THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND PUBLIC ATTITUDES TO SCIENCE, 1919 - 1945

by

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Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

The University of Leeds
School of Education

September 1978

Abstract

The British Association was founded for 'the advancement of science'. In pursuing this objective it has always operated on two fronts : the professional practice of science and the lay attitude to science. It is with the latter that this dissertation is concerned.

During the period 1919 - 1945 a considerable public antipathy towards science became manifest. It was felt that the moral, cultural and political values associated with abstract scientific research were at odds with those of a liberal democracy deriving its ethos from the traditionally defined humanities. It was further thought that the rapid development of scientific knowledge and of its technical application threatened a society which had failed to achieve a corresponding development of its ethical standards. The massive and continuous unemployment of the nineteen-thirties and the mounting danger of another war exacerbated public hostility to science and to the machinery which science made possible.

As the pursuit of scientific knowledge came increasingly to depend on public financial support, and as the consequences of this pursuit came increasingly to affect all members of society, it grew ever more apparent that the continued advancement of science necessitated an hospitable social environment. Since the public seemed inclined to be inhospitable, the British Association was obliged to go beyond its traditional popularising activities and to conduct a concerted defence of science. It tried to persuade the public that science was a spiritually uplifting exercise, that scientific knowledge was intrinsically worthwhile, that its practical applications were generally beneficial to society. In making this defence of science the British Association became involved in an extended debate over the relations between science and society which was simultaneously being waged by other, differently motivated, groups of scientists. The various elements of this debate, and their development during the period under review, are considered in some detail in Part I.

The educational system presents a significant mechanism for influencing public attitudes, and it is one which the British Association had long used to further the status of science. Part II examines how the British Association sought between the wars to enlist the educational system in its defence of science. The emphasis here was chiefly on pure science and in this respect the cultural and the political functions of education were the main themes. The Association made the most

of the opportunities offered by the general science movement in secondary schools and by adult education to disseminate the cultural values of science : that is, to project a view of science as something deeply imbedded in the social and intellectual heritage of the country, fundamentally of a piece with humane, liberal values and able to contribute to the fulfillment of the individual. By thus stressing the cultural aspects of science, the Association hoped to impress on the public that science was concerned with the spiritual as well as the material welfare of man.

The political function of education is considered under the heading of education for citizenship and is examined with reference to two disciplines in particular : geography and biology. At the end of the First World War the professional and educational status of both these sciences was low. Each of these sciences began to develop a man-centred orientation and this was made the basis of their claims to a greater rôle in the educational system. It was argued that geography and biology generated both knowledge and the sort of outlook vital to citizenship in a democratic society and that they should therefore be taught to all schoolchildren. Such arguments, like the cultural ones, served to emphasise the social importance of science in a non-material sense and hence, it was hoped, to ameliorate public attitudes to science. The motivation behind them, however, was not so much the advancement of society in itself as the advancement of science, for which the British Association had been founded.

Acknowledgements

It gives me much pleasure to acknowledge the help of those who in various ways have been involved in the preparation of this thesis.

I owe a very substantial debt to my supervisor, Professor David Layton. Over four years he has patiently tried to raise my intellectual level and to teach me to think like an historian. Such merits as this thesis may have are in large measure due to his stimulus and encouragement.

Other members of the Centre for Studies in Science Education and of the Department for the History of Science in this University have assisted me in my research and greatly encouraged me by the interest they have shown in it. In this respect I should particularly like to acknowledge the help of Mr. Edgar Jenkins and Dr. Jerry Ravetz. Both Departments have provided me with that invaluable asset, a congenial atmosphere in which to work.

I had profitable discussions with Dr. Gary Werskey and Dr. Lyndsay Farrall on certain specific points. The former also supplied me with important unpublished material and both allowed me free access to their theses, for which I am grateful.

The staff of the British Association, especially Miss J. H. Dring and Mr. Alec Hughes, made me most welcome and greatly facilitated the task of sifting through the Association's papers.

By their courtesy and efficiency the staff of many libraries have added considerably to the enjoyment of my research. I should especially like to thank the staff of the Brotherton Library and the Institute of Education Library at this University.

The work of typing this thesis has been carried out with a high degree of enthusiasm and efficiency by Miss Pat Hart, who has devoted a great deal of time and energy to this somewhat laborious task. She has been helped by her sister Mrs. E. Parkin and with some of the typing by Mrs. Doris Postill. To all three I am deeply grateful.

The support of my friends and fellow students has been an important factor in sustaining my morale and ensuring the completion of my work. I owe much to them all. A particular word of thanks is due to Mrs. Geralyn Lawrenson, for her very generous help in proof-reading.

I have left to the last what is perhaps my greatest debt. My parents have been unstinting in their support and encouragement for this as for other activities I have undertaken. This thesis provides me with an opportunity for acknowledging how much I owe to them.

Contents

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND PUBLIC ATTITUDES TO SCIENCE, 1919 - 1945

The objects of the British Association for the Advancement of Science are : To give a stronger impulse and a more systematic direction to scientific inquiry; to promote the intercourse of those who cultivate Science in different parts of the British Empire with one another and with foreign philosophers; to obtain more general attention for the objects of Science and the removal of any disadvantages of a public kind which impede its progress.

The Association contemplates no invasion of the ground occupied by other Institutions.

(Opening paragraph of the Association's constitution)

Introduction

My thesis started out as a study of the educational work of the British Association for the Advancement of Science from the foundation of its education Section in 1901 up to the Second World War. Fairly late on in this exercise it became apparent that certain of its educational activities in the nineteen-twenties and thirties could only be understood by reference to the social relations of science debate, which, from the point of view of the British Association, could itself best be interpreted as part of a concerted effort to influence public attitudes to science. My subsequent investigation of these latter movements rapidly grew to proportions that necessitated a change of plan. What finally emerged was the present study of how the British Association tried to influence public attitudes to science and of the use it made of the educational system in this process.

Insofar as this thesis deals only with the British Association's efforts to reach the non-scientific public, it cannot be described as a history of the Association, the great bulk of whose work was, after all, concerned with the internal affairs of professional science. It does, nevertheless, deal with what I consider to be the most interesting aspect of the Association's history during the period under review, and one which is essential to an adequate appreciation of the character of the Association.

Again, although other organisations and individuals - particularly the Association of Scientific Workers, the British Science Guild and a number of radical scientists - are included in my study, the emphasis is on the British Association : I do not claim to have produced a comprehensive account of how scientists attempted to influence public attitudes to their activities. Nevertheless, by concentrating on the British Association and by comparing its work with that of more radically motivated groups, one gains an important perspective lacking in previous studies, which have dealt only with the latter and have thereby generated a very one-sided picture of the social relations of science debate. An emphasis on the British Association is justified both by the need for this additional perspective and by the fact that the Association was much the largest general scientific organisation with an explicit commitment to the non-scientific public : indeed, Nature described it as 'the principal mouthpiece between science and the public'.[1] It is scarcely possible to obtain an adequate understanding of public attitudes to science without studying the major scientific organisation which concerned itself with these attitudes.

In embarking upon a study dealing with public attitudes, it is reasonable to wonder how such nebulous entities can be discerned. A possible approach would be to look at how science is portrayed in the literature of the period : but that would only reveal the attitudes of that small proportion of the public which writes books. Another approach would be to examine the journalism of the period, which would provide access to the attitudes of a wider range of people. Alternatively, one could investigate the work of popularisers of science from James Jeans to H.G. Wells and attempt to construct the view of science which the layman could have derived from these immensely widely-read authors. Again, one could study how science was depicted in the school curriculum.

My approach has been to analyse the image of science that the British Association was putting before the public and the motivation behind the process, and to work back from these to an analysis of what existing public attitudes to science were and of why the British Association was so anxious to change them. This, admittedly, does not give direct access to public attitudes. It does, however, enable one to elucidate what a particular group of scientists thought the public thought about science. Since it was their perceptions of public attitudes, rather than the actual attitudes themselves, that governed their defence of science, this indirect approach is appropriate to the present exercise, which is concerned with understanding the public dimensions of the British Association's activities. In thus restricting myself to the British Association's perceptions, I am to some extent bound by the limitations of these perceptions. Perhaps the most serious such limitation, and one which might frustrate the sociologically-minded historian, is that the British Association tended to regard the non-scientific public as a more coherent entity than it really was and therefore tended to take a somewhat simplified view of public attitudes to science.

My study runs from 1919 to 1945, from the end of one world war to the end of another. These dates are significant here not simply for their importance in world history. After each war the British Association

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1. Nature, 134, (25 August 1934), 274.

paused to take stock of its situation and to reconsider its proper function in the scientific life of the nation. The period between two such soul-searching exercises makes a coherent unit for investigation. This particular period also makes a coherent unit in the history of the relations between science and society : it begins with a greatly increased effort at popularisation, develops through a time of considerable public hostility to science, of propaganda for a scientific approach to social problems and a powerful attack on the concept of pure science, and ends with the reaffirmation of the values of pure science. It is a fascinating period in many respects, not least in respect of the social history of science.

The non-scientific public has attitudes to science because it is affected by science. It is affected on two levels. Pure science as a source of intellectual concepts and cultural values influences the social and spiritual environment. Technology derived from pure science influences the material environment. The British Association was concerned about public attitudes on both levels.

Part I of this thesis treats of the British Association as a whole : instead of dealing with individual Sections, it concentrates on the activities of the Council, on addresses delivered before the entire Association and on outstanding events at the annual meetings. It describes the efforts made to modify public attitudes to science on each of the above-mentioned levels, since the Association discerned hostility both to the ethos and to the applications of science. Part I is built around an extended debate on the relations between science and society and compares the contributions to this debate made by the British Association with other contributions. The debate served two purposes : it awakened at least some scientists to the importance of the social dimensions of their work, and it showed the non-scientific public both that scientists were concerned about these dimensions and that the relations between science and society were on balance of positive benefit to society. The debate was therefore central to the British Association's public defence of science.

It is disconcertingly easy to talk freely about such things as 'the social relations of science' without ever really coming to grips with what these relations entail. In an endeavour to avoid this pitfall I have tried at all times to identify as precisely as possible what has been under discussion when this and similar phrases have been used. To facilitate this I have adopted a fairly rigorously chronological approach : the relations between science and society, and public attitudes to them, varied substantially from year to year and unless one makes a conscious effort to be strict about chronology it is easy to lose track of what these relations were. Statements that may hold true for one year are not automatically valid for another.

Not only were there many issues in the social relations of science debate : there were also among scientists three main identifiable approaches to these issues. These approaches I have called the radical line, the rationalist line and the British Association line. This analysis provides the framework within which the debate has been interpreted; for detailed discussions of the analysis the reader is referred particularly to the second half of chapter V and to chapters VIII and IX. A fourth approach, embodied in the Society for Freedom in Science, emerged towards the end of the period and is considered in the last parts of chapters VIII and IX. A fifth approach was to ignore the debate altogether as none of the scientist's business ; this would appear to have been the line taken by the majority of scientists, but it is not one that I have investigated. It is worth pointing out, though, that only a minority of the scientific community was involved in the social relations of science debate.

Part II deals with how the British Association used the educational system to influence public attitudes to science. From the middle of the nineteenth century the British Association had actively recognised the importance of education in fostering the advancement of science, so by the period here under review it had a long experience in this field. Education can be thought of as serving four social functions, which may be labelled cultural, political, economic and subject maintenance. I have chosen to concentrate on the first two. The cultural and political functions of science education relate to science as a system of ideas and values : correspondingly, Part II is concerned with how the British Association tried to influence public attitudes to this rather than to the applied aspect of science.

In developing this theme it is necessary to consider individual sciences rather than, as in Part I, to treat of science as a whole. This is particularly true of the political function of science education, but it is also true of the cultural function : for example, the general science movement, the principal vehicle of the latter, in practice if not in theory was very largely construed in terms of individual sciences. Part II is therefore built more around the activities of some of the Sections of the British Association - most notably the education, geography, geology and zoology Sections - than around the Association as a whole.

Chapter X deals with the cultural values of science and discusses how the educational system was seen as a vehicle for disseminating these values among the general public. It was hoped that a wider appreciation of the cultural values of science would enable a public nurtured in the liberal values of the traditionally defined humanities to recognise that science could both support and enrich its outlook. This might help to soften hostile attitudes based on a supposed antithesis between the cultural values of science and those of the humanities.

The political function of science education is considered under the heading of education for citizenship and occupies chapters XI - XIII. Chapter XI introduces the concept of education for citizenship by describing the attempts made by the education Section of the British Association in the fraught years following 1918 to produce a syllabus for the direct teaching of citizenship. The syllabus was a failure, partly because its aims were not sufficiently widely shared and partly because direct methods of teaching citizenship proved generally unacceptable, indirect methods being deemed more appropriate. Geographers and biologists, whose disciplines were struggling for fuller recognition in secondary school curricula, thereupon claimed that these disciplines generated both knowledge and the sort of outlook essential to the citizen of a modern democracy and that they therefore offered valuable opportunities for indirect training in citizenship. The political argument, in other words, was seized upon to support the overall case for more geography and biology in schools. These two disciplines are considered in chapters XII and XIII respectively.

Both cultural and political arguments emphasised the contributions to social well-being of science as a system of ideas and values and were intended to reassure the non-scientific public of the worthwhileness of these ideas and values. The underlying purpose of these arguments was not so much to increase the effectiveness of education in itself as to influence public attitudes to science and thereby generate a social atmosphere hospitable to its further advancement. The educational system was thus used to reinforce the British Association's public defence of science described in Part I.

In a recent essay Roy MacLeod and Russell Moseley have remarked :

> Among historians of science, the history of science education is now acknowledged to be of fundamental importance. It is fundamental because it gives to the historian of science access to those linkages which have structured the assumptions of 'normal science' ... and which have, through at least two centuries, promoted the image of science as internationalist, disinterested and objective. (2)

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2. Roy MacLeod and Russell Moseley, 'Breadth, depth and excellence : sources and problems in the history of university science education in England, 1850-1914', Stud. Sci. Ed., 5, (1978), 85-106; p.85.

Not only is the history of science education of importance to historians of science : it seems to me that the converse is also true. Certainly, the curriculum developments considered in Part II cannot be fully understood without reference to the social history of science. To the latter field of study, an investigation of public attitudes to science between the two world wars offers material of absorbing interest. It is my hope, then, that historians both of science and of science education may be able to benefit from reading this thesis.

Chapter I

The British Association for the Advancement of Science

The British Association for the Advancement of Science, was founded in the wake of Charles Babbage's Reflections on the decline of science in England (1830) and of the failure of a group of reformers within the Royal Society to secure the election as president of the astronomer John Herschel, Herschel being defeated by the Duke of Sussex, sixth son of George III. The Association did not, however, develop along the lines originally envisaged by the reformers. Its law-giver was neither Babbage nor his ally David Brewster, but William Vernon Harcourt, Canon of York, and, when addressing the inaugural meeting at York in 1831, he explicitly disassociated himself from the reformers, or 'declinists' as they were sometimes known from the title of Babbage's book. Rejecting their gloomy prognosis, he pointed to the great quantity of scientific work being undertaken at different levels throughout the country and dwelt upon the need to infuse it with 'a stronger impulse and a more systematic direction'. He particularly deplored the fragmentation of science which appeared to be an inevitable corollary of progress in one or other discipline and saw the prime function of the new Association as the welding together of a community threatened by its own activities with disintegration. The 'stronger impulse' would be provided by the catalytic effect of regular discussion and the 'more systematic direction' would emerge, it was hoped, from the work of specialist research committees and - at the suggestion of William Whewell[1] - from the preparation of periodic reports on the state of science. In addition, the Association would seek 'to obtain a more general attention to the objects of science and a removal of any disadvantages of a public kind which impede its progress'; of the latter, Vernon Harcourt singled out the patent laws as urgently in need of reform. In earnest of his peaceful

1. Whewell also argued that the Royal Society should produce such reports. See J.B. Morrell, 'London institutions and Lyell's career: 1820-41', B.J.H.S., 9, (1976), 132-146, esp. pp. 133-134.

intentions, he expressed the hope that in carrying out these plans the new body would not intrude upon the province of any other institution.(2)

The most distinctive characteristic of the British Association was its membership. Far from wishing to ape the élitist Royal Society, or even to copy the fairly restricted Gesellschaft deutscher Naturforscher und Ärtze (which has often, and misleadingly, been regarded as the model for the British Association), Vernon Harcourt suggested that the Association should be open to every member of any Philosophical Society in the British Empire, subject only to a 'public testimonial of reputable character and zeal for science'. In order to ensure a certain level of competence in the leadership, he proposed that control of the Association should be vested in a General Committee, of whose members was required publication of at least one scientific paper. Since this General Committee was far too large to exercise an effective executive rôle,(3)

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2. B.A.R., (1831), 9-35. Jack Morrell and Arnold Thackray are at the moment studying the early years of the British Association. Meanwhile, a variety of accounts may be read in the following sources:
(i) O.J.R.Howarth, The British Association for the Advancement of Science: a retrospect 1831-1921 (B.A.A.S., 1922), chap. I;
(ii) Everett Mendelsohn, 'The emergence of science as a profession in nineteenth-century Europe', in Karl Hill, ed., The management of scientists (Boston, 1964), 3-48, esp.pp. 22-39;
(iii) A.D.Orange, 'The British Association for the Advancement of Science: the provincial background', Sci. Stud., I, (1971), 315-329;
(iv) A.D.Orange, 'The origins of the British Association for the Advancement of Science', B.J.H.S., 6, (1972), 152-176; and
(v) L.Pearce Williams, 'The Royal Society and the founding of the British Association for the Advancement of Science', Not.Rec.Roy.Soc., 16, (1961), 221-233.

