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COMMONWEALTH OF AUSTRALIA.

Institute of Science and Industry,
314 Albert Street,
EAST MELBOURNE.

27th January, 1926.

The Rt. Hon. S. M. Bruce, P.C.M.C.
Prime Minister of the Commonwealth,
M e l b o u r n e.

Sir,

I beg to submit for the consideration of the Federal Government a number of recommendations for the reconstitution of the Commonwealth Institute of Science and Industry, formulated as the result of the visits I have made during the last three months to every State of the Commonwealth and of consultations I have been able to hold with many of their leading citizens in political, industrial and scientific walks of life.

For the sake of brevity I have drafted these recommendations in a form convenient to the parliamentary draughtsman entrusted with preparing an amending Bill to the present Commonwealth Institute Act. But I have appended to the recommendations in another paper a series of notes, numbered to correspond with the numeration of my recommendations, which set forth as shortly as may be the reasons that have led me to make them. This seemed to be a more convenient method of dealing with a difficult and complicated problem than the usual formal report and I hope it may commend itself to you. I can expand and explain any of these notes if it is desired.

I wish to add that I have been received in the kindest and most sympathetic manner by all those with whom I have been brought in contact with during my journeys and I believe that the plan of reorganisation that I now have the honour to put before you will receive a wide acceptance among thoughtful men throughout the Commonwealth. I have been careful to explain to representative people in each State the general trend of my ideas as they have gradually shaped themselves in contact with the facts and feelings I have encountered, and I have been agreeably encouraged by the large measure of concurrence and sometimes even of enthusiasm with which they have been received.

It is impossible for me to make detailed acknowledgment of the countless services that have been so freely rendered to me, of the wise counsels, the helpful suggestions, or of the careful analysis of past events and present conditions that have been so frankly and generously offered. For much of this invaluable assistance I am especially indebted to you, Sir, for your personal intervention on my behalf at a critical moment won for me a reception I could not otherwise have expected or received. I am very grateful for it; and if the suggestions I have made commend themselves to your Government and ultimately to the country, I shall have received a rich reward. I cannot expect concurrence with all of them, but whatever faults they may have, I do believe they present the outline of a workable plan,

Excluding the grants proposed to be made to individuals, the cost to the Exchequer of maintaining the work would, I think, be approximately £40,000 in the first full year, rising to about £50,000 in the second year, and probably to some £100,000 in the course of time. On a population basis this would be comparable to the probable total expenditure next year of the Department of Scientific and Industrial Research at home without regard to the expenditure of the Government on Agricultural Research. In this estimate is not included the future cost of buildings and their permanent equipment, which experience may show to be necessary. With us this cost is borne upon the vote of the First Commissioner of Works.

If my recommendations for the training in research of young men of science, and for assisting independent research workers are approved, I suggest that the means for putting them into immediate effect are available from the realised surplus in the hands of the Government, without imposing any additional burden upon the taxpayer. The sum of £100,000 already earmarked for the development of research could not, I am sure, be so economically or effectively used in any other way, nor in a manner so likely to attract private endowments for similar and allied purposes.

In conclusion I wish to record my warm appreciation of the services rendered to me by Mr. Donald Chapman of your Department, who has acted as my Secretary.

I have the honour to be, Sir,

Your obedient Servant,

(SGD) H. FRANK HEATH.

CONFIDENTIAL:

RECOMMENDATIONS FOR THE RECONSTITUTION
of the
COMMONWEALTH INSTITUTE OF SCIENCE AND INDUSTRY.

I beg to submit the following summary of my recommendations for the reorganisation of the Commonwealth Institute of Science and Industry with a view to increasing its usefulness and enabling it to co-operate with similar organisations 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 fore-shadowed by the Government in the Governor-General's Speech should define the purpose of the re-organised Institute as follows :-

- (i) 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.
- (ii) 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.
- (iii) 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 Committee 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 described 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 estimate 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 and grants 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 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 direction 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.

(SGD) H. FRANK HEATH.

19-1-26.

CONFIDENTIAL.

NOTES ON RECOMMENDATIONS SUBMITTED FOR THE RECONSTITUTION OF THE COMMONWEALTH INSTITUTE OF SCIENCE AND INDUSTRY.

FOREWORD.

