—

"and also that of acting as a means of liaison between the Commonwealth and other countries in matters of scientific research.".

Co-operation with State organizations.

7. Section twelve of the Principal Act is amended by omitting the word "Director" and inserting in its stead the word "Council".

8. After Part III. the following Part and sections are inserted :—

"PART IIIA.—STATE COMMITTEES.

Appointment of State Committees.

"12A.—(1.) The Governor-General may appoint a State Committee in each State consisting of such number of members as is prescribed.

"(2.) The terms of the appointment of members and the method of appointment of the Chairman of each State Committee shall be as prescribed.

Function of State Committees.

"12B. The function of each State Committee shall be to advise the Council with regard to—

(*a*) the general business of the Council ; and

(*b*) any particular matter of investigation and research.".

9. Section

9. Section fourteen of the Principal Act is repealed and the following sections inserted in its stead :—

Investigators and Committees of Investigation.

"14.—(1.) The Council may, with the approval of the Minister, appoint such Investigators and Committees of Investigation as it deems necessary for the purposes of this Act.

"(2.) Investigators and Committees of Investigation shall be appointed upon such terms and conditions as are approved by the Minister.

Appointment of officers.

"14A.—(1.) The Council may, with the approval of the Minister, appoint such officers as it thinks necessary for the purposes of this Act.

"(2.) Officers employed under this Act shall not be subject to the *Commonwealth Public Service Act* 1922–1924, but shall be engaged for such periods and shall be subject to such conditions as are prescribed.

"(3.) An officer of the Commonwealth Public Service or of the Public Service of a State who becomes an officer under this Act shall retain all his existing and accruing rights.

"(4.) An officer appointed under this Act shall be deemed to be an 'employee' within the meaning of section four of the *Superannuation Act* 1922–1924 unless the Council, at the time of the appointment of the officer, notifies him in writing that he is not to be deemed such an employee.".

Discoveries by officers.

10. Section fifteen of the Principal Act is amended by omitting the word "Institute" (wherever occurring) and inserting in its stead the word "Council".

Bonuses for discoveries by officers.

11. Section sixteen of the Principal Act is amended—

(*a*) by omitting the word "Director" and inserting in its stead the word "Council"; and

(*b*) by omitting the word "Institute" (wherever occurring) and inserting in its stead the word "Council".

Fees and agreements for special investigations.

12. Section seventeen of the Principal Act is amended—

(*a*) by omitting the word "Director" and inserting in its stead the word "Council"; and

(*b*) by omitting the word "he" and inserting in its stead the word "it".

13. After section seventeen of the Principal Act the following sections are inserted :—

Appropriation for investigations.

"17A. For the purposes of scientific and industrial investigations carried out in pursuance of this Act there is hereby appropriated from the Consolidated Revenue Fund the sum of Two hundred and fifty thousand pounds.

Trust Account.

"17B.—(1.) The amount appropriated by the last preceding section shall be paid into and form part of a Trust Account to be known as the Science and Industry Investigation Trust Account.

"(2.) The

"(2.) The Trust Account established by this section shall be a Trust Account within the meaning of section sixty-two A of the *Audit Act* 1901–1924.

"(3.) No money shall be expended from the Trust Account established by this section except in accordance with estimates of expenditure which have been passed by both Houses of the Parliament.".

Annual report of Council.

14. Section eighteen of the Principal Act is amended—

(*a*) by omitting the word "Director" and inserting in its stead the word "Council"; and

(*b*) by omitting the word "Institute" and inserting in its stead the word "Council".

Reports to be presented to Parliament.

15. Section nineteen of the Principal Act is amended by omitting the word "Director" and inserting in its stead the word "Council".

Power to publish information.

16. Section twenty of the Principal Act is amended—

(*a*) by omitting the word "Director" and inserting in its stead the word "Council"; and

(*b*) by omitting the words "him as he" and inserting in their stead the words "it as it".

Regulations.

17. Section twenty-one of the Principal Act is amended by omitting the word "Director" and inserting in its stead the word "Council".

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