3. At the turn of the century, the published membership lists contain some 4,000 names, of whom about 750 are identified as members of the General Committee. In 1900, an attendance of 67 at a meeting of the General Committee was described as 'large' - The Leeds Mercury, 10 September 1900, p.3 - which, considering that a fair proportion of these 67 would also have been members of the Council, gives a fair indication of the importance most of those on the General Committee attached to their status. The length of the membership list should not be confused with the size of actual attendance at the annual meeting. For the latter see below, n.13.

it appointed a more select Council to look after the affairs of the Association between meetings.[4] In the pattern of administration which emerged, a resolution arising at the annual meeting would, after passing through the Committee of Recommendations (made up of about half the Council, the Sectional presidents and some twenty-five others), be put to the General Committee; if approved, it would then go forward to the Council which, having discussed the matter, would report back the following year. The Association really had the best of both worlds: on its Council were to be found many of the greatest figures of British science, imparting intellectual vitality and respectability to the organisation, while at the same time the Association's doors were open to all interested in science, even - surprisingly, perhaps, for a serious scientific body at that time - women, though of course the women were scrupulously excluded from office. It was the only major national organisation which recognised the importance of the rank and file of science and actively sought to encourage their interests.

A very important item of organisation was the setting up of individual 'Sections' to deal with specific sciences, a step which, apart from a trial run during the years 1838-1849, the Royal Society did not take until 1896.[5] After an initial period of experimentation, the Sectional divisions became fairly settled, there being seven Sections in 1836. The development of new sciences and the fragmentation of old ones resulted in the enlargement of the original arrangements: the thirteenth Section was added in 1921.[6]

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4. The Council consisted of a president, a number of vice-presidents (who rarely if ever attended its meetings), one (after 1862, two) general secretary, a treasurer, a permanent (paid) assistant secretary and twenty-five ordinary members. It met regularly in November, December, February, March, June and during the annual meeting.

5. Henry Lyons, The Royal Society, 1660-1940 (C.U.P., 1944), pp.256-257, 292.

6. See O.J.R.Howarth, op. cit., pp.79-89. Details of the Sections are given in appendix II.

Each Section was run by a 'sectional organising committee' consisting of a president, who held office for one year, and a recorder and secretaries, who usually held office somewhat longer. This committee was responsible for the affairs of the Section between annual meetings and for arranging the programme for the annual meeting. At the annual meeting it temporarily co-opted additional members and during this time was called simply the 'sectional committee'; in 1900, for example, the number of such co-optees varied from nine to thirty-nine per Section. The sectional committees had the power to recommend to the General Committee the appointment of research committees, which could sometimes qualify for a grant of money from the Association, and to pass on to the Committee of Recommendations any resolution arising from sectional activities during the meeting. These Sections were highly valued by practising scientists for two reasons: in themselves they offered opportunities for detailed and critical debate which were unique until specialised societies became an established feature of scientific life, whilst together they presented openings for inter-disciplinary discussions which were to become increasingly important as scientific knowledge developed.

The British Association was able to advance science in other ways than just providing a forum for debate, valuable as that was. For example, over many years it dispensed from its own income an annual sum in the region of £1000 in defraying the cost of experimental work both pure and applied carried out by the sectional research committees.(7) Despite the typically Victorian mental block about the proposition that society had responsibilities towards assisting scientists without private means - an issue particularly controversial within the British Association itself during the early years - the Association was also able from time to time to prod the government into action over specific matters of demonstrable utilitarian or military value.(8) A somewhat different aspect of

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7. Details may be found in O. J. R. Howarth, op. cit., chap. VI.

8. ibid., chap. VII. See further pp. 20-22 below.

advancing science is that of popularisation. The British Association was a peripatetic body, holding its week-long annual meeting in a different town each year, and the annual gathering of some two thousand or more devotees in successive centres of population helped to make the non-scientific public aware of the existence and significance of scientific activity. To foster this process the Association laid on a series of special lectures for the local inhabitants.[(9)]

It would seem that Vernon Harcourt had found just the right recipe. The 'cultivators of science' flocked to the meetings of the British Association and research workers of the highest calibre frequently chose it as the venue for unveiling their latest discoveries. Fellows of the Royal Society turned up by the score and quickly dominated the active contingent of the Council - the large overlap of membership, indeed, soon forged closed links between the two organisations - while the powerful scientists who made up the X Club regarded the British Association as a suitable forum for wielding their influence.[(10)] Both national and local press took great interest, some papers giving very detailed accounts of the proceedings[(11)] and others preferring to comment on the fashions displayed at the social events that punctuated the scientific work. When specialised journals came into existence, their editors procured acres of copy at the meetings and were able to publish many of the papers for which space could not be found in

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9. See further chap. II, p. 35 below.

10. J. Vernon Jenson, 'The X Club: fraternity of Victorian scientists', B.J.H.S., 5, (1970), 63-72; Roy M. McLeod, 'The X Club: a social network of science in late-Victorian England', Not. Rec. Roy. Soc., 24, (1970), 305-322. The British Association had its own côteries, but the emphasis tended to be on the side of frolicsome diversion rather than power politics. Examples are the Red Lion Club and the B Club. For the former, see O. J. R. Howarth, op. cit., pp. 89-92; for the latter, Alexander Scott's presidential address to the Chemical Society, J. Chem. Soc., 109, (1916), 338-368, esp. pp. 342-351.

11. These accounts constitute an indispensable source for the history of the British Association. In this study I have had frequent recourse to The Times and the Manchester Guardian, as well as to more specialised publications.

the official Report. Whatever the attendance at a given session, an author was assured of eventually reaching a large audience.

The British Association unquestionably occupied a position of central importance in the scientific life of the country around 1860-1875. Thereafter it was affected by a number of adverse factors. There was, for about a decade, a public reaction against science, which was seen 'no longer as an instrument of limitless progress, but as one of intellectual and moral subjugation ... Scientists were accused of attempting to supplant traditional loyalties by a "priest-craft of science".'(12) During this period the average attendance at the annual meetings was significantly lower than previously; during 1885-1889, on the other hand, it broke all records, before settling down at a figure near 2,000 for the years remaining till the outbreak of World War I.(13) With the gradual restoring of confidence in the scientific community and the eventual establishment of university departments of science, accompanied as it was by a shift in 'the subtle monopoly of power held by the London scientific societies',(14) the British Association was faced with other

12 Roy M. MacLeod, 'The support of Victorian science: the endowment of research movement in Great Britain, 1868-1900', Minerva, 9, (1971), 197-230, esp. p. 221.

13. Attendance varied wildly from one meeting to the next on account of geographical factors. In order to discern some sort of pattern, I have taken averages over five year periods, though one should perhaps be wary of attaching too much meaning even to these. In the following table I have excluded meetings held overseas, since they introduced their own distortions.

Years	1855-1859	1860-1864	1865-1869	1870-1874
Attendance	1906	2425	2121	2362
Years	1875-1879	1880-1884	1885-1889	1890-1894
Attendance	2047	1860	2583	1865
Years	1895-1899	1900-1904	1905-1909	1910-1914
Attendance	2089	1998	1972	1959

Data from tables given at the beginning of each annual Report.

14. Roy M. MacLeod, art. cit. (n. 10 above), p. 318.

difficulties. One of these was the renewed prestige of the Royal Society, which may be instanced by the fact that when, in 1876, the government voted an extra £4,000 p.a. for scientific research, it was the Royal Society which was asked to administer the money.(15) Moreover, by 1860, the reform movement within the Society had been successful to the extent that for the first time since its foundation the scientific Fellows were more numerous than their non-scientific colleagues;(16) from that point the status of the Society within the scientific community grew rapidly.

Another source of difficulty for the British Association came from the rapid proliferation of specialist subject societies.(17) The foundation of the British Association has been described as 'a self-conscious call for the upgrading of science and, of equal importance, an upgrading of scientists',(18) but the Association made no attempt to professionalise the occupation of scientist (if, indeed, it is possible to be a 'scientist' as opposed to a physicist, chemist, etc) and in that sense was not challenged when individual disciplines incorporated their own qualifying associations.(19) The new societies did, however, offer to the practising scientist two advantages with which the British Association could not hope to compete: frequent

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15. Roy M. MacLeod, 'The Royal Society and the government grant: notes on the administration of scientific research, 1849-1914', Hist. J., 14, (1971), 323-358.

16. Henry Lyons, op cit. (n.5 above), p.270.

17. The following societies, with interests overlapping those of the Sections of the British Association, were founded between 1870-1900: Institution of Electrical Engineers (1871), Anthropological Institute (1871), Physical Society (1873) Mineralogical Society (1876), Institute of Chemistry (1877), Royal Economic Society (1890), Physiological Society (1876).

18. Everett Mendelsohn, art. cit. (n 2 ii above), pp. 22-23.

19. For a discussion of the concept of professionalisation, see G. Millerson, The qualifying associations (Routledge and Kegan Paul, 1964). One may note, however, that the word 'scientist' was coined by Whewell at a meeting of the British Association in 1834. See J. B. Morrell, art. cit. (n.1 above), p.134. Also Sydney Ross, '"Scientist" : the story of a word', Ann. Sci., 18, (1962), 65-86.

meetings of workers in the same narrow field and the ever alluring bait of rapid publication. In certain areas of research there were those who felt that the British Association no longer had any contribution to make; for example, an anonymous writer in The Electrical Review declared:

> Electricity has become of a deeply practical, not to say a commercial, character, and the persons associated with it have little sympathy with a pseudo-scientific gathering like the British Association. Besides, with the growth of the electrical industry the importance of the Institution of Electrical Engineers has increased. ... It is not too much to say, therefore, that the value of the British Association from an electrical point of view is of little importance nowadays.(20)

That this did not represent the unanimous opinion of the profession was, however, made clear in a parallel journal, The Electrician :

> Notwithstanding the friendly and healthy competition of other multifarious scientific bodies, this Association is still capable of justifying its existence to the scientific world; its utility, whether to those who attend its meetings, or to the still wider circle of those who from outside keenly watch the progress of science, is a proved fact.(21)

How did the Association respond to the increasing specialisation of science? The growth of knowledge in certain fields was recognised by the creation of individual Sections for anthropology (1884), zoology (1895), botany (1895) and physiology (1896),[22] but at the same time the original function of the Association in fusing together the diversifying strands of science was re-emphasised. Thus, for example, C. W. Siemens dwelt in his presidential address of 1882 on the great value of an umbrella organisation in a world of increasing specialisation; Alfred Newton assured the biology Section in 1887 that 'our Association has no justifiable cause for thinking that its work is accomplished'; and Douglas Galton in 1895 trenchantly affirmed that with 'the growing connection between the sciences ... the field of usefulness of the Association is widening. ... We are only at the beginning of work.'[23] It would appear,

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20. The Electrical Review, 47, (1900), 456.

21. The Electrician, 47, (1901), 834.

22. Anthropology (H) was a new Section, though the subject had previously come under the consideration of other Sections. Zoology (D), botany (K) and physiology (I) had earlier been lumped together in Section D under the heading of biology.

23. B. A. R., (1882), 2-4; (1887), 726; and (1895), 35, [cont. over/

however, from remarks made in 1920 and discussed in the next chapter that up to that time the Association had itself drifted with the tide of specialisation and had failed to exercise an effective coordinating, inter-disciplinary rôle.

It was more successful in coordinating the activities of the many groups of local amateur scientists which flourished in the latter part of the nineteenth century. In 1883 a committee under Francis Galton reported to the Council that 'the British Association is fitted by its constitution and position to become an organising centre of local scientific work.' Societies carrying out and publishing local scientific investigations were invited to enter into correspondence with the Association and to send delegates to the annual meeting. These delegates soon formed themselves into a distinct branch of the Association, the first so-called Conference of Delegates of Corresponding Societies being convened in 1885.[24] By the turn of the century some 70 societies with a total membership approaching 25,000 were thus represented; in 1916, these figures were 121 and 40,000, respectively.

The basic challenge facing the Association if it was to maintain its relevance for the practising scientist was to demonstrate that it was a serious scientific organisation. Two features seemed to cast doubt on this: its efforts to reach the non-scientific public, and the existence of Sections falling outside the traditionally defined scope of science. In America, during the period from the turn of the century to the outbreak of World War, the great nineteenth century tradition of popularisation gave way to a feeling that popularisation was beneath the dignity of the professional scientist,[25] and it may be that a somewhat similar attitude developed in this country. Certainly, the work that the British Association did in popular lecturing, its unrestricted membership policy and the occasional festive tone of its meetings laid it open to description

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23. (cont.) respectively. cf. O. J. R. Howarth, op. cit. (n. 2i above), p. 242.

24. O. J. R. Howarth, op. cit., 94-97. See also the introduction to R. M. MacLeod, J. R. Friday and C. Gregor, The Corresponding Societies of the British Association for the Advancement of Science, 1883-1929 (Mansell, 1975), though note A. D. Orange's review in B. J. H. S., 9, (1976), 84. The Conference of Delegates was disbanded in 1970.

25. Ronald C. Tobey, The American ideology of national science, 1919-1930 (U. Pittsburgh P., 1971), chap. I.

as 'an amateur scientific picnic', unworthy of serious attention. The need to guard against, and to be seen to guard against, too trivial an approach to science may well have been behind the Council's rejection, in 1876 and again in 1886, of proposals that women be allowed to hold office.(26) It is interesting that O.J.R. Howarth felt it necessary to declare: 'At no time, however, is there traceable any tendency to allow the meetings to degenerate into popular exhibitions.' (27) Unscientific Sections were another source of trouble. Among the original Sections was one for statistics - then perhaps the nearest thing to social science - and it incurred immediately the strenuous opposition of William Whewell on the grounds that its activities involved 'exactly what it was most necessary and most desired to exclude from the proceedings'. (28) In 1856 the Section changed its name to 'economic science and statistics', but when, in 1877, the Council appointed a committee to consider 'the possibility of excluding unscientific or otherwise unsuitable papers and discussions from the Sectional Proceedings of the Association', Francis Galton made a strong attack upon the Section. In a letter to the committee he argued:

> It would appear from all this that the subjects commonly brought before Section F cannot be considered scientific in the sense of the word that is sanctioned by the usages of the British Association. Also that as the Section is isolated and avowedly attracts much more than its share of persons of both sexes who have had no scientific training, its discussions are apt to become even less scientific than they would otherwise have been.

The Committee suggested that 'the question of the discontinuance of Section F deserved the serious consideration of the Council'; the Council, however, refused to disband the Section but it did tighten up the rules so as to ensure 'a sufficient guarantee for the exclusion of unscientific and unsuitable papers'.(29)

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26. B.A.R., (1876), l and (1886), lxvii. The Council capitulated on this issue in 1900 - see B.A.R., (1900), xcvi. The first woman sectional president was the botanist Miss Ethel Sargant, elected in 1913; the first woman to be elected to the Council was another botanist, Miss E.R.Saunders, in 1914. The Royal Society did not admit women to its Fellowship until 1945.

27. O.J.R.Howarth, op.cit., p.43

28. ibid., p.87

29. B.A.R., (1877), xlix and (1878), lvi; O.J.R.Howarth, op.cit., pp.88-89. Galton's letter is preserved amongst his papers at University College, London (item 150/1).

The importance of sustaining a serious scientific reputation may also be seen in the status of medicine within the British Association. Medicine had been included among the original Sections but was abandoned in mid-century 'on account of the growing strength of the British Medical Association'.[30] During the 1890s an attempt to re-introduce medicine was rejected, 'it being logically maintained that Medicine is not a science in itself, but merely an application of several sciences.'[31] Physiology, however, did constitute a recognisable science and was given its own Section; eventually, in 1969, this Section changed its name to 'bio-medical sciences'. In this context it is significant that when a Section for education was established in 1901, it was called 'educational science', implying that education was an activity susceptible to scientific treatment. As will be seen in the next chapter, both economics and education Sections came under attack in 1920 as 'not properly within the scope of the Association'.

Writing in 1921, O.J.R.Howarth observed that on several occasions he had encountered 'such a phrase as "the great days of the Association," referring vaguely to a period half a century ago'.[32] He was, of course, at pains to demonstrate the continuing vitality of the Association, but it does seem that after about 1890 it lost something of its earlier sparkle. That Douglas Galton should conclude his 1895 presidential address with the words 'We exhibit no symptom of decay'[33] implies that the Association was having to struggle a little to maintain its position in the scientific community. As the Yorkshire Post wrily commented:

> For many years past there have been prophets to predict the decay and end of the British Association, but like the coal-supply it continues in spite of all warnings. It is doubtful, indeed, whether the Association was ever more firmly established than at present.(34)

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30. B.A.R.,(1931), 405.

31. The Electrician, 47, (1901), 835.

32. O.J.R.Howarth, op.cit., p.241.

33. Quoted ibid., p.242.

34. Yorkshire Post, 5 September 1900, p.5.

One characteristic of the British Association not so far discussed is its activities overseas. Having taken the British Empire for its stage, it is not surprising to find a strong interest in imperial affairs amongst its concerns. India was a particular favourite, and the Association was constantly pressing the government on such diverse matters as the setting up of a chain of stations across the sub-continent for magnetical and meterological observations, the utilisation of the 1891 census for a thorough anthropometrical survey of the Indian tribes and the inclusion of botany in the training of Indian Forest Officers. A different aspect of imperialism may be seen in a joint discussion between the economics and geography Sections in 1890 on 'the lands of the globe still available for European settlement'. By the First World War, five of the annual meetings had been held overseas: at Montreal in 1884, Toronto in 1897, South Africa in 1905, Winnipeg in 1909 and Australia in 1914. The wide-ranging influence of the British Association may also be inferred from the foundation of Associations for the Advancement of Science in Italy (1839), America (1848), France (1872), Australia and New Zealand (1887), South Africa (1903), Spain (1908), India (1914) and Canada (1923), amongst others.[35]

The final matter which needs to be discussed at this stage is the relation between the British Association and the government of the country. The whole issue of whether such a relation should exist at all was bitterly contested from the earliest days. Babbage and Brewster, for example, wanted to make a firm stand and demand governmental respect for science. On the other hand, Whewell equally firmly declared his refusal 'to share in any association which had for one of its objects to influence Government in its proceedings with regard to science and its cultivators'. And yet the British Association had for one of its objects the 'removal of any disadvantages of a public kind which impede 'the progress of science,

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35. A complete list is given in appendix XX of N.H. Mikhail, The contribution of the British Association for the Advancement of Science to education in England and selected countries abroad (Ph.D. thesis, London 1964).

which meant that it could not altogether ignore governmental relations. A tacit compromise was reached whereby, while conceding Whewell's ideal that the 'dignity and utility' of scientists was best secured through 'abstaining from any systematic connection with the Government of the country',[36] the Association nevertheless transmitted resolutions and arranged deputations to appropriate government departments on a wide variety of specific matters of concern to science. An outstanding example of exerting influence on a matter of fairly general concern was the manoeuvres which led in 1870 to the Devonshire Commission on scientific instruction and the advancement of science. Less immediately successful was a deputation to the prime minister and the chancellor of the exchequer in 1904 to urge the necessity for increased national provision for university education.