In the following notes, which are numbered to correspond with the foregoing recommendations, I have confined the arguments and evidence which appear to justify my conclusions to the narrowest limits necessary to my purpose. I venture to hope that an opportunity may offer itself for an expansion and illustration of the arguments in personal conference with Ministers. It is obvious that useful co-operation between the Homeland and the Commonwealth in scientific work must depend upon the existence in the Dominion of an active and effective organisation operating on national lines, co-operating with all promising and efficient agencies in the several States, and able to act as the authoritative source of information and action in all matters in which co-operation between the two nations is likely to be helpful. It is also common ground that for a variety of reasons the present Institute has not been able to fulfil all the hopes of its founders. If, however, it can be adjusted in the light of past experience and of present needs to the purposes the Prime Minister has in view, it should not only be the means of compassing this end, but what is of even greater importance to Australia, it should become the principal source of encouragement and stimulation to all that is best in Australian science, especially in its application to industry, and the means of support to those inquiries and investigations which study may show to be of importance to the whole nation and therefore the peculiar responsibility of the Federal Government.

NOTES ON THE NUMBERED PARAGRAPHS OF THE RECOMMENDATIONS.

1. (1) The Training of Young Scientific Workers in Research and the Encouragement of Independent Workers. In the course of my visits to the various States I have come in touch with each of the Universities (except that of Tasmania, which was in recess), and with all the different research laboratories and institutions (except Griffiths in New South Wales.) Everywhere I have found promising and useful work going on, but without exception I have found on closer inquiry that, while the work has often been hampered by lack of funds, the fundamental difficulty has been to find well-trained men for the work. The Universities are turning out numbers of young graduates in science, sometimes in larger numbers than can be absorbed into suitable occupations, but a young graduate however well equipped with existing knowledge cannot be expected to know how to attack new problems unless he has been trained in the methods of scientific investigation. The technique of this kind of work is different from that of acquiring information and for all but the rare and highly gifted minds such as a Bragg or a Rutherford, specific training in research is necessary. At present parents are unwilling to encourage their sons who have a leaning that way to adopt a scientific career, because the number of openings is too small, but if the other duties of the new organisation are seriously pursued, openings for permanent employment will be available in connection with the researches

it conducts or assists, while in time producers here, as they are doing increasingly at Home, will offer appointments to well trained men capable of doing research for the benefit of the firm or undertaking concerned.

Scarcely less important to the Commonwealth is the stimulation of greater productivity by men who have already shown capacity for original work. Most men of this kind will be found in the Universities but they are gravely hampered by the amount of their teaching and routine duties and by the inability of the Universities to supply them with the special apparatus - often costly - which is necessary for their work. Grants for the payment of research assistants or for the purchase of special apparatus would greatly speed up their work, at it has at home - and would incidentally strengthen the power of the Universities to train the generations of younger men in research, which are so necessary to the development of the industries of the country.

2. The Conduct of Scientific Investigations into Problems of National as Distinct from State or local Importance. The number of problems of this kind is much greater than can possibly be attacked effectively under present circumstances. In matters of research, it is safe to say that both in the interests of science and of the national finances, it is better not to begin an investigation at all than to begin it with second rate men. There is room in research for the humdrum worker if he is led and directed by a first rate man. The Germans are past masters in the employment of large numbers of men of average capacity, but careful training. But they need the leadership of men of really original workers or their efforts are wasted. It follows that great care will be necessary in selecting the fields in which the Commonwealth will first begin operations, and the first requirement will be the finding of well-equipped leaders. Only when they have been found will it be safe to commit the Government to the provision of a permanent organisation, still less to the provision of permanent buildings and expensive equipment. Among the many groups of investigation which a growing nation should contemplate undertaking in the national interest, four fields of research appear to me to be specially urgent in Australia, and to require immediate cultivation if co-operation with the Home Land is to be effective in its influence on inter-Imperial trade. They are no less urgent when viewed from an internal or purely Australian point of view. They all affect intimately, and as time goes on will affect increasingly, the interests not only of each of the States, but the populations resident within them. They are all accordingly suitable for support by the Commonwealth Exchequer as distinct from local sources of revenue. On the other hand the most suitable location is likely to be different in some cases at least, with the result that the Commonwealth's own activities will come to be distributed among the States most suited for the conduct of particular sections of its work, and the knowledge of what is being done in their midst will become a source of interest and pride to the people of the State, and a means of convincing them that the national effort in scientific things is a pervasive instead of a centralised and bureaucratic influence.

