Scientific and Industrial Research.[1]

THE Committee of the Privy Council for Scientific and Industrial Research, in presenting its report to Parliament for the year ending July 31, 1926, gives the customary summary of the year's activities of the National Physical Laboratory, the Geological Survey, the nine boards governing researches in specialised fields, and the State-aided industrial research associations. The report also contains a summary of the principal conclusions reached by the Advisory Council, based upon the effects produced during the last ten years by the work of the Department for which it is responsible, and the principles which it is considered should guide further endeavours which are made to assist Great Britain to regain its position as the leading industrial nation of the world.

To the 'general research' programme of the National Physical Laboratory have been added: investigations into the characteristics of insulating materials when subjected to direct and alternating currents, methods of earthing electrical circuits with the object of eliminating danger from leakage currents at high voltages in high-power electrical work, special investigations on the properties of various resistance materials, the effective resistance of large cables of the three-core type, in connexion with which the installation of new high-tension transformers will be invaluable.

Buckley, Collier, and Brookes have devised a method for using the photo-electric cell for colour matching: the cell has been found to be considerably more accurate than the eye. In the Metallurgical Department, considerable progress has been made in research on the alloys of iron, the work being mainly directed to the production of pure iron, free from oxygen, and the constitution of the various iron alloys. The researches have been made more effective by the production in the Department of refractive vessels of pure magnesia and alumina. Increased attention has been given to the fundamental work of the Laboratory on standards. Verification of a number of standards has been made for the Board of Trade, including two new line standards and ninety-six standard weights. Preliminary work on the proposed use of a wave-length of light as the primary standard of length has been completed. An important change has been made in the graduation of scientific glassware, almost all of which is now graded in terms of the millilitre instead of, as formerly, in cubic centimetres. Progress has been made on the work of the international high-temperature scale. In the Photometry Division, work is in progress with the view of the adoption of a black body as a primary standard of light.

The work done by the Laboratory for the boards and committees of the Department, the fighting services and Government departments, continues to increase, while a large number of specific researches are being undertaken for the various State-aided research associations. The researches on the safe loading of underground cables, undertaken for the British Electrical and Allied Industries Research Association, have shown the possibility of immediate economies in the electrical supply industry valued at £250,000 a year. An investigation on the 'spinning' of aeroplanes has been completed. The main features of the effect are now recognised, so that it has been possible definitely to indicate the characteristics of aeroplane design that are likely to lead to danger from inability to recover from a spin. Wind tunnel experiments on the Cierva 'Autogyro' have been commenced. In the Froude Tank the investigation of the influence of waves on the resistance, propulsion, and pitching of ships has been completed by a second series of model experiments, the results of which throw further light on the causes of loss of speed and the shipping of seas in bad weather. Work on the design of propellers and rudders continues. An interesting piece of work has been commenced on the increase of weight due to water absorption of wooden planking cut from timber treated in different ways.

The work of the Laboratory continues to be hampered by the inadequate accommodation and the difficult conditions under which the work is accomplished. It is hoped that sanction may be given at an early date for the erection of the proposed central block for the physics department; the need of further accommodation in the Electro-Technics Division also remains urgent.

The Geological Survey of Great Britain has continued the work of revising the original maps of British coalfields and industrial areas on the basis of the most recent topographical Ordnance Survey maps on the scale of six inches to one mile. A series of memoirs are being prepared on the sources of underground water in Great Britain. A volume on copper ores has been added to the Special Mineral Reports, which describe the principal metalliferous deposits of Great Britain and its deposits of fireclay, ganister, refractories, and other industrial raw materials of mineral origin. The Survey has also resumed the publication of vertical sections to illustrate the sequence of strata in coalfields. Owing to reductions made in the Government's building programme for the year, no further progress has been made towards the provision of a new building at South Kensington, in spite of the dilapidated and dangerous condition of the Museum of Practical Geology in Jermyn Street.

The work of fuel research has been considerably affected by the difficulties of the coal-mining industry; the development of the physical and chemical survey of the national coal resources in particular has been delayed by the general situation. The most suitable means of carrying into effect the various recommendations of the Royal Commission on the coal industry are under consideration, but it is pointed out that the financial resources of the Department cannot meet the increased expenditure which would be entailed by the full programme of research work outlined by the Commission relative to the winning and marketing of coal, which in any case falls outside the present activities of the fuel research division. Work on high-temperature carbonisation continues. The report on the enrichment of coal gas by the injection of oil into vertical retorts during carbonisation has aroused considerable interest in the gas industry and may have important results. Experiments with various types of retorts in connexion with the problem of low-temperature carbonisation continue. Distinct progress has been made with the work on the production of power alcohol from cellulosic materials by bacteriological processes. The by-product of this research is the production from vegetable material, such as straw, of a binding material for the manufacture of briquettes. It is not mentioned in the report, but this may prove to be of the greatest importance in connexion with the development of the Nigerian coalfields, which produce a friable coal.

[1] Report of the Committee of the Privy Council for Scientific and Industrial Research for the Year 1925–26. (Cmd. 2782.) Pp. iv+178. (London: H.M. Stationery Office, 1927.) 3s. net.