Between 1849 and 1867 a group of members of the British Association who were members of the House of Commons or the House of Lords formed themselves into the Parliamentary Committee of the British Association.[37] The object of this exercise was not, however, to develop relations between science and government in the direction advocated by Brewster, but simply to facilitate communications between the British Association and the government of the day within the limits that had already been established. The Committee collapsed with the death of its chairman Lord Wrottesley, there being no available successor of his calibre. During this same period, a controversy within the British Association resulted in the re-affirmation of the view that while government assistance was occasionally beneficial to the progress of science, 'our national genius inclines us to prefer voluntary associations of private persons to organisations of any kind dependent on the State.'[38] The Royal Society similarly emphasised the advantages of keeping science 'beyond the influence of anything in the shape of party politics'.[39]

A fresh plea for a more intimate relation between science and

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36. Quoted in A.D.Orange, art.cit. (n.2 iv above), p.166.

37. David Layton, 'The educational work of the Parliamentary Committee of the British Association for the Advancement of Science', Hist.Ed., 5, (1976), 25-39.

38. O.J.R.Howarth, op.cit., pp.250-255.

39. Quoted, from Benjamin Brodie's first presidential address to the Royal Society (1858), in David Layton, art.cit., p.37.

the State was made in 1903, by Norman Lockyer in his presidential address to the British Association. He argued that the Association should view itself as 'a scientific Parliament competent to deal with all matters, including those of national importance, relating to science' and should organise 'machinery for influencing all new councils and committees dealing with local matters'.[40] Following his address, a resolution was referred to the Council claiming: 'It is desirable that Scientific workers, and persons interested in Science, be so organised that they may exert permanent influence on public opinion ... and that the Council be recommended to take steps to promote such organisation.'[41] The Council, however, declined to take any such action and Lockyer was forced to establish a new body, the British Science Guild, to carry out his plans.[42] The episode illustrates the deep-rooted reluctance of the British Association to become involved in courses of action that might be politically controversial.

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40. B.A.R., (1903), 10.

41. ibid., p. cvi.

42. Accounts of the foundation of the British Science Guild may be found in A.J. Meadows, Science and controversy - a biography of Sir Norman Lockyer (Macmillan, 1972), chap. X and T. Mary Lockyer & Winifred L. Lockyer, Life and work of Sir Norman Lockyer (Macmillan, 1928), chap. XXXVIII (contributed by Richard Gregory).

PART I

THE SOCIAL RELATIONS OF SCIENCE

Chapter II

1919-1930 : The public image of science

The traumatic experience of the Great War and the unprecedented mobilisation of science and scientists for the defence of the nation could not but lead the British Association, in common with most institutions, into a period of introspection. The beginnings of this, though, were fairly low key : in 1918 the Council set up a committee to consider 'the working of the Association', with a view to streamlining financial and administrative arrangements. Its report,[1] for which the assistant secretary[2] O. J. R. Howarth[3] was largely responsible, did however contain two items of more than simply bureaucratic interest : tickets were to be made available at half price to 'university and other students, teachers, etc.' working in the locality of the annual meeting,[4] and non-members were to be eligible to give papers and serve on research committees. Thus it was hoped to make the Association a little more accessible and to facilitate participation in its affairs.

The 1919 Bournemouth meeting attracted an attendance of 1482, well down on the pre-war figures[5] but quite satisfactory under the still difficult circumstances. The following year, however, the expected up-turn did not materialise : only 1380 tickets were sold for the Cardiff meeting, a total which could not be attributed simply to practical exigencies. This disappointing attendance was compounded by a feeling of dissatisfaction with the content of the meeting. Commenting on it, R. V. Stanford, *Nature*'s reporter at Cardiff, voiced some

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1. *B. A. R.*, (1919), xlix-liii.
2. His job was upgraded to that of 'secretary' in 1922 : *B. A. R.*, (1922), xix.
3. 1877-1954. Educated at Westminster and Christ Church, Oxford. Diploma in geography, 1902. Author of several works and texts on geography. President of the Geographical Association, 1953. Secretary of the British Association, 1909-1946. Author of the Association's centenary history. President, Section E, 1951. 'For some 37 years he guided the affairs of the British Association with a statesmanlike hand. ... Yet though he was absorbed in administration and the needs of British Science at large, Howarth never ceased to be a geographer.' - *Geography*, *39*, (1954), 291-292.
4. cf. O. J. R. Howarth, *The British Association for the Advancement of Science: a retrospect 1831-1921* (B. A. A. S., 1922), pp. 249-250.
5. See chapter I, n. 13.

criticisms of the British Association and in so doing unleashed a torrent of correspondence, in Nature and elsewhere, at times reminiscent of the mutterings about obsolesence current at the turn of the century. He believed that the Association was performing a valuable service for the professional scientific community, but he maintained that it was failing in what he regarded as its most important function, namely 'to make scientific knowledge accessible to the general public'. He spoke of 'the apathy of local people of the educated classes' and even asserted: 'The plain fact remains that it is the exception to find anyone who has heard of the Association.'[6]

Richard Gregory,[7] who had recently assumed the editorship of Nature, wrote a leader in support of Stanford and added his own view of the Association's duty to the public:

> The Association makes little endeavour to show the bearing of scientific methods and principles upon most subjects of vital importance in national polity and industrial affairs. ... We desire to urge that this aspect of the Association's activities should be given more consideration

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6. Nature, 106, (2 September 1920), 13.

7. 1864-1952. Educated at elementary school. Became lab. assistant to A.M. Worthington at Clifton College. Won a studentship to the Royal College of Science in 1885. Joined the staff of Nature in 1893, having worked as an assistant to Lockyer on the Solar Physics Committee. Assistant editor, 1893-1919; editor, 1919-1939. Editor of The School World and the Journal of Education, 1899-1939. Scientific editor of Macmillans, 1905-1939. F.R.S., 1933. President of twenty-five organisations, including A.S.L.I.B., the Geographical Association and the Science Masters' Association, but the two which claimed his greatest devotion were the British Science Guild, in which he was heavily involved from the beginning (see chap. IV, pp. 90-91 below), and the British Association. He attended every single meeting of the Association from 1901 to 1951. He was secretary of Section L, 1901-1908; vice-president, 1910-1911, 1919-1921, 1923, 1925; president, 1922; chaired five Section L research committees and sat on many others. Member of Council, 1916-1932, 1938-1939; president of the Association, 1939-1946. The following are useful biographical sources:
(i) W.H.G. Armytage, Sir Richard Gregory (Macmillan, 1957) -hereafter cited as Armytage, Gregory - though it needs critical reading;
(ii) Harold Hartley, 'The life and times of Sir Richard Gregory, Bt., F.R.S., 1864-1952', Adv. Sci., 10, (1953-54), 275-286; and
(iii) F.J.M. Stratton, 'Richard Arman Gregory, 1864-1952', Ob. Not. Roy. Soc., 8, (1952), 411-417.

> than it now receives, instead of concentrating upon the work of the Sections. ... We believe that a much larger public, in any place of meeting, would take active part in its work if greater consideration were given to wide national questions and the bearing of local conditions upon them.

Even in relation to the scientific community, Gregory found fault with the Association: instead of a disparate series of specialist communications each of little interest to the majority of any particular Section, he urged that general reviews of progress in wider fields should be given prominence and that more attention should be paid to inter-Sectional discussions. He also criticised the lack of co-ordination between Sections, illustrating their 'fissiparous tendency' by the fact that at Cardiff several Sections had, quite independently of each other and of Section L, brought forward resolutions dealing with educational matters.[(8)]

This provided a splendid opening for everyone to voice their opinions about the British Association, and for the Association itself to do some serious thinking about its proper postwar function in the scientific life of the nation. During the next three months Nature published twenty-five letters on the subject.[(9)] The various criticisms offered reveal three more or less distinct views as to the main purpose of the Association's existence. According to the first of these, it was primarily an organisation for practising scientists. From this angle, the complaints were that there were far too many papers given at the annual meetings which ought rather to be read to the appropriate subject society, and that the pressure of the time-table left quite inadequate opportunity for discussion.

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8. Richard Gregory, 'The British Association and national life', Nature, 106, (16 September 1920), 69-72. For information concerning authorship of (anonymous) Nature leaders I am indebted to a typescript list prepared from a master-copy of the journal by Roy MacLeod and Paul Gary Werskey and available on request from the history and social studies of science department at Sussex University.

9. Between 23 September and 30 December letters were published from the following (in alphabetical order): N. Annandale, H. E. Armstrong (twice), F. A. Bather, W. M. Bayliss, E. Brabrook, Neville Chamberlain, A. L. Cortie, Arthur Cushny, F. R. East, A. S. Eddington, John W. Evans, L. N. G. Filon, W. L. Fox, William Garnett, Ray Lankester, Oliver Lodge, H. R. Mill, the N. U. S. W., W. J. Pope, Napier Shaw, Arthur Smithells, Frederick Soddy, R. W. Stanford, and H. H. Turner & J. L. Myres (pp. the B. A.). Half these men were or had been presidents of Sections.

The tendency towards ever greater specialisation was particularly deplored: the British Association was unique in the opportunities it offered for lowering the barriers between disciplines and its distinctive contribution to the advancement of science was identified as the encouragement of the 'cross-fertilisation of the sciences'.[10] To this end there were suggestions that the twelve Sections be reduced to four; that only papers of general interest be allowed; that presidential addresses be given at different times so that a member could hear more than one; and that inter-Sectional meetings become the rule rather than the exception.

The second view of the British Association maintained, with Stanford, that its chief responsibility lay towards the interested, non-scientific public. The annual meeting provided a rare occasion when the public could encounter real live scientists in action and it was accorded exceptionally wide press coverage;[11] it was urged that greater use should be made of this opportunity for instructing the lay audience in recent scientific developments. Several correspondents called for a concerted effort to provide semi-popular lectures and Francis Bather suggested: 'Why not have "Section X, Popular Science" in continuous session, with a jolly president, a lantern that will work, and as many "star" performers as you can get?'[12] Fr. A. L. Cortie and Arthur Eddington, both students of the more recondite features of nature, each remarked on the fact that, at Cardiff, it was the discussions on pure rather than applied science which drew the largest numbers of non-scientists. Eddington's comment on this is interesting:

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10. cf. Chapter I, p.16 above.

11. The fact that the meeting fell during the journalistic silly season served at least to improve the quantity of this coverage, if not always its quality.

12. Nature, 106, (23 September 1920), 112. In 1953 the name 'Section X' was given to the Conference of Corresponding Societies. The following year the latter reverted to being a 'Conference', and Section X acquired the title 'General'. Its work has been a little more heavyweight than Bather suggested!

> I very much doubt the assumption commonly made that the application of science to life and industry is what the public want to hear about. It may be good for them to hear about it, but we shall have to gild the pill with more attractive subjects, such as the age of the earth, the excavations at Cnossus, the properties of prime numbers, or Einstein.(13)

The purpose of popularisation, then, was not to emphasise the social importance of science by describing its technological applications or by discussing the significance of scientific method, but rather to satisfy public interest by expounding developments in pure science. Having thus secured the public's attention, it might then be possible to discuss these wider aspects of science, if it was so desired. In America at this time, many scientists became involved in popularisation activities in order to demonstrate the congruence between the set of values inherent in science and those inherent in democracy. Developments in pure science, particularly Einstein's theory of relativity, greatly hindered their efforts.(14) The British Association, as represented by this 'second view', was not concerned to build up an 'ideology of national science'; it was concerned simply to foster public interest in science by explaining those developments in which the public seemed most interested.

The British Association had always served both professional and lay audiences. Few correspondents wished it to devote itself exclusively to one or the other. Some regarded these two functions as equally important and felt that increasing specialisation had upset the balance.(15) Others thought that a definite emphasis should be given to one or other function and on this were, numerically, fairly evenly divided between those who valued the Association principally as a forum for inter- disciplinary discussion and for debates on general issues within individual sciences, and those who saw the annual meetings chiefly as occasions for acquainting the public with the achievements of science.

As mentioned above, there were three identifiable views as to the proper function of the British Association in postwar science put forward in the Nature correspondence. The third view, simply stated, was that the Association's duty to the lay public was not

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13. Nature, 106, (14 October 1920), 212. Eddington was, of course, the leading populariser of relativity.

14. Ronald C. Tobey, The American ideology of national science, 1919-1930 (U. Pittsburgh P., 1971), chaps II - IV.

15. The Times, for example, was worried that the public had been sacrificed to the professional scientist. See its issue of 20 September 1920, p.11.

exhausted by its traditional popularisation of science; rather, it had also to propound a 'scientific attitude' to life. Disseminating information about scientific achievements was not enough: science had a message which was vital to a society shattered by the most total war in history. It was very much of a minority view, but it is important to examine it in some detail.

In his famous 1903 presidential address, Norman Lockyer had raised the old bugbear of relations between organised science and the State and had urged the British Association to take upon itself the task of influencing those aspects of national policy to which science (or technology) was relevant. The Association declined to do so, and in 1905 Lockyer founded the British Science Guild.(16) By the end of the war Richard Gregory was a leading member of both organisations. Now he is quoted as believing that the two bodies served quite different purposes: 'The B. A. consists of priests and noviciates of science, while the B. S. G. represents a missionary effort to proclaim a new gospel.'(17) Nevertheless, in the leader quoted above, he criticised the Association for failing 'to show the bearing of scientific methods and principles upon ... national polity and industrial affairs'. In other words, he argued that the British Association should not only explain actual scientific discoveries and, where relevant, their possible practical applications, but also demonstrate the importance of scientific <u>method</u> for the solution of non-technological social problems - the very rôle which the British Science Guild was struggling to play.

Some of the major literary figures of the nineteen-twenties saw in the Great War the destruction of all the traditional forces of social order and reacted by a 'withdrawal in revulsion from all

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16. See chapter I, p.22 above.

17. Quoted in Harold Hartley, art. cit. (n.7 ii above), p.283. cf. the epitaph which Gregory composed for himself:

> My grandfather preached the Gospel of Christ;
> My father preached the Gospel of Socialism;
> And I preach the Gospel of Science.
> But the ethical principles of all three are
> pursuit of truth and righteousness for the
> improvement of man and society.

Quoted ibid., p.286.

social and political responsibility'.[18] Gregory's message was that, on the contrary, real progress could be achieved in social and political affairs, but only on the basis of scientific method and scientific rationality. Though he did not mention it explicitly in this particular leader, his 'Gospel of Science' was compounded both of a crude form of scientific rationalism and of the 'spirit and service of science', a phrase much seen in Nature leaders between the wars and first used in his very popular book Discovery, or the spirit and service of science (Macmillan, 1916). In a stirring presidential address to the Conference of Delegates in 1921, he left his audience in no doubt that he regarded the preaching of this gospel as proper, indeed central, to the British Association.[19]

The idea that science had this redeeming message for postwar society was supported in a fierce letter from the vituperative chemist Frederick Soddy, who declared that its proclamation was the British Association's only worthwhile task. More strongly than Gregory, indeed in terms reminiscent of the extreme positivists of the 1890s,[20] he claimed that science and scientists had a unique prerogative - and duty - in the conduct of public affairs:

> It is not too much to say that whole fields of government in the real sense, which is not the conventional sense of party politics, now fall wholly within the ascertained realm of science. ... The public application of science is a totally different thing from applied science. This scientific synthesis and the direction of the unique mental attitude, induced only by the actual discovery of new knowledge, to the conduct of public affairs are the real and peculiar functions of the Association if it is to regain its national position.

As for what might be called the moral or ethical components of the gospel of science, not only did the 'vast body of the general public', according to Soddy, look to scientists 'to provide a way of escape from the evils that threaten our civilisation', but also its needs were being ignored by the British Association, which 'makes no attempt to come to grips with the real enemy or to take the position already conceded by the general public to the spirit and service of science

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18. Neal Wood, Communism and British intellectuals (Columbia U.P., 1952), chap.IV, esp.p.103. Hereafter cited as Wood, Communism.

19. Richard Gregory, 'The message of science', B.A.R., (1921), 488-497.

20. cf. Karl Pearson, The grammar of science (A.&.C.Black, 2nd. ed.,1900), p.15: 'The material of science is coextensive with the whole life, physical and mental, of the universe.'

as almost the only disinterested and effective agency in a cannibalistic and corrupt society'.[21]

That science both could and should guide society through the postwar moral wasteland was also the line taken by the National Union of Scientific Workers. This organisation had been formed towards the end of the war as a result of the taxing experience of wartime scientific work, some younger scientists in particular feeling that the established societies were unwilling or unable to protect them against exploitation. Its objectives were both political and economic: to remedy the observation that 'scientific workers do not exercise in the political and industrial world an influence commensurate with their importance' and 'to regulate the conditions of employment of scientific workers'.[22] Major A.G. Church,[23] a close personal friend of Richard Gregory, became full-time secretary of the Union in January 1920. In its contribution to the Nature correspondence the Union compared the contemporary situation with that of fifty years earlier. Thomas Huxley's great achievement, it suggested, had been that in preaching evolution he had provided a dramatically new account of man's relation to his natural environment; analogously, in the aftermath of war,

> the public is now ripe for a lead from science in the direction of a fundamental revision of that part of its

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21. Nature, 106, (23 September 1920), 111-112.