3. The Encouragement, Stimulation and Assistance of Institutions of Interest to Particular States or Groups of States. The initiation of these investigations would come principally from the States concerned, though the Commonwealth organisation would no doubt suggest suitable lines of work from time to time. The number of proposals will undoubtedly exceed by far the initial capacity of the

country, whether in men or funds to prosecute them all effectively. The first duty of the central organisation will accordingly be to place the subjects proposed in an order of priority next to determine the minimum scale on which the work can be effectively begun, and finally to determine the proportion of the total capital and annual cost it is prepared, in view of all the circumstances of the case, to recommend the Federal Government to bear and the period for which the grant shall be made, subject to careful review before the lapse of the grant. Examples of this kind of activity already exist in the investigations going on into prickly-pear, bunchy-top in bananas, blow-fly, and into viticultural problems at the experimental farm at Mildura. In making grants for the assistance of work of this kind it is important that the central authority should make it a condition that a definite proportion of the funds should be earmarked for fundamental scientific attack upon the doubtful points which are certain to emerge in the course of the investigation - "Loose-ends" which are very likely sooner or later to endanger the validity of the solution if they are left aside, but which it is impossible to pick up and unravel effectively unless a certain proportion of the staff are definitely freed from the burden of the routine and practical work which must form so large a part of all industrial research. In every research station I have visited these danger points are apparent, and when probed to the bottom it has become evident that even had larger funds been available, suitably trained men were difficult or impossible to find.

I would add that the detailed list of functions assigned to the Director by the present Act tends to limit the proper powers of the Institute by over definition at a period of its growth when the meaning of scientific and industrial research is constantly receiving a wider interpretation as its powers and possibilities become better appreciated. On the other hand, certain powers assigned under the Act are not in practice suitable to a scientific body but must in their nature be the subject of agreement between manufacturers and consumers, e.g., the Standardisation of Apparatus (other than Scientific Apparatus) machinery, materials and instruments (other than Scientific Instruments) used in industry. On the other hand the testing of scientific apparatus and instruments and the testing of materials may properly be placed under the guidance, and when funds, buildings and equipment are available, under the control of a central authority, because the making of such tests is a fruitful means of research directed towards the improvement of these products. Similarly, the investigations necessary to the establishment of a specification for the standardisation of apparatus, machinery materials and instruments used in industry are the proper function of a central scientific authority as defined in my recommendations - as is also the establishment of physical constants and a study of the nature of materials used in industry.

2 to 10. The present Act appears to me to have been unduly influenced by the psychology of War which leads to highly centralised control and tends to seek a solution of urgent difficulties calling for prompt decisions, in the granting of wide powers to a single strong man. But democratic communities in normal times are impatient of one-man control, an impatience likely to be emphasised when the activities of the organisation it is ought to create must inevitably operate within the boundaries and for the benefit, or the reverse, of a number of sovereign States, while if it is to be successful it must secure the active co-operation of those States and their peoples. There is more-over no sphere of work in which a centralised direction and control is more hostile to the

free spirit of inquiry than that of scientific investigation, which must proceed with a constant and keen appreciation of local conditions and needs. Accordingly the basis of the proposed reorganisation is sought in a co-operation of all the States with the Commonwealth in the formulation of advice through carefully selected men of responsible position and wide outlook. The vast distances in Australia and the wide range of climates necessitate, it seems to me, a degree of decentralisation which will undoubtedly involve greater delay in reaching decisions and heavier overhead costs than are necessary or desirable in a smaller and more closely populated country. But these are conditions inherent in the situation and it must never be forgotten that a greater deliberateness in approaching a decision as to the best means of attacking a scientific problem is by no means always a disadvantage. It is so easy to waste money and time by hasty attempt at improving the conditions of an industry, that the greater cost in time and expenditure due to the necessity for bringing local knowledge and experience into counsel is more than counter-balanced by the loss of confidence and the errors in judgment that one-man control, however wise and experienced it may be, is bound to bring in its train. The organisation of scientific effort on a national basis can as little be compassed by one man as the organisation of national defence.