It is interesting to note that an agreement has been entered into with the interests controlling the Bergius process by which the Department obtains full information as to the work on British coals being carried out either in Germany or in Great Britain, and a voice in directing the investigations. Other investigations include an inquiry into the spontaneous combustion of coal in ships, an investigation into slow combustion in boiler furnaces, and a search for suitable metals for the construction of low-temperature retorts.

The year has been remarkable for the increase in the demands from industry for the investigation of special problems in connexion with the preservation and the storage of food. Much information is being accumulated regarding the way in which water is held by the proteins of the flesh of beef and the effect of cold upon the intimate chemical structure of the muscle substance, but it has not yet been found possible to apply the method of very rapid freezing to masses of beef so large as a quarter, or even a joint. No definite programme of work on fish was undertaken during the year, because it had been found that work on fish preservation at an inland station is too wasteful of time and effort. The report emphasises the need for a small research station at a fishing port, and it is understood that arrangements have already been made in connexion with the Empire Marketing Board to acquire a suitable site. The new laboratory at Covent Garden is doing useful work in connexion with the conditions of produce after transport and storage, and the diagnosis of the various types of wastage and depreciation found. Two inquiries of general interest were undertaken at the request of shipping companies: the first was concerned with the leakage of air from one storage chamber to another, resulting, for example, in the contamination of eggs or butter by food odours; the second was concerned with the best design for refrigerated provision stores on passenger boats and with the method of stowage and the temperature to be used for foodstuffs. A report has been published on gas storage, marking an end of a definite stage in this investigation which covers the results of laboratory experiments and storage trials extending over a period of six years.

Many interesting topics are dealt with in the account of investigations given in the various sections under the co-ordinated research boards, among which may be mentioned: stresses in railway bridges; work at the Royal Naval Cordite Factory under Dr. A. C. Thayssen on the deterioration of fabrics by micro-organisms; the development of apparatus for the absolute measurement of sound intensity; the utility of artichokes as a raw material for the manufacture of alcohol and good quality cellulose; the use of substances derived from low-temperature tars and minor metals in chemotherapy; stone preservation and building research generally; and the deterioration and restoration of museum exhibits. An interesting reference is made to the examination of the fatty substance, apparently a cosmetic, contained in a calcite jar recovered from the tomb of Tut-ankh-amen. The fat, which had been sealed up for 3000 years, was apparently of animal origin; a small quantity of resinous and odoriferous substances had originally been added to it.

While the report gives an encouraging account of the researches being undertaken in the State laboratories under the Department of Scientific and Industrial Research and those under the supervision of the various co-ordinating research boards and in university laboratories, the same note of optimism is not present with regard to the industrial research associations, and very little information is available in the report regarding the research activities of these bodies. The Committee of Council states that it has adhered to the policy of continuing to assist for a second five years those associations which have done good work and show promise of becoming self-supporting when normal conditions are restored. During the year the work of the British Motor-Cycle, and Cycle Car Research Association, the British Silk Research Association, and the British Cast Iron Research Association, having reached the end of their initial five-year grant periods, came under review. In each instance diminishing block grants have been made for a further period of five years. The British Leather Manufacturers' Research Association has been given a grant on the £ for £ basis for a period of two years. The Committee did not feel justified in giving further aid to the Scottish Shale Oil Scientific and Industrial Research Association, which had not agreed to the recommendations made for the vigorous prosecution of research on a considerable scale involving a considerable increase of expenditure. Further assistance has been given to the British Motor and Allied Industries Research Association, the British Cutlery Research Association, and the British Refractories Research Association. The appeal to the industry for the necessary contributions for the British Empire Sugar Research Association having been unsuccessful, the Committee has not authorised any further grant assistance being given.

The Advisory Council expresses the view that industry is not as a whole sufficiently alive to the need of scientific research or inclined to give sufficient recognition to the work which is being done by the various co-operative research associations. The electrical industry, for example, not only owes its origin to pure research, but is assisted even now more than any other industry by researches carried out in universities and in Government establishments. The work carried out under the direction of the British Electrical and Allied Industries Research Association is of sufficient value to the electrical industry to call for a far greater effort on the part of the supply undertakings to maintain the Association on an adequate financial basis. Further direct support from the taxpayer after the present grant period, which ends in September 1930, cannot be looked for. "We recognise," say the Advisory Council, "the especial difficulties of the time; but nevertheless we must emphatically record our opinion, which we feel assured is shared by all progressive sections of British industry, that essential though a steady scientific policy always is, its importance increases in times of adversity. When we reflect how trivial in relation to the value of the total output of an industry is the expenditure needed to produce by co-operative research results of direct industrial importance, we cannot believe that private enterprise will lack the courage and foresight to maintain on an adequate basis these associations which have already shown their actual and potential value."

During the year under review recommendations have been made by the Advisory Council on the programme for research for 1926–27, for which estimates have been drawn up amounting to £442,877, as compared with £380,263 for 1925–26 and £328,281 for 1924–25, or a slightly greater percentage increase for the current year than for last year. The Empire Marketing Board has promised a grant-in-aid of £25,000 for capital expenditure and £5000 as a first annual grant for current expenses of research for the extension of the work of the Food Investigation Board.