22. E. Kay MacLeod, Politics, professionalisation and the organisation of scientists: the Association of Scientific Workers, 1917-1942 (D.Phil. thesis, Sussex, 1975), pp.80,89. Hereafter cited as Kay MacLeod, A.Sc.W. A brief account of the A.Sc.W. may be found in Hilary Rose and Steven Rose, Science and society (Pelican, 1969), pp.52-57. The tension between the political and trade union functions of the Association provides the key to its history during the period covered by MacLeod; it formally abandoned trade unionism in 1927, changing its name to the Association of Scientific Workers, and formally reverted to it in 1940, eventually, in 1968, merging with A.S.S.E.T. to form the Association of Scientific, Technical and Managerial Staffs.

23. 1886-1954. Educated at University College, London. Schoolmaster, 1909-1914. Secretary of the N.U.S.W., 1920-1931, and of the B.S.G., 1931-1933. Thereafter devoted himself to business interests. Labour M.P., 1923-1924, 1929-1931. Founder of the shortlived journal, The Realist (1929). Contributed 35 leaders to Nature between 1925 and 1933.

outlook on life which concerns the relations of man to the social and economic environment which he has created. (24) [emphasis in original]

Such a lead was essential if bodies like the British Association were to enjoy public esteem.

This third school of thought, then, argued that it was not enough for the British Association merely to concern itself with the advancement of science at the professional level and with the popularisation of science in the sense of explaining scientific developments to the non-scientific public. Over and above these functions, it had to promulgate the message of science, that the scientific method could resolve the anarchy of politics and that the 'spirit and service' of science could provide a model for the conduct of social life. The future of the British Association, it was suggested, lay in bringing this message to the people and in motivating scientists towards its proclamation. Despite the cogency of its advocates, it must be stressed again that this was very much of a minority view.

How did the British Association react to this public examination? There was little likelihood that it would adopt the sort of social programme envisaged in the third view just described, but it seems that the Association was genuinely worried lest the upstart National Union of Scientific Workers should encroach upon its territory and membership.(25) At an informal dinner around this time H. H. Turner,(26) one of the general secretaries, made

> a strong fighting speech combining admission of certain shortcomings with a definite programme of revision. Other speeches and the informal discussion were almost wholly in support of his view that the structure and principles of the Association were sound but that more should be done to keep in touch with public opinion, adult

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24. Nature, 106, (18 November 1920), 373.

25. This paragraph is based on chap XIII of Praeterita, an unpublished and very informal autobiography written by J. L. Myres (n. 28 below) 'a year or two before he died, when he was already over 80 and too blind to check anything he wrote from existing papers'. (Letter from J. N. L. Myres to author, dated 14 July 1977.) I am most grateful to his son J. N. L. Myres for allowing me access to Praeterita, which was written 'largely for family interest'.

26. 1861-1930. Educated at Trinity College, Cambridge. Chief assistant, Royal Observatory, Greenwich, 1884-1893; Savilian professor of astronomy, Oxford, 1893-1930. F. R. S., 1896. President of Section A, 1911; general secretary 1913-1922.

education and the younger scientists. ... By accepting nearly all of the scientific programme of the Association of Scientific Workers [i.e. the N.U.S.W.] its political motives were stripped of this camouflage.(27)

Thus, according to J.L.Myres,[28] the other general secretary, the task facing the Association was to strengthen the national appreciation of science while rejecting the particular view of its social significance held by the National Union; this would weaken the ambitions of the Union to become the spokesman for organised science and expose its 'political motives'. To do this, it was necessary that the Association should increase its popular appeal, among both scientists and non-scientists.

Despite the general distrust in British Association circles of the concept of a scientists' trade union, it is interesting that at the Cardiff meeting several Sections adopted a resolution urging that 'no scheme of payment of professional scientific men[29] in the service of the State is satisfactory which places them on a lower level than that of the higher grade of the Civil Service.'[30] At its meeting on 5 November 1920 the Council endorsed this resolution and forwarded it to the Treasury.[31] However abhorrent the idea of a professionals' trade union, the British Association was going to be seen to be concerned that scientists were not financially exploited.

Increasing its general appeal was not, of course, solely or even chiefly a defensive strategy against the National Union of Scientific Workers: it was also necessary in order to retain the loyalty of those who had offered criticisms under the first and second headings discussed above. Turner and Myers wrote a long and somewhat rambling letter to Nature at the end of October which stressed the importance of catering for both professionals and lay audiences and, while not defending the Association as perfect, pointed out that its flexible organisation allowed for most

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27. J.L.Myres, Praeterita, chap.XIII, p.4.

28. 1869-1954. Educated at Winchester and New College Oxford. Varied and distinguished career as a classical archaeologist, anthropologist, geographer and historian. Wykeham professor of ancient history at Oxford, 1910-1939. He attended every meeting of the British Association (except 1905) from 1893 to 1939. Secretary of Section H, 1895-1904, and president, 1909. Member of Council, 1909-1916; general secretary, 1919-1932.

29. Note the difference in rhetoric: the British Association spoke of 'professional scientific men', the N.U.S.W. of 'scientific workers'.

30. and 31. cont. over.

of the more moderate suggestions advanced by correspondents.[32] Or, as Arthur Smithells benignly put it when expressing his 'strong affection' for the Association: 'It is so truly British - so far from perfect, yet so adaptable.'[33]

On 3 December 1920 the Council appointed a committee to consider how the Association could improve its attractiveness for the practising scientist. At a meeting on 21 January 1921 attended by the president and general officers (W. A. Herdman, H. H. Turner, J. L. Myres and E. H. Griffiths), Richard Gregory and Peter Chalmers Mitchell, this committee confirmed that ' no change in the constitution of the Association is necessary or desirable' and, by a majority, rejected the suggestion that 'the Sections of Economics and Education are not properly within the scope of the Association and should be suspended.'[34] Several other ideas were discussed jointly with the Sectional organising committees on 25 February. The net result of these meetings was that the Council approved a number of procedural changes designed to facilitate the 'cross-fertilisation' of the sciences. These involved explicitly encouraging joint Sectional activities; allowing the Sectional presidents to use their addresses as introductions to discussions rather than as formal perorations; and staggering the addresses over several days. It was, as Myres later observed, 'nothing revolutionary'.[36]

These measures were intended to make the annual meetings of greater value to practising scientists. In order to encourage younger scientists into the fold, the Council, building on the 1919 precedent of half-price students' tickets, decided to establish in time for the 1922 meeting exhibitions to allow about a score of selected undergraduates to attend free of charge. The idea was

30. (cont.) B. A. R., (1920) xxvi and (1921), xv.

31. (cont.) Council minutes.

32. Nature, 106, (28 October 1920), 277-279.

33. ibid., (30 December 1920), 565.

34. cf. chapter I, p. 19 above.

35. Council minutes; B. A. R., (1921), xvi.

36. J. L. Myres, Praeterita, chap. XIII, p. 4.

that they should be informally introduced to the leading lights of the scientific world and have an opportunity to appreciate the advantages of membership. The exhibitions were maintained throughout the inter-war years.[37]

The Council was also anxious to improve its services to its lay audience. Public lecturing had been a feature of the annual programme almost from the beginning: 'evening discourses' had been initiated for Royal Institution-type audiences in 1842 and had been given, normally at a rate of two per meeting, ever since. They dealt with recent developments in pure science. In 1867 began a move to reach other sections of the community with 'lectures to the operative classes', given by equally distinguished speakers but differing from the discourses in being less formal and dwelling more on the technical applications of science. In 1912 they acquired the more dignified if still clumsy title of 'public or citizens' lectures' and from 1924 were known simply as 'citizens' lectures'. It was thus a natural extension of a well-established tradition for the Council in 1922 to set up a series of 'children's lectures'. These became 'lectures for young people' in 1925[38] and three years later were amalgamated with the citizens' lectures under the general heading of 'public lectures'. The evening discourses remained on a separate footing. The Council was naturally keen to make the most of these public lectures. They varied in number from year to year according to the scope offered by the locality of the meeting and to the enthusiasm of the local organisers: the greatest number was seventeen, at Liverpool in 1923.

An unusual exercise in self-publicity, and one that must be related to the fear that the British Association was fading from the public consciousness, was the publication in 1922 of a volume commemorating ninety years of existence.[39] It was written by the secretary O.J.R.Howarth and financed by the 1919 president,

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37. B.A.R., (1922), xvii and (1923), xvi.

38. Involvement with young people, chiefly sixth-formers, is now one of the chief areas of British Association activity, boosted by the establishment of the British Association Young Scientists in 1969.

39. O.J.R.Howarth, op.cit. (n.4 above). The volume was updated and re-issued for the centenary in 1931.

Charles Parsons. In his final chapter Howarth discussed the Nature controversy and expressed satisfaction with the steps taken, especially those facilitating inter-displinary activities. He also set out in an interesting passage the virtues of the 'middle course' between too much and too little governmental involvement in organised science - a balance greatly altered by the war - and argued that the British Association was the competent body to articulate the scientific side of the equation. He urged that its well tried organisation was one

> which may well be employed, and if necessary extended, as an alternative to setting up wholly new machines, to carry out any duty which involves the co-ordination of effort within the body corporate of science itself, or the strengthening of understanding and relationship between science on the one hand, an d the State and the nation on the other. (40)

This was a lightly-veiled criticism of the National Union of Scientific Workers, which had been founded 'without waiting for the [British] Association to resume even its normal activities'[41] after the war. The Association was not going to get involved in the formulation of social policy, as Lockyer had discovered, but insofar as science and the State experienced a degree of mutual dependence it was willing and able to speak for the former. Howarth's book was also a riposte to Soddy's extravagant outburst that 'the British Association seems to be attacked by senile paralysis just as a belief in science and in the power of its methods is arising in the world phoenix-like from the ashes of its own self.'[42]

The result of the controversy, then, was not to provoke any profound shift in British Association policy, but rather to sharpen and render more conscious its commitment to what had long been the two mainsprings of its existence : providing scientists with a forum for discussing the wider issues within each discipline and for learning of developments in each others' fields, and, by involving the public as much as possible in its meetings, seeking 'to obtain a more general attention to the objects of science'. While the Association's interest in the relations between science and the State was, perhaps, reinforced, its understanding of what was involved in their liaison remained basically unaltered. It was a gentle reform.

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40. ibid., p.254.
41. J.L.Myres, Praeterita, chap. XIII, p.3.
42. Nature, 106, (23 September 1920), 112.

It was also a very popular reform. Even Gregory was pleased: he wrote a laudatory editorial in Nature heralding the 1921 Edinburgh meeting as 'the beginning of a new epoch in the history of the Association' and congratulating the Council for acting 'in a spirit which should be characteristic of all scientific bodies'.[43] The public, too, showed its appreciation: 2768 people - twice the Cardiff total - turned up at Edinburgh and the average attendance for the decade was 2710,[44] a substantial (and lucrative) improvement on the pre-war figure of under 2000.

The image of science which the British Association sought to project to the public during the 1920s may most readily be traced through the presidential addresses. Some presidents simply described a particularly outstanding intellectual or practical achievement of science such as, for example, Lord Rutherford in his account of 'The electrical structure of matter' in 1923 or David Bruce's address on preventative medicine the following year. Others prefaced or concluded their addresses with some general remarks on the nature and purpose of science. The mathematician Horace Lamb, in 1925, defended the scientific enterprise in terms of its intellectual and aesthetic qualities rather than its practical benefits. The latter were, he agreed, of enormous importance, but he thought that the former were more profoundly significant, both in motivating scientists and in their influence on the non-scientific public. As an example of intellectual influence he instanced the nineteenth-century battles over evolution, adding:

> We may rejoice that these antagonisms are now almost obsolete. ... The change is even reflected in the sermons delivered before the Association. The quarters where we may look for suspicion and dislike are now different; they are political rather than ecclesiastical.

The struggle with the Church for intellectual freedom had been concluded; but, according to Lamb, science had still to overcome 'a certain dumb hostility' from political quarters, because

> the habit of sober and accurate analysis which scientific pursuits tend to promote is not always favourable to

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43. Richard Gregory, 'The British Association', Nature, 108, (8 September 1921), 33-34; see also ibid., (22 September 1921), 115-116.

44. Calculated for the years 1921-1930, exclusive, again, of overseas meetings. This was, in fact, the highest sustained attendance ever achieved up to the end of the Second World War. See chapter I, n.13, for the pre-1914 attendance figures.

> social and economic theories which rest mainly on an emotional if very natural basis.(45)

In stressing these intellectual aspects of scientific endeavour and the ways in which they altered established perspectives, Lamb added a warning against expecting too much of science. There were those, he said, who had conceived unrealistic expectations of science: that it would generate a steady increase of prosperity and reconciliation of national antagonisms. When their dreams of quick progress failed to materialise, they reacted against science in disappointment and disillusion and spoke of 'the bankruptcy of science'.(46) Against such, Lamb pleaded that science had never promised those ambitious goods which it was accused of failing to deliver:

> It can have no pretensions to improve human nature; it may alter the environment, multiply the resources, widen the intellectual prospect, but it cannot fairly be asked to bear the responsibility for the use which is made of these gifts. That must be determined by other and, let us admit it, higher considerations.(47)

Lamb, then, was presenting a picture of science as an activity which brought practical, intellectual and aesthetic gifts to society, but which had no capacity to regulate the use of these gifts. On the other hand, politicians who resisted the 'sober and accurate' scientific mind were criticised: science could not run society, but neither should it be prevented from making such contributions as it was able. Despite hints of public distrust, Lamb was confident that 'science has never been so widely or so enthusiastically cultivated as at the present time.'

The president of the British Association the following year was the Prince of Wales. He took as the starting point of his address this last remark of his predecessor's, hoping that it 'may dispel an attitude towards Science, which personifies it somewhat as the ancients personified the powers of darkness, and invests it with some of their sinister attributes'. Such an attitude, he added optimist-

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45. B.A.R., (1925), 3.

46. Other than a quotation from President Wilson, Lamb did not identify those of whom he spoke. One may, however, note: (i) his reference to politicians in general; (ii) the difficulties which Richard Gregory was then experiencing in his attempts to interest the Labour Party and the T.U.C. in science (Armytage, Gregory, pp. 83-97, 100-102); and (iii) Lamb's remark that 'The provinces of art and science are often held to be [mutually] alien and even antagonistic.'

47. B.A.R., (1925), 4.

ically, 'is fortunately less common than it used to be'. He then went on to chronicle the growth of State financial support for science and the benefits which had subsequently accrued to the community. Mutual distrust between science and the State, illustrated by the fierce mid-nineteenth century controversies within the British Association on this subject,[48] had, he believed, been 'almost if not quite wholly removed'. Save, apparently, for a small residuum of scepticism, the Prince of Wales believed that the value of science in solving the material problems of society was fully conceded; indeed, he had 'come to realise that the future solution of practically all of the domestic and social difficulties with which we have to grapple nowadays will only be found by scientific methods'.[49]

This vision of science coming into its own both socially and governmentally had a rude shock at the 1927 Leeds meeting of the British Association. The occasion was the sermon traditionally preached to members on the Sunday of the meeting; the preacher was E. A. Burroughs, Bishop of Ripon.[50] His theme was not that science was in itself de-humanising, or brutish, or irrelevant; rather, it was simply too successful. So successful, in fact, that it was changing society at a faster rate than man could change himself. It was in this unequal rate of development that the Bishop foresaw danger :

> Unless we are making parallel progress towards the moral and spiritual supremacy, dare we go on enhancing Man's body without some sure hope of saving his soul?

One method of equilibrating the two growth rates was to slow down the faster :

> Dare I even suggest, at the risk of being lynched by some of my hearers, that the sum of human happiness outside

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48. cf. chapter I, n.38 above.

49. B.A.R., (1926), 1-15.

50. H.G. Mulliner, Arthur Burroughs (Nisbet, 1936) makes no mention of this incident. The fullest account is in J.G. Crowther, The social relations of science (Macmillans, 1941), pp.612-614. (Hereafter cited as Crowther, Social relations.) For the story of its considerable impact in America, see Carroll Pursell, '"A savage struck by lightning" : the idea of a research moratorium, 1927-1937', Lux et Scientia, 10, (1974), 146-158 and Ronald C. Tobey, op. cit. (n.14 above), pp.150-152. I am grateful to Prof. Pursell for a copy of his paper : Lux et Scientia is apparently unavailable in this country.

> scientific circles would not necessarily be reduced if for ten years every physical and chemical laboratory were closed and the patient and resourceful energy displayed in them transferred to recovering the lost art of getting on together and finding the formula for making both ends meet in the scale of human life.(51)

The Bishop of Ripon was to protest in private a few years later that 'my remark was made with a broad smile, and in a context which might have given even a journalist a hint of how I meant it to be taken.'(52) The hint was largely lost on his audience,(53) many of whom proceeded to attack ideas he had not in fact put forward. His main point was that the intense pursuit of scientific knowledge of recent years had not been matched by an equal pursuit of wisdom and that consequently man lacked the 'moral and spiritual supremacy' necessary to assimilate the changes wrought by scientific developments. To judge by the number of references both to this idea and its proposed solution - the ten year scientific holiday or moratorium - in the proceedings of the British Association between 1927 and the outbreak of World War II, it was a suggestion to which scientists were extremely sensitive.(54) The need to defend science against the charge of being indifferent or worse to the larger social issues raised by its rapid development was a major source of motivation for the British Association's efforts during this period seriously to consider the social implications of science.

From this point onwards it became almost obligatory for the president of the British Association to devote some part, at least, of his address to extolling the benefits of science and demonstrating that the fears of those who mistrusted its effects on society were ungrounded. Thus in 1928 William Bragg reaffirmed the idea that the process of scientific research enhances rather than diminishes appreciation of the spiritual:

> There are even some who think that science is inhuman. They speak or write as if students of modern science

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51. <u>The Times</u>, 5 September 1927, p.15.

52. In a letter to the American physicist Robert Millikan dated 25 March 1930, quoted in Carroll Pursell, art.cit., p.146.

53. <u>The Times</u>, though, commented that he 'can hardly have been serious'.

54. cf. Carroll Pursell, art.cit., p.149: 'The sometimes violent reactions from the scientific and technical communities were based either on a vast over-estimation of the support for a moratorium, or on a deliberate desire to gain some advantage from beating a dead horse.'