The responsibilities placed by these recommendations upon the shoulders of the Executive Committee will be continuous and important, but they are of a kind that should not involve their being resident near the Headquarters of the Institute. The means of consultation by post telegraph and telephone - to say nothing of the developing communication by air - are today so rapid and convenient that the delay involved in seeking their guidance between the meetings of the Advisory Council is negligible compared with the necessity of securing the advice of men, wherever they may live, whom everyone will acknowledge to be wise and trusted counsellors. In selecting suitable men for the three important seats assigned in these recommendations to the Commonwealth representatives, I suggest that the first test to be applied to suggested names should be the certainty that their presence on the Advisory Council will bring prestige and public confidence to the work of the Institute.

Subject to this condition it is suggested that the persons selected by the Commonwealth Government should collectively be competent owing to their scientific training and knowledge to form a considered judgment on as many of the activities of the Advisory Council as possible.

In view of the importance and responsibility of the duties suggested for the Executive Committee, it is proposed that they should each receive a substantial honorarium of £500 a year for their services. It is now increasingly recognised that men of the first rank in their respective fields of work cannot be expected to devote their time and energies over long periods and under normal conditions to the service of the State in circumstances than can bring them neither personal kudos nor reward. This has long been appreciated when the help of lawyers or doctors is called for. It is no less necessary in the field of science.

In addition, I recommend that travelling expenses and subsistence allowance at appropriate rates should be granted to all members of the Advisory Council when attending its meetings or travelling at the request of the Institute.

11. This recommendation and that in paragraph 12 as to the appointment of special scientific officers are intended to establish a differentiation in function between the persons responsible officially for (a) the framing and supervision of scientific policy, (b) the executive acts of preparing material for due consideration, the organisation of the means for carrying out the policy when approved by the Minister, and the control of expenditure when sanctioned, and (c) the actual direction of research and investigation. To concentrate these three very different kinds of skilled activity in one type of officer and still more in a single individual is undesirable for reasons already given in Note to paragraphs 2 to 10. Accordingly function (a) is entrusted to the Advisory Council, function (b) to an Executive and Accounting Officer with the assistance of State Executive and Sub-Accounting officers, and function (c) to special scientific officers who will be of varying rank according to the importance and responsibilities of their work, but will in each case be responsible to the Minister through the Secretary for the actual conduct of the researches under their charge.

If the Secretary is the right man, his influence over all departments of the work will become very great, but it will not be inherent in his official status.

The State Secretaries should be men of science capable of assisting in the smaller and less populated States in the research work undertaken there, with duties in addition analogous to those of the Secretary, and with the duty before all of learning to know the local conditions, the difficulties in the way of progress, the men most likely to help, the research work already going on, and thus acting as a liaison between the Headquarters and the State and as an assistant to the Chairman of the State Advisory Committee in the formulation of proposals or the supervision of work being done. Such men will deserve and should earn salaries commensurate with these important duties. The most important of these posts should be comparable in status and remuneration to that of a University Professor.

The Headquarter's staff of the Secretary should include scientific and technical officers capable of assisting him to keep in touch with the work by visiting the States from time to time, conferring with the State Secretaries when these are unable to visit Headquarters, and capable also of taking charge, under the Secretary, of the subordinate and derivative work of the Institute as defined in paragraph 1(a). The continuance and gradual development of the intelligence work already done by the Institute seems to me to be very important, especially in connection with the secondary industries which, though they may be expected to undertake for themselves the researches which are likely to assist better production directly, are greatly in need of information and advice as to the best practice and in particular as to factory lay-out and management. The Headquarters staff dealing with intelligence should be able to give this assistance.

12. Of the various sections of work referred to in this paragraph of my recommendations, by far the most urgent appears to me to be that of Agriculture, the present Act directs the formation of a Bureau of Agriculture, but up to the present time it does not appear to have been established. I recommend that the best possible officer be selected immediately after the passage of the amending Act to take charge of this section as its Director or Superintendent, and that he be instructed to prepare plans forthwith for the formation of a Dairy Research Institute. I understand that

less scientific work has been done in the problems of dairying than in any branch of Agriculture. Yet statistics show that in the five years ending 1924, of the three great groups of export commodities, wheat, wool and dairy products, the last is the only one that has shown marked expansion in bulk.