> would destroy reverence or faith. I do not know how that can be said of the student who stands daily in the presence of what seems to him to be infinite.(55)

The daily work of the researcher rendered him humbler and wiser: it did not prompt him in a fit of arrogance to disdain the mystical. Science was such a vital part of contemporary society that a true understanding of its congruence with spiritual values was essential:

> The proper employment of scientific research is so necessary to our welfare that we cannot afford to allow misconceptions to hinder it; and the worst of all are those which would suppose it to contradict the highest aims. Science ... is not setting forth to destroy the soul of the nation, but to keep body and soul together.(56)

A very different aspect of science, but one which also revealed the potential benefits which society could gain from science, was discussed by the geologist Thomas Holland, principal and vice-chancellor of Edinburgh University, in 1929. His address was on the influence of the distribution of minerals in the earth's crust upon international politics, and it is interesting that he felt the need to apologise for his choice of subject:

> It would have been a shock to our members if, before the war, political problems were discussed from this Chair, and party politics may always be inconsistent with the mental products of culture. But the results of science and technology now limit the effects of national ambitions, and therefore dominate the international political atmosphere for good or evil.(57)

His thesis was that modern military technology required mineral resources beyond the scope of any one country, so that international control of these resources could become an effective instrument of world peace. By a comforting trick of nature, 'the only two nations that can fight for long on their own natural resources are the British Empire and the United States': nature and science between them seemed to guarantee survival of democracy in the world.(58)

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55. B.A.R., (1928), 17.

56. ibid., p.20. cf. A.G. Church, 'Man and machine', Nature, 122, (8 September 1928), 337-339: 'There is a tendency on the part of some people to attribute all the ugliness of present day life to the advance of science and invention...'

57. B.A.R., (1929), 36.

58. cf. Ronald C. Tobey, op. cit. (n.14 above), p.151: 'The public had to learn not to fear science ... for science disclosed nature's benevolence and was therefore itself benevolent.'

An actual rather than a conjectural blessing of science was described by the botanist F.O. Bower at the end of his 1930 presidential address: the enormous, indeed life-saving, advance in agriculture consequent to the development of applied botany under government sponsorship. He showed how the impending crisis in world production of wheat diagnosed by William Crookes in 1898 had been solved by the mass production of artificial fertilisers and by the application of Mendelian genetics to the development of new strains of wheat; but he went out of his way to emphasise that such progress rested on the indispensable basis of pure science and that however much he became involved in State organised work the pure scientist must continue to be motivated 'as of old' by the pursuit of truth. It was pure science and the traditional truth-seeking values of pure science which ultimately guaranteed the possibility of solving the practical problems of the world.(59)

The presidential addresses of this decade then, in addition to their more strictly scientific aspects, served as a sort of public relations exercise, and one that was carried out with increasing deliberateness after 1927. The need for this had been emphasised by the Prince of Wales in 1926:

> In order that the community may fully realise all that it owes, and all that it might owe, to the advancement of science, the channels of communication between research and the public mind have to be kept clear, maintained and widened. ... The public support of scientific research ... should be accorded freely, with understanding, and with patience.(60)

The non-scientific community was reminded that its very existence, as well as its comforts, depended to a considerable extent on science and technology; it was reassured that scientific research was not a de-humanising process for the individual researcher nor was it destructive of spiritual values; it heard the suggestion that science, recently mobilised for total war, might in fact have a stabilising influence on international relations; and it was shown how State support for science had served the mutual interests of both. In all this the primary value of pure science was underlined. While the scientific community brought all these possibilities to society, it was not considered to bear any ethical responsibility for their use:

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59. B.A.R., (1930), 11-14.

60. B.A.R., (1926), 14-15.

science proposes, society disposes. Disquiet was voiced because the ethical standards of society - not of science - were inadequately geared to the rapidly changing environment generated by the growth of science and technology. The actual value of this growth was not seriously discussed, save for the purposes of assertion, nor was its effect on the structure of society deemed a matter for concern.

It was remarked by several contributors in the 1920 Nature controversy that one factor hindering the British Association's efforts to project an image of science to the public was the quality of the press coverage of its meetings. In 1921 the newspaper magnate E.W. Scripps had established Science Service - originally called 'Science News Service' - in America to provide authoritative syndicated articles on scientific matters to the press.[61] In 1926 the British Association collaborated with the British Science Guild in summoning a conference of major scientific societies to consider setting up a science news service in this country. The move eventually came to nothing,[62] but it is an interesting illustration of the Association's concern to build up a public opinion properly informed on science. Nature, though appreciative of 'the growing prestige of the Association', still felt that it was pandering too much to the specialist and failing to interest the public sufficiently in its affairs. An editorial by A.G. Church echoed the Prince of Wales:

> The public must be better informed if it is to appreciate to the full the need for more and more research. It will not willingly endow what it cannot understand. (63)

The public relations exercise in which the British Association became increasingly involved during the 1920s was necessary in order to create an atmosphere hospitable to the advancement of science. The more science came to depend on public support and the more hostile attitudes to various aspects of science manifested themselves, the more important it became to reassure the public that it was in its own interest to support science.

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61. Ronald C. Tobey, op. cit, chap. III.

62. B.A.R., (1926), xvi and (1927), xvi. The British Science Guild had apparently started a science news service in 1924 - Armytage, Gregory, pp.99-100 - but how long it lasted is not clear.

63. A.G. Church, 'The interpretation of science', Nature, 120, (8October 1927), 501-503.

There were in the nineteen-twenties two other organisations besides the British Association whose members were drawn from all scientific disciplines and which were intended to represent science as a whole to the non-scientific community. These were the British Science Guild and the National Union of Scientific Workers. (I exclude the Royal Society as its membership was highly selective and its public functions were very different from those of the British Association. Many Fellows, of course, played prominent parts in the affairs of the Association.) The British Association reached the end of the decade in a fairly vigorous state of health; what of the other two organisations?

The main sphere of the British Science Guild's activities during the twenties had been in the building up of a scientific lobby in Parliament.[64] Whatever slight success it may have achieved in this direction, the Guild itself was in a precarious situation by the end of the decade. Financial difficulties had forced it to cease publication of its Journal in 1927. Faced with a declining membership, its claim to speak for the scientific community was losing force and it began to question its own function and future.[65] Nevertheless, when the British Association made overtures towards a 'working union' between the two bodies in 1927,[66] its advances were spurned. The move foundered because Richard Gregory, on behalf of the Guild, insisted on regarding the issue as a merger between equals, with the joint organisation's new name to include the names of both constituent bodies. He was not prepared to see the Guild simply re-absorbed by the body whose recalcitrance had originally led to its foundation. This attitude led to 'stormy scenes' and nothing was achieved.[67] Gregory later blamed the General Committee of the

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64. There is, somewhat surprisingly, no history of the Guild. For its foundation, see chapter I, n.42 above. Some information on its later years may be gleaned from Armytage, Gregory and Kay MacLeod, A. Sc. W.

65. Kay MacLeod, A. Sc. W., p.300.

66. B. A. R., (1927), xvi.

67. P.G.H. Boswell, A narrative written for his wife, pp. 240-241. This is Boswell's autobiography, written for his wife (whom he married in 1939) during the 1940s. The unpublished typescript was deposited in the archives of Liverpool University by his wife on her death; it contains much fascinating information on the doings of the British Association. Hereafter cited as Boswell, A narrative.

British Association which, he said, 'was opposed on the grounds that the Association should concern itself with scientific work only, and not with the social consequences'.[68] The 1928 report of the British Association Council, however, stated clearly its approval of the conditions suggested by a joint Association/Guild committee on the union and added: 'Further action by the Council of the British Science Guild is now awaited.'[69] Such action was apparently not forthcoming and the Guild, losing momentum, soldiered on.

The National Union of Scientific Workers was also somewhat in the doldrums. Again, the year 1927 brought crisis: faced with the threat of bankruptcy, it was forced to suspend publication of The scientific worker. But its problems went deeper than finance. Its founders had had two objectives: a propaganda body for science and a trade union for scientists. In the wake of the popular reaction against unionism following the general strike of 1926, it was felt that the latter objective was a deterrent to potential members. The more respectable Institute of Professional Civil Servants and the Association of University Teachers had, anyway, creamed off between them government and academic scientists, leaving only industrial research scientists, who proved singularly difficult to organise. The logic of the situation was formal abandonment of trade union activities, which step was taken at the end of 1927; at the same time, the body changed its name to the Association of Scientific Workers. But its radical traditions served to deprive the Association of the gains it hoped to make from this move; any goodwill generated by the change of direction was quickly squandered by 'the indiscretions of certain prominent members, who advertised too openly their adherence to a school of politics that was known to be obnoxious to those whom it was sought to placate'. The second plank of the Association's platform, that of promoting the professional and political rather than the economic interest of scientists, was weakened by the lack of demand among scientists themselves for such a pressure group and by the fact that such demand as did exist

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68. Gregory, 'Science and social problems', Nature, 132, (28 October 1933), 654.

69. B.A.R., (1928), xlix.

was already being orchestrated by the British Science Guild and, to some extent, by the British Association.(70)

So, in the approved manner, the Association of Scientific Workers appointed a committee to examine its affairs. Disconcertingly, the committee reported in 1929 that 'we found it by no means easy to suggest any definitive purpose that the Association could serve.' As a representative body it had no future; as a propagandist body its best course would be amalgamation with the British Science Guild. The only course which could distinguish it from the Guild would be

> to seek to do for science and for the attitude towards the world in general that results from the practice of science, what the Fabian Society has done for Socialism or the Rationalistic [sic] Press Association for Free Thought.(71)

But the committee itself doubted that the Association could undertake such a programme, and at the time nothing came of it; later, from 1934 onwards, it was to be tackled by a revitalised Association of Scientific Workers.(72)

By the end of the nineteen-twenties, then, the British Association more or less had the field to itself. The 1920-1921 reforms had secured it a sound popular base and this had been maintained in succeeding years. Its prestige both within and without the scientific community was high. The corresponding growth in subscription income was not enough to compensate inflation, but this was offset by careful management and by a number of large donations, the most spectacular of which were £10,000 from Charles Parsons in 1921-22 and another £10,000 from Alfred Yarrow in 1926-27. Adequate funds and their competent husbanding are inescapably important: while the Journal of the British Science Guild and The Scientific Worker were forced, respectively, into oblivion and hibernation, the Report of the British Association was merely trimmed and continued to flourish.

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70. For example, the British Association protested to the Government about the omission of scientists from the Royal Commission on the Civil Service: B.A.R., (1930), xxiii. cf. F.A.A. Menzler, 'The Royal Commission on the Civil Service', Nature, 124, (12 October 1929), 565-567.

71. On the Rationalist Press Association, see Susan Budd, Varieties of unbelief: atheists and agnostics in English society 1850-1960 (Heinemann, 1977), chaps. VI-VIII.

72. Kay Macleod, A.Sc.W., chap. VI.

For this success the Association was indebted not only to its benefactors but also to the eminent economist Josiah Stamp.[73] As general treasurer of the Association from 1928 to 1935, he steered it through the gravest economic crisis in the nation's history. To his careful stewardship of its funds and his constant efforts to increase them must be attributed a share of the credit for the Association's continuing vitality.

By way of an aside, even the British Association had the occasional financial failure. To celebrate its centenary, the Council decided to launch an appeal with a target of £40,000, which sum would serve to cover the exceptional costs of the centenary meeting itself, enable the Association to pay a larger share of the local expense of future meetings and stabilise the fluctuating nature of its subscription income and its research grants.[74] It had been hoped that Josiah Stamp would be able to tap the resources of the City companies and of big business,[75] but the slump intervened and only £4,115 were donated, which fell £2,751 short of the special expenses of the centenary.[76]

Two other matters bearing on the Association's finances should be mentioned. One concerns its endowment of research through grants to the sectional research committees. In 1920 the Council recommended that such committees should where appropriate seek financial assistance from the Department of Scientific and Industrial Research, the Medical Research Board and 'other bodies entrusted with the distribution of public funds'.[77] This did not imply any slackening of the Association's commitment 'to give a stronger impulse and a more systematic direction to scientific enquiry', but was simply a practical move to take advantage of the new developments in State support for science. Following a detailed review of its finances in 1931-32, the Council put on record its opinion that 'the true function of the Association, in making grants to research

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73. 1880-1941. Educated privately and at London University. President of the L.M.S. Railway, 1926-1941; director of the Bank of England, 1928-1941; member of the Economic Advisory Council, 1930-1941; vice-chairman of the L.S.E., 1925-1935, and chairman, 1935-1941. Secretary of the Royal Statistical Society, 1920-1930, and president, 1930-1932. President of Section F, 1926; treasurer of the British Association, 1928-1935; president of the Association, 1936.

74. B.A.R., (1930), xxii.

75. Boswell, A narrative, p.209.

76. B.A.R., (1932), xxxiv-xxxv.

77. B.A.R., (1920), xiii.

committees, is the initiation of particular pieces of research rather than their quasi-permanent endowment.'[78] Again, this was a pragmatic statement about the Association's resources, not a disclaimer of its function as a promoter of research. In the event, the Association's grants for research averaged, in numerical terms, about the same during the twenties as in pre-war years (slightly over £1,000 p.a.) and rose a little during the thirties; in 'real' terms, the grants between the wars were about half their pre-war value.

The other matter was of more general concern. In 1925-1926 the British Association, in common with many other societies, lost its charitable exemption from tax on investment income. Its Council took issue with the Financial Secretary of the Treasury and with the Inland Revenue; fought test cases on behalf of two societies in the courts; lost them and lost the appeals as well. It transpired, however, that the test cases could not be regarded as universally applicable, since the charitable status of a scientific society hinged on whether its main objective was to further science or to benefit its own members, and had therefore to be determined separately in each individual instance. Under this ruling the Association was able, from 1928-1929, once more to claim charitable status for income tax purposes - which, in the year 1929-1930, brought in nearly £400. The Royal Society, whose status was not challenged, held aloof from the whole affair; the British Association, greatly helped by the expertise of Josiah Stamp, not only fought its own case but also put its experience and influence at the disposal of many other societies similarly affected. It was a signal service to the scientific community.[79]

To dwell thus on the Association's finances serves to illustrate the importance of such matters to the well-being of any large organisation, which was never more evident than at the time of the world depression. The Council's appreciation of this may be crudely indicated by the fact that the treasurer's report occupied two pages of

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78. B.A.R., (1932), xxiii.

79. B.A.R., (1925), xvi; (1926), xvi-xvii; (1927), xvi; (1928), xlv; and (1929), xix. See also J.L.Myres, Praeterita (n.25 above), chap. XIII, p.6.

the *Annual Report* in 1920, nine pages in 1930 and fifteen pages in 1938; and references to finance in the Council's report were constantly increasing. The fact that the British Association had a sufficiently general appeal and loyal following to maintain itself in credit meant that it entered the nineteen-thirties in a far healthier state than the British Science Guild or the Association of Scientific Workers.

Chapter III

1931-1932 : The rôle of science in society

The centenary meeting of the British Association was held in London in September 1931. True in both literal and metaphorical senses to its promise disclaiming any 'interference with the ground occupied by other institutions', the Assocation had never before assembled in the metropolis : the practicalities of the 1931 meeting left it no alternative. As a diplomatic exercise, the president and officers of the Association spent the weekend in York, the city which first gave the Association hospitality and which had made strong representations to be allowed to stage the centenary meeting.(1) The centenary was a tremendous affair : with a total attendance over 5,700 it must qualify as one of the greatest scientific jamborees ever held. Many distinguished foreign scientists participated including, appropriately enough, a good number from the Dominions. As befits an organisation claiming the Empire for its stumping ground, it chose General J.C. Smuts, ex-premier of the Union of South Africa, for its president and devoted a considerable part of the programme to imperial affairs.

Smuts discussed two aspects of the public image of science and its non-material contributions to social affairs. In his inaugural speech he referred to the supra-national qualities of scientific activity : the objective pursuit of truth stood above the squalid rancour of nationalism and could therefore serve to unite a politically divided world. 'Science', he proclaimed,

> knows no political boundaries. More and more it is becoming a collective collaboration among the scientific workers of all nations for the common good of mankind. ... And it is destined, perhaps more than any other form of human activity, to draw the nations together, to reconstitute their broken unity, and to give form and substance to that ideal of mankind as one human family, which science itself has done most to reveal as a fact.(2)

Thomas Holland had earlier suggested that technical advances underlined the interdependence of nations and thus weakened the forces of

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1. See B.A.R., (1929), xvii. By way of compensation, the 1932 meeting was held in York and the sesquicentenary (1981) will also take place there.

2. B.A.R., (1931), xviii.

economic nationalism which threatened world peace. (see p. 41 above.) Smuts' approach was complementary to this : the existence of a large body of men drawn from all countries cooperating in an intellectual endeavour whose fruits would benefit all mankind was a parable of the oneness of the human race. By teaching this parable and enacting it in their daily lives, scientists could make a major contribution to global harmony.

In view of the widespread currency which this idea, and its corollary, that scientific internationalism was the gateway to political internationalism, gained during the nineteen-thirties, it is interesting to glance quickly at the previous decade. At the end of the First World War there was a concerted movement to ostracise Germany from the international scientific community. This movement did not abate until after 1925 and then only slowly. It went hand in hand with the desire to cripple Germany economically and militarily, and its decline followed rather than led the softening of political attitudes. Nature fully endorsed the movement.(3) The British Association also joined in : German scientists admitted before the war as corresponding members were 'temporarily suspended' from membership. Despite representations from the physics and chemistry Sections, the Council refused leave to invite Germans to the 1925 meeting; only in 1926, and then not unanimously, did it revoke its ban.(4) Such discordances were conveniently disregarded in the desire to project a more idealistic view of science.(5)

In his presidential address J. C. Smuts gave further illustrations of the enlightenment which science could bring to human understanding and social conduct. To begin with, he stressed as Bragg had before him that science was consonant with the highest human aspirations : 'in its selfless pursuit of truth' it 'ranks with art and religion'.

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3. Gary Werskey, 'The perennial dilemma of science policy', Nature, 233, (1971), 529-532, esp. p. 531. Hereafter cited as Werskey, 'Perennial dilemma'.

4. B. A. R., (1925), xvi and (1926), xiv.

5. For critical discussions of scientific internationalism, see Brigitte Schroeder-Gudehus, 'Challenge to transnational loyalties : international scientific organisations after the First World War', Sci. Stud., 3, (1973), 93-118 and Jean-Jacques Salomon, 'The internationale of science', ibid., 1, (1971), 23-42. The former article gives a detailed account of the German boycott.

He went further : 'Indeed, it may fairly be said that science is perhaps the clearest revelation of God to our age. Science is at last coming into its own as one of the supreme goods of the human race.' While science, art and religion remained rigidly segregated, the disequilibrium between scientific and ethical progress which so worried the Bishop of Ripon would persist. Smuts' prescription was that rather than wait for ethics to catch up, as it were, it was necessary that men should break out of their compartmentalised ways of thought and 'link up science with ethical values' :

> Science must itself help to close this dangerous gap in our advance which threatens the disruption of our civilisation and the decay of our species. Its final and perhaps most difficult task may be found just here. Science may be destined to become the most effective drive towards ethical values, and in that way to render its most priceless human service.(6)

Taking a very altruistic view of science, then, Smuts presented his audience with a vivid picture of what it had to teach society. He gave no indication as to what was involved in the linking up of science with ethical values, but that is perhaps less significant than the fact that he thought they both could and should be linked up, and that scientists should take the lead in this process. What is also significant is that he unhesitatingly implied that the ethical deficiencies were located entirely in 'society' rather than in 'science' : science itself was 'one of the supreme goods', beyond criticism. Such confidence was not uniformly displayed by his successors during the nineteen-thirties.

In its commentary on this meeting, Nature concentrated on the theme of interpreting science to the public. The exclusion of scientists from positions of administrative power was due, it suggested, both to popular prejudice and to their own apathy. These factors were largely responsible for the 'ethical gap', the bridging of which demanded a great effort in 'educating the community as to the value of the contribution of science to the progress and well-being of society' and in convincing scientists that such a task was in keeping with their professional vocation and eminently worth their while. Opportunities for putting these ideas across to both scientists and non-scientists were few; the annual meeting of the British Association was the best; and by 'its attention to the human values of science' the Association could render its greatest service to the community. In the context of overcoming

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6. B.A.R., (1931), 13.

popular prejudice the leader writer, Rainald Brightman,[7] pointed out how much would be lost by a ten-year moratorium on research and, in an oft-repeated catch-phrase, argued that 'what is required is not less research but more wisely and widely directed research.' Science would be linked with ethical values by a shift of emphasis from the physical sciences to the biological and social sciences, from whose development would emerge a scientific resolution of social problems.. Science could serve society by example, certainly, but also by bringing social problems to the impartial bar of scientific analysis. Most if not all social problems were susceptible to 'scientific' - i.e. rationalistic - treatment, according to Gregory and Brightman : society had therefore to learn to trust the scientist, and the scientist had in turn to be 'directed' to the study of society.[8]

There was thus pressure on the British Association as the new decade opened to place greater emphasis on its function as popular interpreter of science. Within the Association the talk was of the ethical gap, inspired by the need to defend science against such misgivings as those articulated by the Bishop of Ripon in 1927. The defence, like the attack, was conducted at a high degree of generality. Scientific research was a spiritually uplifting experience; the universal brotherhood of science gave hope for the universal brotherhood of man; in the linking up of science with art and religion lay the key to improved social ethics. While all this was grist to Nature's mill, the journal added to the issue the perspective indicated in the 'third view' of the 1920 debate over the functions of the Association.[9] The Association should serve the community, it urged, not simply by disseminating the mores of science but also by bringing the forces of scientific rationality to bear on the study of society and on the running of industry and the civil service.

Three months before the centenary meeting a new perspective had been injected into the discussion about the duty to society of organised

7. d.1968. Worked as a librarian with I.C.I. Wrote one third of the editorials in Nature during the 1930s. He shared Gregory's scientific rationalism to such an extent that his editorials may be taken as voicing Gregory's opinions. See Gary Werskey, 'Nature and politics between the wars', Nature, 224, (1969), 462-472 - hereafter cited as Werskey, 'Nature and politics' - and the obituary notice in Nature, 217, (1968), 794.

8. Brightman, 'Science and humanity', Nature, 128, (26 September 1931), 505-508; idem., 'Exposition and authority', Nature, 129, (30 January 1932), 145-147.

9. cf. chapter II, pp. 28-32 above.

science which, for a small number of enthusiasts, revolutionised their outlook and gave the issue a position of central importance. The occasion was the Second International Congress of the History of Science and Technology.[10] It is remembered today chiefly for the fact that a delegation from the Soviet Union seized the opportunity to present a sustained account of the marxist interpretation of science, apparently for the first time in England. From the marxist angle the issue was not simply that science could give society a moral lead and that a greater concern of scientists with social affairs was desirable; rather, all scientific activity was intimately determined by social and economic forces and inseparable from them. Only in a society organised along certain lines - specifically, those of marxism-leninism - could science flourish; conversely, in such a society science and scientists enjoyed pre-eminent status. This perspective was elaborated by accounts of the exalted rôle of science in post-revolutionary Russia and, historically, by Boris Hessen's famous paper, 'The social and economic roots of Newton's Principia'.[11]

The Russian delegation exerted a decisive influence on the small number of scientists already more or less vaguely sympathetic to marxism, prominent among whom were J.D. Bernal,[12] J.B.S. Haldane,[13]

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10. N.I. Bukharin et al., Science at the crossroads (Kniga, 1931), reprinted, with an introduction by Gary Werskey, by Cass & Co in 1971, and references to other accounts in Werskey's introductory essay.

11. Hessen's paper was answered by G.N. Clark, Science and social welfare in the age of Newton (Clarendon Press, 1937).

12. 1901-1971. Educated at Stonyhurst and Emmanuel College, Cambridge. Lecturer (1927-34) and director of research (1934-37) in crystallography at Cambridge. Professor of physics at Birkbeck College, London, 1938-1963. F.R.S., 1937. Joined the C.P.G.B. in 1923. Stalin Peace Prize, 1953. President of the World Peace Council, 1958-1965. President of the A.Sc.W., 1948-1949. Member of the British Association Council, 1946-1949.

13. 1892-1964. Educated at Eton and New College, Oxford. Reader in biochemistry at Cambridge, 1922-1932; professor of genetics at London, 1933-1937; professor of biometry at London 1937-1957. Research professor of the Indian Statistical Institute, 1957-1964. Took Indian citizenship shortly before his death. F.R.S., 1932. Member of the C.P.G.B.; chairman of the editorial board of the Daily Worker, 1940-1949. - The Times, 2 December 1964, p.13.

Lancelot Hogben,[14] Hyman Levy[15] and Joseph Needham.[16] These men[17] were presented not only with a completely new view of the importance and the methodology of the history of science but also, and more significantly, with a fundamentally different approach to the relations between science and society, which were now seen to be inescapably bound up with political attitudes. As Hyman Levy put it some years later :

> What became clear [at the Congress] was not only the social conditioning of science and the vital need for planning ... but the impossibility of carrying this through within the framework of a chaotic capitalism. (18)

On the great majority, however, the marxists made virtually no impact : their message was too far removed from current ideas to be seriously considered.[19] Some authors have suggested that this

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14. 1895-1975. Won a county school scholarship to Trinity College, Cambridge. Imprisoned as a conscientious objector during the First World War. Lecturer in zoology at Imperial College, 1919-1922 ; lecturer in experimental physiology at Edinburgh, 1923-1925 ; assistant professor of zoology at McGill, 1925-1927 ; professor of zoology at Cape Town, 1927-1930 ; professor of social biology at London, 1930-1937 ; professor of natural history at Aberdeen, 1937-1941 ; professor of zoology at Birmingham, 1941-1947 ; professor of medical statistics at Birmingham, 1947-1961 ; vice-chancellor of Guyana University, 1963-1965, F.R.S., 1936. - The Times, 23 August 1975, p.14; 27 August 1975, p.12; 1 September 1975, p.12.

15. 1889-1975. Educated at George Heriot's school, Edinburgh and Edinburgh, Oxford and Göttingen Universities. Worked at the N.P.L., 1916-1920 ; assistant professor of mathematics at the Royal College of Science, 1920-1923 ; professor of mathematics at Imperial College, 1923-1954. Joined the C.P.G.B. in reaction to Hitler's treatment of Jews;left in 1958 after discovering the persecution of Jews in Russia. - The Times, 1 March 1975, p.14.

16. b.1900. Educated at Oundle and Gonville and Caius College, Cambridge. University demonstrator in biochemistry, 1928-33; reader, 1933-1966. F.R.S., 1941. Fellow of Gonville and Caius, 1924-1966, and Master, 1966-1976. Author of the monumental Science and civilisation in China. Felt that his commitment to the Anglican Church debarred him from membership of the C.P.G.B., and remained on the left wing of the Labour Party.

17. Bernal, Haldane, Hogben, Levy and Needham are the principal characters investigated by Gary Werskey in his The Visible College : A study of left-wing scientists in Britain, 1918-1939 (Ph.D. thesis, Harvard, 1972) - hereafter cited as Werskey, Visible College - which contains much biographical information.

18. Hyman Levy, Modern science (Hamish Hamilton, 1939), p.97.

19. See eg. a paper by Bernal in The Spectator for July 1931, reprinted in J.D. Bernal, The freedom of necessity (Routledge & Kegan Paul, 1949), pp.334-339.

Congress was the starting-point for the 'social relations of science movement'.[20] This is unduly flattering to the Russian delegation[21]; as will be seen in the following pages, there were other and more influential sources of motivation for the movement, which, indeed, was a markedly heterogeneous affair.[22] Nevertheless the Congress was a pivotal event in the thinking of those just mentioned and the marxist view of science was to gain widespread currency, if little critical understanding,[23] through their prodigious output of lectures, articles and books during the nineteen-thirties.

The 1932 York meeting of the British Association was the scene of an instructive and vehement clash of views on the influence which science had had and should have on society. One important development from previous discussions should be noted at the outset. When Smuts spoke of the gap between scientific and ethical progress, he illustrated its danger by reference to war: mankind was ethically ill-equipped to live with the magnitude of potential destructiveness which scientific and technological advance had brought into being. This was regarded as a critique of society rather than of science. In 1932, however, the focus of attention had shifted to unemployment. Although unemployment had passed the two million mark two full years before the York meeting, its rise, while abating, was still continuing and the peak figure of 2,955,000 was not reached until January 1933.[24] As the social effects of these appalling statistics became evident, the

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20. eg. John R. Baker, Science and the planned State. (Allen & Unwin 1945), p.61; John R. Baker & A.G. Tansley, 'The course of the controversy on freedom in science', Nature, 158, (1946), 574-576; Wood, Communism, pp.123-125.

21. Nature, for example, was not impressed by the Russians : see Thomas Greenwood's account of the Congress in Nature, 128, (11 July 1931), 77-79 and N.I. Bukharin, op. cit. (n.10 above), p.xxii.

22. See Gary Werskey, 'British scientists and "outsider" politics, 1931-1945', Sci. Stud., 1, (1971), 67-83 - hereafter cited as Werskey, 'Outsider politics'. This paper is lifted from chap. VI C of Werskey, Visible College and is reprinted in Barry Barnes, ed., Sociology of science (Penguin, 1972), pp.231-250. I shall discuss Werskey's analysis of the 'movement' in detail in chapter V below.

23. Wood, Communism, pp.136-137.

24. C.L. Mowat, Britain between the wars, 1918-1940 (Methuen, 1955; University Paperback, 1968), p.432. Hereafter cited as Mowat, Britain.

accusing finger was pointed at the scientific community : 'technological unemployment' was a problem for both science and society and could not easily be shrugged off as none of science's business. The advocates of science had justified their subject on the grounds (among others) of its technical applications for too long and with too much success not to be affected when the public identified these applications as a major source of unemployment and its concomitant hardship. It is perhaps significant that at York the running was made by the engineers, the sector of the scientific community most clearly implicated in technological unemployment.

Alfred Ewing,[25] wheeled out at the age of seventy-seven to serve as president (he alluded apologetically to 'the unwelcome distinction of being the oldest President the Association has ever suffered'[26]), devoted most of his address to a panegyric on the achievements of science in general and engineering in particular - with such warmth, indeed, as to suggest that there were some who had doubts on the matter. But just before the end he faltered, his enthusiasm for his subject tempered by the realisation that its fruits were not an unmixed blessing. The development of science-based technology had given birth, assisted by Henry Ford, to methods of mass-production which in turn had 'in great measure deprived [man] of one inestimable blessing, the necessity of toil'[27]; it had destroyed 'the joy of craftmanship'; it had led to unemployment 'more saddening than any drudgery'; and it had generated an amount of leisure for which man seemed ethically unprepared. This last particularly vexed Ewing ; the spiritual value of honest toil had been sacrificed to the machine, and the shortened working day - not to mention the non-existent working day for nearly three million men - seemed to invite the attentions of the traditional employer of idle hands. Only by an act of faith that man's

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25. 1855-1935. Educated at Dundee High School and Edinburgh University. Professor of mechanical engineering at Tokyo, 1878-1883 ; professor of engineering at Dundee, 1883-1890 ; professor of mechanism and applied mechanics at Cambridge, 1890-1903 ; director of naval education, 1903-1916 ; principal and vice-chancellor of Edinburgh, 1916-1929. F.R.S., 1887. President of Section G, 1906 and 1931 ; president of the British Association, 1932. See his autobiographical An engineer's outlook (Methuen, 1933) and Nature, 135, (1935),137-140.

26. B.A.R., (1932), 5. Edward Poulton, president of the Association in 1937, beat Ewing's record by four years.

27. Ewing had mentioned this problem in his presidential address to Section G the previous year : B.A.R., (1931), 140.

spiritual qualities would develop in proportion to his needs could Ewing avoid the pessimistic conclusions to which his thoughts pointed :

> Where shall we look for a remedy? I cannot tell. ... Dare [man] hope for such spiritual betterment as will qualify him to use [leisure] well? God grant he may strive for that and attain it. ... I cannot think that man is destined to atrophy and cease through cultivating what after all is one of his most God-like faculties, the creative ingenuity of the engineer. (28)

Ewing's frank discussion of the difficulties generated by the development of science and technology so impressed the local worthies that a group of them, headed by Arnold Rowntree, Sheriff of York, asked him to make a public statement which 'should serve as an "apologia" for the life scientific, and a guide for general public action'. He consulted his colleagues and 'much desultory discussion' ensued; but eventually he decided that he could not produce anything suitable and nothing came of it.(29) The episode does show, however, that an element of diffidence on the part of scientists was appreciated by the non-scientific community.

Nature contrived to carry a leader which went over much the same ground as Ewing without once mentioning his name.(30) Its author, Rainald Brightman, was more certain than Ewing that the difficulties posed by the spread of mechanisation were the fault of society and not of mechanisation. 'It is useless', he explained, 'for the scientific worker to provide the greater productive powers ... unless society has an economic and social organisation ... capable of understanding their use.' Particularly open to criticism were the spheres of commerce and distribution, 'a world of crude empiricism, secrecy, and mystification into which scientific method or principles have yet to permeate'. The way forward lay in the application of the scientific mind to these problems of social organisation. Although he referred, with startling self-assurance, to 'the steady rise in the ethical standards of the industrial community wherever

28. B.A.R., (1932), 16-19. See also Crowther, Social relations, pp.619-620 and J.D.Bernal, The social function of science (Routledge, 1939), pp.7-9.

29. Boswell, A narrative, p.210. See also Council minutes, 4 November 1932.

30. Brightman, 'The contribution of science to the future', Nature, 130, (3 September 1932), 325-327.

science has influenced its activities', Brightman conceded that scientific rationality could not of itself ensure the rightful use of new discoveries and inventions, unless combined with 'a sense of values, a moral purpose, and a vision of order and beauty'. But in such combination he was confident, with Smuts, that 'science may be destined to become the most effective drive towards ethical values.' Under the impact of this drive leisure would cease to be a problem.

If Brightman spoke more positively than Ewing of the rôle of science in social affairs, his views were mild in comparison with those of Miles Walker,(31) professor of electrical engineering at Manchester. Walker's presidential address to Section G(32) must have disconcerted many of his hearers. He began by singing the praises of electrical engineering and, by implication, of the intellectual and moral qualities of the electrical engineer. He then went on to describe the paralysing effect on social progress of the profiteering middle-man and the incompetent administrator. The obvious way to eliminate the wastefulness and inefficiency wrecking society was to call in those whose professional expertise was the epitome of efficiency :

> The kind of mental training required to find the right solution of a difficult economic problem is exactly the same as the kind of training required to tackle engineering problems. ... [Politicians] are not engineeringly minded, and that is the reason why they make a failure of state management. ...
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> Things will never be better as long as they are controlled by people who are not engineeringly minded. (33)

Being an engineer, Walker was not content to throw out generalisations about how the country should be run : he wanted to prove by experiment the feasibility and efficacy of an engineeringly minded social organisation :

> I suggest that the engineers and economists of this

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31. 1868-1941. Educated at Finsbury Technical College. Practised as a lawyer before studying science at St. John's College, Cambridge. Worked as an engineer for the British Westinghouse Company (later Metropolitan-Vickers). Professor of electrical engineering at Manchester, 1912-1932. F.R.S., 1931. President of Section G, 1932.

32. B.A.R., (1932), 131-146; cf. Crowther, Social relations, pp.620-621.

33. B.A.R., (1932), 139, 142. Walker explained that he was using the word 'engineering' as a shorthand for all scientific activity.