The head of the S section of Agriculture should be a man whose advice and suggestions would be received with respect by the State Departments of Agriculture and by Agricultural experts throughout the country. He must have an intimate acquaintance with the problems and practice of Australian agriculture and he should receive a salary and status commensurate with these qualifications. It will be found difficult if not impossible to staff an Institute of Dairying effectively in the first instance with Australian trained men and in this particular and urgent case I recommend that the nucleus staff should be recruited abroad, though I am strongly in favour of appointing Australians to important posts wherever possible.

Where, as in the case of the other sections recommended in this paragraph, the urgency is less marked, promising young Australians should be sent abroad to qualify for definite appointment on their return. In the case of the Sections for Food and Fuel I have already recommended sending men to the English Research Stations dealing with these problems, and similar early preparation should be made for staffing the Forestry and Forest Products Section by sending young men with forestry experience to Dehra Dun, Madison (Wisconsin) and possibly to England.

It is important in my judgment that every means should be used when a section of work is established to explain to the public, to State officers, and to producers, the aims and achieved results of the research work done by the Commonwealth in the national interest, and I hope that arrangements will be made to secure that the Staff of Research Institutes, when established, will keep those interested informed of what they are doing not only by the issue of printed publications which are too seldom studied, but by lectures and personal visits to local officials and the like and by short broad-casting addresses. Experience has shown that broad-casting is a potent means of interesting and instructing scattered students and others in special employments. In Australia it should prove particularly valuable.

It is suggested that the new Dairy Institute might be placed in Victoria as well as the fruits and dairy work of the Food Section; that the Meat Division of the Food Section might be located in Queensland; that the Fuel work might be centred in New South Wales; the silvicultural division of the Forestry and Forest Products Section at Canberra which would be the headquarters of the Section; the minor forest products, e.g., tannin, resins and wood-pulp at Adelaide; a division for wood-waste in Western Australia whence the largest export of timber is made and the greatest losses from waste experienced, and a division for seasoning and preservation in Queensland, Fisheries research when it can be started might be centred in Tasmania.

The reference to the importance of a scientific attack on Dairying must not be taken to imply that other institutes for agricultural research will not be needed. Perhaps one of the most important will be that devoted to the problems of the Pastoral Industry and particularly the problems of better and more cheaply produced wool. Public attention has recently been drawn to the threatened invasion of the woollen trade by artificial wool fabrics based on cotton and possibly other fibres.

In connection with silviculture and forest products research, I wish to emphasise the importance of keeping them in a single intellectual control as has been done in India, and the equal importance of basing the research into forest products on the experience and practice of the trained forester rather than on that of the lumber man, the engineer or the chemist. These considerations are particularly important in a country like Australia which should not only be entirely self-contained in timber but also possess a large exporting trade. Accordingly I recommend that silviculture and forest products research should form a single section of the new organisation and should be under the supervision of a special Board or Committee with a trained forrest-officer in charge, who would be responsible for co-ordinating the various divisions of the work in the different States of the Commonwealth and for seeing that silviculture experiments were carried out in all typical districts with the co-operation of the several States. It is no less important that the headquarters of the Section devoted to forestry and forest products and especially the laboratories and records for silviculture research should adjoin and be in continuous touch with the Commonwealth Scholl of Forestry.

Under the fisheries section, when it can be established, will fall not only the study of edible fish in Australian waters, but the pearl fisheries, the trochus, the beche de mer and the seal, besides many related problems of marine biology.

The term "section" for the several departments of the work undertaken by the Commonwealth is preferred to that of "Bureau" used in the Act, because "Bureau" in the English language seems to imply an emphasis on the clerical and office side of the work in contra-distinction to the laboratory and field work which are the fundamentals.

13. The term "Institute" appears inappropriate to the decentralised organisation outlined in the recommendations. The particular connection and constitution recommended is based upon the experience of the old country where the responsibility for Government assistance to research in agriculture, medicine and science as applied to industries other than agriculture is separated from the administrative departments of State. It has been found to be very advantageous to free scientific work from the embarrassments of departmental administration, which is often of a regulative kind under statutory control, and from any possibility of suspicion that its findings are under the influence of administrative exigency. For these reasons, the British Medical Research Council and the Department of Scientific and Industrial Research were placed under the Lord President of the Council who has no administrative department under his care. Similarly the Development Commission and the Forestry Commission, responsible respectively for financing agricultural and silvicultural research, are unattached to any department of State. There is, however, no doubt that the representation of medical, scientific and industrial research in Parliament by an important Minister of the Crown has been a great assistance to the cause they represent and it appears to me that the nearest analogy in Australia to the British arrangement is to entrust the care of research to the Prime Minister, since the activities of the new Department cannot fail, if successful, to exercise an influence upon the national life in times of peace corresponding to that exercised by the Committee of Imperial Defence in the affairs of War. Neither organisation is directive or executive. Both proceed by inquiry and compel by the force of reason alone.