> association should urge upon the Government the necessity of organising a wealth-producing community in which the voluntary work of thousands of young men might be directed to making things for themselves. (34)

This community would be

> an experimental, voluntary, self-supporting colony under the auspices of engineers, scientists and economists. The object in view would be to ascertain how far it is possible with our present knowledge and the best methods of manufacture and distribution for a group of say 100,000 persons to maintain themselves and continually to increase their wealth when freed from the constraints and social errors of modern civilisation. (35)

Once the prototype was functioning efficiently, 'the region under sane control would be extended until it gradually embraced the whole world.' (36)

The contrast between these two addresses is striking, to say the least. Ewing felt that the crisis of unemployment raised ethical problems not only for society but also, to some extent anyway, for science, especially applied science. Mechanisation had not solved the material problems of mankind, or only in very unequal degree, and it had cheapened the value of skilled craftsmanship, removed from many the opportunity to work at all, and left men with more leisure than they seemed spiritually equipped to handle. Even if the other problems were resolved, this last would remain. Ewing would not accept the Bishop of Ripon's approach and in the absence of a positive alternate could only hope that somehow the devil would not provide too much work for hands made idle by engineering. But Walker saw only the other issues, and he saw in them a challenge for the engineer. He located the crisis not in the production of wealth - that was the engineer's pigeon - but in the inefficiencies of its distribution, for which 'unscientific' organisation was to blame. The problem, for Walker, was one of management, not of ethics, and its solution was evident: engineers - by definition efficient - should take the lead in showing how to run the country.

Walker's address was a sustained eulogy of the logical, efficient, systematic qualities of the 'engineeringly minded' and a forceful argument that these virtues were the necessary and sufficient criteria for the solution of social problems, particularly, in 1932, that of unemployment. It was the doctrine of scientific rationalism carried to its

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34. ibid., p.144.
35. ibid., p.145.
36. ibid., p.143.

logical conclusion - but without the redeeming features of Gregory's 'spirit and service of science'. Brightman found himself reminding Walker that cold-blooded rationalism was not enough : 'We need the moral rectitude of a Joseph, as well as his economic prudence, in planning under the conditions of today.'[37] The engineering world as a whole - if the leader columns of Engineering and The Engineer may be taken as representative - felt that Walker had given a false analysis of the situation based on a caricature of homo engineerens. The former journal doubted whether 'engineers and scientists are so different from the rest of mankind as he suggests', asserting to the contrary that they 'are much like other people, full of prejudices and preconceived notions'.[38] The latter roundly declared : 'Professor Walker is out of sympathy with those traits and weaknesses that give the charm and character to human existence.'[39] Criticism came also from the left wing : P.M.S. Blackett,[40] in a talk broadcast in March 1934, poured scorn on the thesis that social crises were caused by the ineptness of politicians and could be resolved by the ministrations of objective scientists.[41] Nor did Walker meet with much sympathy from the national press. The Manchester Guardian, in a leader entitled 'A Brave New World?', gently derided 'his delectable address' which 'would delight the heart of Mr. Wells',[42] while The Times described his ideas as 'scientific Fascism' and wondered darkly :

> Who is to select the political principles and practices to be forced on the people by the greater driving power of science? Is there any reason to suppose that scientific

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37. Brightman, 'Science in social problems', Nature, 130, (17 September 1932), 414, quoting from a speech by Josiah Stamp to Section M.

38. Engineering, 134, (9 September 1932), 303.

39. The Engineer, 154, (9 September 1932), 259.

40. 1897-1974. Educated at the Royal Naval College and, after the war, at Magdalene College, Cambridge. Worked under Rutherford, 1923-1933. Professor of physics at Birkbeck College, 1933-1937; at Manchester, 1937-1953; and at Imperial College, 1953-1965. Nobel Prize for Physics, 1948, for work with the Wilson cloud chamber, especially on cosmic rays. F.R.S., 1933; P.R.S., 1965-1970. C.H., 1965. O.M., 1967. Life Peer, 1969. Sympathetic to communism though not a member of the C.P.G.B.

41. The talk was later published in Daniel Hall et al., The frustration of science (George Allen & Unwin, 1935), pp.129-144. See esp. pp.132-135.

42. Manchester Guardian, 3 September 1932, p.10. Aldous Huxley's Brave new World was published at the beginning of 1932.

men would judge better than others of moral and emotional values ? (43)

This invigorating start to Section G's morning session was maintained in a paper by A. P. M. Fleming, (44) an industrial colleague of Walker's, in which by way of commenting on Walker's address he gave 'An engineer's review of the Soviet enterprise'. (45) Fleming observed that 'the tendency during the past few years has been to view the Soviet enterprise much in the light of what each individual thinker hopes may happen to it, and for the most part hopes have been concentrated on its failure.' It might, however, be more profitable to look at it more objectively, to discover whether it contained any lessons for the rest of the world. By explicitly, if disingenuously, ignoring its political aspects, Fleming could define the enterprise as the achieving of 'a state of well-being hitherto unattained by the people of Soviet Russia, through the carrying out of plans that are essentially based on engineering conceptions and carried out by engineers'. By discarding all those features of the Soviet Union which made it different from Walker's experimental colony, Fleming could present it as an example of such a colony and thus assess the efficacy of rationalism in practice. The crucial element, he noted, was the planning of both production and consumption, and most of his paper was given over to a discussion of the first (1928-1932) and second (1933-1937) five year plans. These, he said, were 'only large-scale organisation'. Whatever discomforts the Soviet Union had to endure as its road to industrialisation, it seemed clear that 'science adequately employed can accomplish all the industrial problems that the U.S.S.R. has set itself to solve.'. One of the most significant advantages of Russia was its self-sufficiency in raw materials; the British Empire taken as a whole was similarly endowed 'and here again, the problem is one of large-scale organisation not beyond the capacity of those engineeringly minded.' Fleming did, however, remark that in Russia planning was not restricted to the industrial sphere but embraced the entire educational system and was accompanied by an 'extraordinary amount of propaganda' and 'the

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43. The Times, 8 September 1932, p.11.

44. 1881-1960. Educated at the Finsbury Technical College. Joined the British Westinghouse Company with Miles Walker (q.v.) in 1900, becoming director of research and education from 1931 till his retirement in 1954. President of the Institute of Electrical Engineers, 1938. President of Section L, 1939, and of Section G, 1949.

45. The paper and the ensuing discussion were fully reported in both the above-mentioned engineering journals; quotations have been taken from the version in Engineering, 134, (9 September 1932), 308-310, unless otherwise indicated.

prevention of free contact by the bulk of the population with foreign countries'.

During the thirties many British intellectuals, Fleming among them, made trips to the Soviet Union and on their return spoke or wrote of their experiences.(46) A good number of them were scientists who were not necessarily left wing but who, like Fleming, were prepared to suspend their criticism of the grosser aspects of the situation in favour of sympathy for a people making enormous sacrifices to unite and modernise their vast, industrially backward country. Their hosts took care that they should be impressed by the great importance attached to science, which contrasted with their experience at home; the Soviet delegation to the 1931 International Congress had given them an idea of how much science was valued by the marxist regime and what they were shown reinforced this, as did the writings of Bernal and his colleagues. Particularly after 1931, some scientists began to cast envious looks at the prestige which their Soviet counterparts apparently enjoyed. As Neal Wood puts it:

> The communist emphasis upon control and manipulation, and upon the idea of a scientific society in which scientists would play a leading role, touched the Achilles heel of the nihilistic scientist. In a world in which science alone seemed to know what it was about, communism held the hope that the rule of the scientist-king might become more than a dream.(47)

In the brief discussion which followed Fleming's paper, opinions varied from warm approbation for the ideal of eliminating private gain through anxiety over the maintenance of scientific originality to outright scepticism:

> If things were so successful in Russia, why was the country closed to all except those who were taken to see what the Russian Government wished them to see. (48)

Other voices were also raised in protest. The Engineering leader-writer, for example, was highly suspicious of 'the ultimate intentions of the rulers of Russia and the deplorable nature of some of their methods'. He further raised the question of whether individual imagination and incentive - essential factors in scientific progress - could survive if, as in the Soviet Union, the scientist and engineer became a 'glorified civil servant' with no outside competition: 'It has yet to be demonstrated that it is possible to invent a constitution of society which, while eliminating

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46. A fairly typical example of this literary genre is Julian Huxley, A scientist among the Soviets (Chatto & Windus, 1932).

47. Wood, Communism, pp. 150-151.

48. R. MacGregor, quoted in The Engineer, 154, (9 September 1932), 253.

private gain, will not at the same time eliminate private incentive.'[49] And a correspondent in the Manchester Guardian observed that Russia, which had implemented certain of Walker's ideas, was run by 'the very people for whom Professor Walker has such contempt - politicians and agitators of the deepest dye'.[50]

Out of this - by British Association standards - most unusual morning's work emerged a resolution. It was, not surprisingly, a good way short of Walker's original proposal. Instead, it observed that

> the present economic position of Great Britain calls for far closer co-operation between the scientific community and the Government. Further ... as a possible means to this end ... the Government should invite the leading scientific institutions and societies to appoint representatives to co-operate with it to formulate plans for dealing with the present pressing problems facing the country.[51]

In this form it managed to secure the support of a majority, only, of the committee of Section G. Before passing it on to the Committee of Recommendations - a body which vetted proposals before they were offered to the General Committee for approval and onward transmission to the Council of the Association - the committees of other Sections were asked to back it. The available minute books of seven Sections other than G refer to the matter : two - C and, with reservations, H - decided to support the resolution and five - D, F, J, K and L - rejected it, with comments ranging from 'too vague to be useful' (Section L) to 'prejudicial to the prestige of the Association' (Section F). Despite vigorous canvassing[52] by Gregory and Ritchie Calder,[53] the resolution was defeated in the Committee of Recommendations by a large majority and did not therefore come before the Council.[54]

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49. Engineering, 134, (9 September 1932), 303-304.
50. S.J.Gregg in the Manchester Guardian, 9 September 1932, p.16.
51. Committee of Recommendations minute book, 6 September 1932.
52. Armytage, Gregory, pp.115-116.
53. b.1906. Educated at Forfar Academy. Author, scientific, social and political journalist, and broadcaster. Daily Herald, 1930-1941. Science editor, News Chronicle, 1945-1956; editorial staff, New Statesman, 1945-1958. Professor of International Relations at Edinburgh, 1961-1967. Much work for the U.N., especially with F.A.O., U.N.E.S.C.O. and W.H.O. Life Peer, 1966. President of Section X, 1955.
54. The Times, 8 September 1932, p.6. Armytage, Gregory, p.116, writes : 'The resolution was enthusiastically endorsed (cont.over)

Given the traditionally apolitical ethos of the British Association, it is reasonable to wonder why Walker & co. chose the Association as the medium in which to float their ideas. The answer would seem to be <u>faute de mieux</u>. In the summer of 1932 the British Association was easily the largest and the most active scientific organisation in which as untechnical an address as Walker's could be delivered, and it had the added advantage of guaranteed publicity in both scientific and lay circles. When the scientists assembled in York rejected Walker's technocracy, the rationalists could at least draw some consolation from the fact that 'the responsibility of the man of science in these matters has been publicly admitted before such a representative gathering' and at the same time encourage themselves by observing :

> The representation at the British Association meetings is still largely academic, and it may be hoped that, as the industrial element in the attendance increases, the interest in the social consequences of scientific discoveries may grow stronger.(55)

Brightman was implying in these two quotations that the issue of social responsibility was evident primarily in industry - because of 'technological unemployment' - and that academic scientists were not as yet interested. What grounds he had for thinking that the industrial element in the attendance at British Association meetings was going to increase is unclear : chiefly, one may suspect, optimism. The point was, moreover, irrelevant since, Brightman's analysis notwithstanding, the social relations of science movement involved principally academic scientists, governmental and industrial scientists being conspicuously absent.(56) Meanwhile, Brightman expressed the hope that the British Science Guild 'may be induced to make some definite proposals for bringing scientific work and thought to bear upon social problems'.(57)

An attempt to do just that had, in fact, already been made, though not by the British Science Guild. It took the form of the Committee

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54. (contd) by the engineering, economics and educational sections ... [but] was defeated, largely by the 'ologist' groups.' This is fairly typical of Armytage's sweeping style : it is also almost the exact opposite of what the sectional minute books tell.

55. Brightman, 'Science in social problems', <u>Nature</u>, <u>130</u>, (17 September 1932), 415, 414.

56. Werskey, 'Outsider politics', p.71.

57. Brightman, 'Science in social problems', <u>Nature</u>, <u>130</u>, (17 September 1932), 414.

of Civil Research, which was established in June 1925 through the efforts of Lord Haldane, Lord Chancellor in MacDonald's 1924 Government, and Lord Balfour, his successor under Baldwin. This body was in some respects analogous to the Consultative Committee of the Board of Education (created by the Board of Education Act, 1899), being a pool of expertise, in this case economic and scientific, to which specific problems could be referred. Like the Consultative Committee, it had neither executive authority nor the power to initiate its own investigations. In the event nearly all its work was concerned with imperial rather than domestic problems. Its significance lay in the fact that it was directly responsible to the prime minister so that scientific advice was available at the highest level; but it proved unable either to coordinate the research activities of the various government departments or effectively to bring scientific issues to the attention of Parliament. By May 1930 the scientific branch of the Committee of Civil Research had been overshadowed in importance by the economic branch, and the Committee was reconstituted as Economic Advisory Committee.(58)

Now Richard Gregory was both editor of Nature and chairman of the executive committee of the British Science Guild, so Brightman's above-quoted remark was clearly no idle comment. If the British Association would not countenance an organised, systematic involvement of science in State problems, the Guild was the obvious body to try : it would, at least, prove more amenable to the rationalist view of the rôle of science in social affairs, and it had acquired fairly considerable experience in parliamentary lobbying. Furthermore, involvement in such a scheme could serve to revitalise the Guild which, as already mentioned, seemed to have lost its sense of purpose. So Gregory began to put new life into it.

He also turned to the Association of Scientific Workers, and in so doing proved to be the catalyst of its reanimation. Reanimating it certainly needed : it reached its nadir in October 1932 when only five branches, themselves to all intents and purposes dormant, sent delegates to the annual Council meeting. At this time its overriding concern was to placate its creditors, as B. W. Holman, who succeeded

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58. Roy MacLeod & Kay Andrews, 'The Committee of Civil Research : scientific advice for economic development, 1925-1930', Minerva, 7, (1969), 680-705.

A.G. Church as secretary of the Association in June 1931,[59] had on several occasions to remind his colleagues. Nevertheless, Holman was anxious to help Gregory in his efforts to involve science at parliamentary level; indeed, his faith in his Association was largely inspired by the hope that it would participate in Gregory's campaign. Already in 1929 the Association of Scientific Workers had established its own Parliamentary Science Committee, a step hailed by A.G. Church, then both secretary of the Association and a Labour M.P., as 'pregnant with possibilities for advancing the interests of science and scientific workers'[60]; but in the next four years it held precisely one meeting. It was, nevertheless, a precedent on which Gregory and Holman could build.

Their original plan was for the formation of a National Science Council, which had the blessing of the majority of the executive of the Association of Scientific Workers. The other godparent to the project, the British Science Guild, was however more reluctant, and the necessary money was not forthcoming. In July 1933 the Association reported that it was hopeful 'of being able to cooperate with the B.S.G. in the formation of a joint committee'. Finally, in October 1933, Gregory was able to secure the collaboration of both bodies in the establishment of a new Parliamentary Science Committee for which he also obtained the support of eleven, mostly professional, associations.[61] The Committee was housed in the Guild's headquarters and its officers were drawn from both Guild and Association. The British Association was not involved.[62]

The objects of the Committee, as set forth by one of its joint

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59. Church left to become organising secretary of the British Science Guild. He resigned from this post two years later to concentrate more on his industrial interests. Kay MacLeod, A.Sc.W., 299-302.

60. A.G. Church, 'A Parliamentary Science Committee', Nature, 124, (26 October 1929), 641-643.

61. These were : the Joint Council of Qualified Opticians, Pharmaceutical Society of Great Britain, Institute of Physics, Royal Institute of British Architects, Society of Engineers, Institution of Professional Civil Servants, Institution of Mechanical Engineers, South Eastern Union of Scientific Societies, Institution of Naval Architects, Oil and Colour Chemists Association and the Institute of Metals.

62. Armytage, Gregory, pp.116-118; Kay MacLeod, A.Sc.W., pp.336-341; S.A. Walkland, 'Science and Parliament : the origins and influence of the Parliamentary and Scientific Committee', Parliamentary Affairs, 17, (1963-64), 308-320, esp. pp.308-311.

secretaries H.W.J. Stone[63] in a Nature leader,[64] were

> to promote discussions in both Houses of Parliament on scientific matters in their application to economic policy and national well-being; ... to consider Bills before Parliament which involve the application of scientific method; and to urge the proper representation of science on public committees.

Stone appealed for widespread scientific support for the Committee, which was essential if it was to become 'the spear-head of science as a whole, and a worthy co-partner with our rulers at Westminster'. In the event, by comparison with the Parliamentary and Scientific Committee which replaced it at the outbreak of war, the Parliamentary Science Committee was not dazzlingly successful. Its peak strength, reached in 1938, was a membership of 14 M.P.s and 26 affiliated scientific associations, whereas its successor could claim a record of 156 M.P.s in 1946, an average around 130 thereafter and the affiliation of 127 scientific associations by 1962.[65] The Committee's record during the thirties fell somewhat short of its initial expectations and could hardly constitute a claim to co-partnership in government. But in the present context the aspiration is more significant than the achievement.

Meanwhile, the Association of Scientific Workers had indeed been reanimated. When it reached its lowest ebb, B.W. Holman drew up and published a new set of objectives for the Association, viz. :-

> To secure a fuller recognition of the value of scientists to society, with a view of securing the wider application of science and scientific method to industry, education and government; and
>
> To develop the Association, which is a professional society of qualified men and women, into a central unifying body, sufficiently powerful to advance the interests of science and scientific workers. [66]

The first of these in particular was straight out of Gregory's book :

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63. Stone was recruited from the Conservative Whips Office and later joined the A.Sc.W. executive. The other joint secretary was Albert Howard, who had succeeded Church as organising secretary of the B.S.G. Kay MacLeod, A.Sc.W., p.341. According to Armytage, Gregory, p.125, Howard 'was not in touch with contemporary needs, having just returned from India'.