15. If it is true that the root difficulty in establishing an efficient organisation for research in Australia is the inadequate supply of workers well trained in research, rather than the shortage of funds - and I have no doubt of this - then it is of the first importance to place the training of promising workers and the stimulation of those already available not merely before all other purposes, but to shelter it so far as possible from the chill blasts that lean years or other causes may bring to the steady growth of the young tree. It would be very surprising if times were never to a rise when the Federal Government would have to restrict their annual expenditure and when scientific work would be called upon to curtail or postpone its plans. These things happen in all countries. But if the training of a scientific corps d'elite can go steadily on through the difficult times, leaders will be available directly a new move forward is again possible. Otherwise any arrest in the steady development of the work conducted or aided by the Government will not only mean postponement, but discouragement to young men and women inclined to prepare themselves for a career in research. It will cause a lag in the recovery of the country more serious than the direct effects of the necessary economies.

Accordingly I recommend the establishment of the fund described in paragraph 15. The example set by the Government would, I believe, attract gifts from private benefactors as it has in England and probably in richer measure; for the number of existing foundations with similar purposes is as yet smaller in Australia than it is at Home.

CONCLUSION.

The foregoing notes explain the intention of the recommendations made for the re-organisation of the Commonwealth Institute of Science and Industry and give some indication of the manner of its working. It only remains to suggest the best means of bringing the new organisation, if it is established, into living relation with the work going on in Great Britain. A living relation - and nothing less will be effective - can only be established by the personal contact of men.

The British Government has already offered to throw open the research institutions connected with the Department of Scientific and Industrial Research and the Ministry of Agriculture to young Australians selected by the Commonwealth Government to be members of the staff of their own research stations. They will have the opportunity as members of the British staffs of seeing the manner in which scientific problems are being attacked at home, and of taking part in their solution. I have already recommended that four men should be sent home as soon as possible to prepare for becoming a nucleus staff for Food and Fuel research on their return to Australia. A similar course should be followed in Forestry and Forest Products Research.

It will be no less important that British scientific workers should have the opportunity for similar privileges in Australia as soon as research establishments are available to receive them, for wherever co-operation is sought for, it is important that both sides should know

the methods and conditions of the other. Meantime I propose to recommend my own Government, if the Federal Government agree, to do their utmost to facilitate visits by members of our research staffs to confer with Australian workers and with the authorities of the re-organised Institute, when it is thought that this would be useful.

Finally, I suggest for the consideration of the Federal Government the establishment at the High Commissioner's Office in London of a scientific post to be filled by a well-qualified man who would have duties in relation to questions of scientific progress and policy. The recent creation of the Civil Research Committee of the British Cabinet as the civil counterpart of the Committee of Imperial Defence appears to make such a post particularly necessary. The officer would be able and qualified to become personally acquainted with the work and personnel of the research stations and laboratories at home and would be able to supplement their published reports. He would be able to advise his Government as to the best sources for expert advice when advice is needed - a matter of considerable importance - and he would be available for consultation when the Research Department or the Development Commission wished to make suggestions or inquiries preparatory to more formal action. In the absence of an officer of this kind it is sometimes difficult to determine the best method of approach.

After occupying this post for a couple of years, the officer in question might, it is suggested, return to Australia to act as locum tenens to one or other of the Secretaries of the State Advisory Committees, who would take his place in London. In this way the scientific liaison officer would gradually become personally acquainted with the work going on in the several States, while the State Secretaries would each in turn come into touch with the research work and authorities at Home to the great advantage not only of the central Commonwealth organisation, but also of the State activities. Thus the new type of scientific executive officer would gradually be brought into existence.

(SIGNED) H. FRANK HEATH.

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