64. H.W.J. Stone, 'Science in Parliament', Nature, 132, (30 December 1933), 981-983.

65. S.A. Walkland, art. cit., p.311.

66. B.W. Holman, 'Progress of the A.Sc.W.', Progress, (September-October 1932), 54-56, as quoted in Kay MacLeod, A.Sc.W., p.339.

it seemed at this stage as if the Association was identifying itself with the rationalist view of the rôle of science in society. Only Hyman Levy spoke out at the time against this approach : the social crisis was far too deep to be cured simply by more science. So long as the Association was financially unstable it could not contemplate taking the sort of line which Levy wished, as Holman had to remind him; but from the beginning of 1934 it began slowly to turn towards the radical analysis, carried there by the rising tide of pacifism and anti-fascism.(67)

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67. Kay MacLeod, A. Sc. W., pp. 339-343; Werskey, Visible College, pp. 231-233.

Chapter IV

1933: The social relations of science debate intensifies

During the year 1933 several events helped to focus public attention on the relations between science and society. Perhaps the most dramatic was Hitler's seizure of power in Germany at the beginning of the year. This had two major consequences for the issue. Firstly, the persecution of the Jews and their systematic expulsion from the universities was inescapable evidence that scholars, even scientists, were not immune from politics. The message was underlined by the presence in this country of hundreds of refugee scholars, brought hither under the aegis of the Academic Assistance Council.(1) Secondly, the rise of fascism brought with it the threat of war, with all that that implied for the social responsibility of the scientist. At home, while the tide of unemployment turned in January 1933, it remained, as tides do, near its peak for some time; not until July 1935 did unemployment fall below two million. Science as a source of unemployment, science as a mitigator of unemployment and science as an alleviator of its accompanying distresses - particularly malnutrition and ill-health - were highly topical issues.

The output of books, articles and lectures on science and on its social applications grew steadily;(2) of these the ones to reach the widest audiences were probably a series of articles on 'How can science help us' organised by Ritchie Calder and published in the Daily Herald, whose science correspondent he was, in September and October(3) and the radio talks given by Julian Huxley(4) in the

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1. cf. E.N. Fallaize, 'Nationalism and academic freedom', Nature, 131, (17 June 1933), 853-855. The Academic Assistance Council found posts for 800 scholars in the next four years: W. Adams, 'Freedom of science and learning', Nature, 140, (31 July 1937), 169-170. For further information on the A.A.C., see Lord Beveridge, A defence of free learning (O.U.P., 1959).

2. For the contribution of five radical scientists to this effort, see Werskey, Visible College, chap. VI A.

3. Kay MacLeod, A.Sc.W., pp. 340-341.

4. 1887-1975. Educated at Eton and Balliol College, Oxford. Senior demonstrator in zoology at Oxford, 1919-1925; professor of zoology at King's College, London, 1925-1927; professor of physiology at the Royal Institution, 1926-1929. (cont. over.)

last quarter of the year. Gary Werskey describes Huxley as a sort of intermediary between two approaches - the 'radical' and that taken by Richard Gregory - to the rôle of science in society and he sees in these talks a turning point in the latter approach.(5) The talks are certainly worth examining, as they illustrate the main social issues facing science at the time of the very important Leicester meeting of the British Association.

The talks were the result of a decision by the B.B.C. to despatch 'three modern pilgrims' to make nationwide surveys of agriculture, industry and science: Julian Huxley was given science. The experience served to sharpen his thinking in two ways. Firstly, the process of having to conduct a personal investigation into the relation of science to food, building, clothing, health, communications, industry and war, visiting most of the relevant institutions in the country, opened his eyes to the great extent that science was involved, through technology, in society and to the manner in which its development was bound up with political and economic questions. What also impressed Huxley considerably was

> the fact that both our existing structure of civilisation and our hope of progress are based on science, and that the lack of appreciation and understanding of science among business men, financiers, educational authorities, politicians and administrators was a serious feature in our present situation.(6)

The other factor which had, in the long run, an impact on Huxley was the dialogues with Hyman Levy, P.M.S. Blackett and Thomas D. Barlow, which formed part of the series and which highlighted their ideological differences.

In his first talk Huxley stated his faith in the crudest scientific

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4. (cont.) Director-General of U.N.E.S.C.O., 1946-1948. F.R.S. 1938. President of the National Union of Scientific Workers, 1926-1929. Secretary of the Zoological Society of London, 1935-1942. Leading member of the Eugenics Society for many years. President of Section D, 1936; member of Council, 1935-1937.

5. Werskey, Visible College, pp. 246-248 and idem., 'Outsider politics', pp. 74-75.

6. Julian Huxley, Scientific research and social needs (Watts, 1934), p. ix. This book is an expanded version of the radio talks, all save one of which were also published in The Listener.

rationalism: 'Why, certainly, any subject is capable of being examined by the scientific method.'(7) As the series progressed he enlarged on this - 'in the long run human reason, employing the scientific method, will enable us to control our destiny'(8) - and at the end he was still confident that 'science, if it were allowed a free hand, could control the evolution of the human species.'(9) To this bland optimism Levy and Blackett were bitterly opposed. Blackett warned Huxley that 'if society thinks that the scientist is going to be its saviour, it will find him a broken reed.'(10) Levy explained why:

> Science is used, when it is used practically, to develop and further the ends of present-day society, and is restricted and circumscribed by the possibilities inherent in that social order. ... We have to study our desires in this matter - our prejudices, our bias if you will - and deliberately set about acquiring power in order to create with the help of science such a biased society. (11)

Science might serve as the tool of social reform, but it could never dictate its direction. Huxley, on the other hand, looked to the application of the scientific method to social problems for both the means and the end of social progress. He therefore argued strongly for the development of the social sciences.(12)

Levy set about some of the other tenets of the rationalist view of science while he was at it. Thus:-

> We have to get rid of this myth of impartiality, for we have to recognise that whatever we set about doing is simply a method of fulfilling the desires of some person or group, and the only <u>scientific</u> question we can ask is whose bias has it been in the past, and whose is it to be in the future? (13)

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7. Huxley, op. cit., p.31; <u>The Listener</u>, 11 October 1933, p.527.
8. Huxley, op. cit., p.149; this talk was not published in <u>The Listener</u>.
9. Huxley, op. cit., p.276; <u>The Listener</u>, 3 January 1934, p.25.
10. Huxley, op. cit., p.224; <u>The Listener</u>, 13 December 1933, p.908. cf. chapter III, n.41 above.
11. Huxley, op. cit., pp.276-278; <u>The Listener</u>, 3 January 1934, p.25.
12. Huxley, op. cit., pp.31-33; <u>The Listener</u>, 11 October 1933, p.545.
13. Huxley, op. cit., p.278; <u>The Listener</u>, 3 January 1934, p.25.

And again :-

> You know how glibly people talk about science being open, published for all, and working for the benefit of humanity. ... This may all sound very nasty, but ... if what I am hinting at is true, we must give up all this claptrap about science always being the benefactor of humanity at large and international in all its aspects.(14)

Huxley, wilting, conceded that 'the form and direction [science] takes is largely determined by the social and economic needs of the place and the period'(15) but still maintained, if hesitantly, that

> Though for the time being it may be exploited for sectional ends, and may actually intensify present rivalries, in the long run it is hard to see how each new advance in science can help preparing the way, however deviously, and through however much of preliminary chaos, for the world-state.(16)

In addition to the argument about the objectivity of science, another fundamental difference between the radical and rationalist camps emerged during these talks. Levy remarked that Huxley's programme for a thorough-going scientific approach to social problems

> really involves national directing and planning of research, but that is surely impossible without drastic control over so-called freedom in industrial enterprise which, in the main, stimulates this research.(17)

Such a prospect would not, of course, have perturbed a marxist. At this time the rationalists were enjoying a 'flirtation with a variety of planning doctrines'(18) in pursuit of the application of scientific method to social problems. Levy was arguing that the planning of scientific research necessitated the prior planning of industry. The rationalists were more interested in planning research in order to plan industry. Even this degree of planning conflicted with the

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14. Huxley, op. cit., p.25; The Listener, 11 October 1933, p.526.
15. Huxley, op. cit., p.252; The Listener, 3 January 1934, p.24.
16. Huxley, op. cit., p.250; The Listener, 20 December 1933, p.942.
17. Huxley, op. cit., p.259; The Listener, 3 January 1934, p.24.
18. Werskey, 'Outsider politics', p.71; see also idem, 'Perennial dilemma', passim.

traditional freedom of the academic scientist. While the rationalists struggled to accommodate the competing claims of planning and of freedom, they staunchly resisted any other threats to freedom of research. As Brightman declared when discussing intellectual life in Germany, Italy, Japan and Russia:

> To demand allegiance to one narrow creed or outlook as a condition of disinterested inquiry is to impose shackles on the human intellect from which its noblest spirits instinctively revolt. ... The world is entitled to look to scientific workers for help, but that help cannot be given on terms which deny their allegiance to the supreme claims of truth for unrelenting, wholehearted and unselfish service. (19)

Belief in planning, with or without its concomitant dangers to scientific freedom, was not universal. Thomas Barlow, a leading industrialist, expressed this view succinctly to Huxley:

> Do not let us have any illusions about planning being a panacea. Some people seem to think that something valuable will result if they just say the word planning often enough - just as they did with the word rationalisation ten years ago. ... Do you really think you can plan everything; or that, if you can, life will be worth living? (20)

Julian Huxley's radio series served at least to identify some of the controversial issues in the debate as to what were and what might be the relations between science and society, even if it could not resolve them!

Another outstanding contribution to this debate was made in November 1933, when the physiologist A. V. Hill[21] delivered his

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19. Brightman, 'Science and service', Nature, 132, (16 September 1933), 423.

20. Huxley, op. cit., p.149.

21. 1886-1977. Educated at Blundell's and Trinity College, Cambridge. Mathematician turned physiologist. Fellow of Trinity, 1910-1916 and of King's College, Cambridge, 1916-1925. Professor of physiology at Manchester, 1920-1923, and at University College, London, 1923-1925. Foulerton Professor of the Royal Society (at U. C. L.) 1926-1951. F. R. S., 1918; Sec. R. S., 1935-1945. Nobel Prize for Physiology and Medicine 1922. C. H., 1946. M. P. (Ind. Cons.) for Cambridge University, 1940-1945; member of the War Cabinet Scientific Advisory Committee. Chairman (1946-1963) and president (1963-1977) of the Society for the Protection of Science and Learning. Secretary-General of I. C. S. U., 1952-1956. President of the British Association, 1952; member of Council, 1934-1939; president of Section I, 1925. See The Times, 4 June 1977.

Huxley Memorial Lecture.(22) Hill took a very different line from both Huxley and Levy:

> Not meddling with morals or politics (23): such, I would urge, is the normal condition of tolerance and immunity for scientific pursuits in a civilised state. ... Science should remain aloof and detached, not from any sense of superiority, not from any indifference to the common welfare, but as a condition of complete intellectual honesty.

Freedom of research was the overriding prerequisite for science and the upholding of the ideal of the pursuit of truth, 'freely available for the use of all', was the return paid for its immunity. The pursuit of truth was the main force which could unite the hearts of men and in this lay its crucial importance for society:

> Science and learning ... must realise that they exist, not only for their own sake, not only for what they can do for the material welfare of mankind, but perhaps chiefly for the fact that they alone seem to be truly international, to be capable of transcending national follies and absurdities.

But the freedom of science could not be taken for granted. As Hill, an active member of the Academic Assistance Council, was fully aware, it was under serious attack from political totalitarianism:

> Communism, and its natural - its inevitable - antibody, fascism, have taken charge of the minds of a large section of human society - religious and political toleration is on the wane.

In a memorable sentence Hill described the relation of the free man to his freedom: 'Those who will not fight for freedom do not deserve to be free.'

A little paradoxically, then, Hill was led to the conclusion that

> in a civilisation tottering unsteadily on a foundation of applied science, it is necessary that people scientifically trained should take some part in affairs. ... It is perilous to disregard the scientific basis of modern civilisation or its dependence on international co-operation.

This was far from the rationalist thesis that the powers of the

22. Published in full in A.V. Hill, The ethical dilemma of science (Rockefeller Institute Press /O.U.P.,1960), pp.205-221 and briefly in Nature, 132, (23 December 1933), 952-954. Quotations in this and the next paragraph have been taken from the full version.

23. Hill was quoting from a document written by Robert Hooke in 1663 concerning the function of the Royal Society.

scientific method gave the scientist the right and the duty to pronounce on social issues. Rather, in order to safeguard the cause of intellectual freedom, held in esteem by all 'intelligent people of goodwill', from the threat of extinction posed by both marxism and fascism, the scientist had to lend his talents to the defence of that civilisation, built on 'a foundation of applied science', which had hitherto provided him with 'tolerance and immunity'. The pursuit of truth was incompatible with meddling in politics; but, or therefore, urged Hill,

> We must see to it that neither race, nor opinion, nor religious belief, nor the advocacy of theories unpopular perhaps at the moment, shall cause disinterested able men to be deprived of the means of carrying on their work, even in some cases of their means of living.

Such an able statement of this view of science was an obvious target for the radicals; indeed, 'no event ever quite so elicited the essential unity of the Visible College as did this address by Hill.'(24) For those involved, the question of the relations between science and society was a keenly felt issue.

Such then was the state of the social relations of science debate at the time of the Leicester meeting of the British Association. Under the guidance of the then general treasurer, E. H. Griffiths, the practice had evolved during the nineteen-twenties of holding a joint meeting of all sectional organising committees early in January to plan the summer's meeting of the Association.(25) In 1931 the Council decided that the term of the president's office should run from one such meeting to the next instead of from summer meeting to summer meeting, as this would enable him to exert a much greater influence on the annual meeting over which he was to preside.(26) So it was that on 6 January 1933 Alfred Ewing retired from the presidency. In his farewell speech he suggested that scientists should play their part in overcoming the ethical problems of which he had spoken earlier and, tentatively, that the British Association should encourage them to do so.

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24. Werskey, Visible College, p. 204.

25. B. A. R., (1920), xvi and (1931), xlii; Nature, 132, (19 August 1933), 270.

26. B. A. R., (1931), xli-xlii.

> It seemed not unlikely [said Ewing], and probably it was desirable, that in future meetings of the Association scientists would make a more conscious effort to relate their studies to social problems. Science was now playing so large a part in human life, both for good and for evil, that they could not logically stand aloof. ... Science had brought new powers, and with them new dangers - grave dangers of which the community were scarcely yet aware. It was clearly the duty of science to point these out.(27)

That the British Association would respond to this challenge was rendered more likely by the fact that Ewing's successor was Frederick Gowland Hopkins,(28) then in the middle of his term as president of the Royal Society and one of the most eminent scientists in the land. Perhaps more relevant than his eminence, however, was the fact that he was the accessible and popular leader of a brilliant group of young biochemists characterised by an unusually high degree of involvement in radical politics.(29) Though not himself a radical, he was not unsympathetic: Charles Sherrington recalled of Hopkins: 'I fancy that after biochemistry his greatest interest lay in socialism; his views were quite far to the left.'(30)

As befits the grand old man of biochemistry, Hopkins devoted three quarters of his presidential address to 'some chemical aspects of life': it is the fourth quarter(31) which is of interest here. This began with a lament of the low public esteem accorded to biology, which he attributed to its neglect in the education system. Hopkins then stressed 'the need for recognising biological truth as

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27. B.A.R., (1933), xvi.

28. 1861-1947. Educated at the City of London School; articled to consulting analyst; studied chemistry at South Kensington and University College. Worked at Guy's Hospital, 1888-1898. Lecturer in chemical physiology at Cambridge, 1898-1914. Professor of biochemistry at Cambridge, 1914-1943. Particularly associated with tryptophan, glutathione and the concept of vitamins. Nobel prize for Physiology and Medicine, 1929. F.R.S., 1905; P.R.S., 1930-1935. O.M.1935. President of the British Association, 1933, and of Section I, 1913.

29. On the relation between Cambridge, biochemistry and radicalism, see Werskey, Visible College, pp. 219-229. Werskey stresses the importance of the communal atmosphere within each group of researchers rather than the theoretical state of their field of research.

30. Quoted in Joseph Needham & Ernest Baldwin, eds., Hopkins and biochemistry, 1861-1947 (Heffer, 1949), p.99.

31. B.A.R., (1933), 17-24.

a necessary guide to individual conduct and no less to statecraft and social policy', which served to criticise the unequal distribution of resources between the physical and biological sciences. He illustrated the point by reference to the study of nutrition, to which he had himself made such fundamental contributions. Consideration of scientific progress led him on to Ewing's 'wise and eloquent address' of the previous year, 'still echoed in thought, talk and print'.

Whereas Ewing's 'Engineer's outlook' had generated a somewhat gloomy view of the social effects of science, Hopkins thought that a 'biologist's outlook' might give a different picture. He argued, for example, that the danger resulting from a command of natural forces disproportionate to man's command of himself, which had so worried the Bishop of Ripon, was not, in itself, a condemnation of science. Rather, 'the indictment is of mankind.' Science had added to the terrors of war and in that regard had brought a special urgency to the ethical problem, 'an urgency which must of course be felt in these days when some nations at least are showing the spirit of selfish and dangerous nationalism'; but war apart, Hopkins felt, 'the gifts of science and invention have done little to increase opportunities for the display of the more serious of man's irrational impulses.' The paradox of poverty amidst plenty then much under discussion did not detain him long, save to absolve science from blame and to suggest that 'Money versus Man' was a bigger threat than 'Machine versus Man'. On the latter, he argued firstly that the replacement of human by mechanical labour neither could nor should be stopped, and secondly that an optimistic view of the consequent increase in leisure could reasonably be entertained, Ewing's fears notwithstanding:

> Most of us have had a tendency in the past to fear the gift of leisure to the majority. To believe that it may be a great social benefit requires some mental adjustment, and a belief in the educability of the average man or woman.

Finally, in reply to those who felt that the values of science were opposed to the values of liberal culture, Hopkins, echoing Bragg and Smuts, proclaimed: 'I believe that for those who cultivate it in a right and humble spirit, Science is one of the Humanities; no less.'

Now in all this Hopkins was going over fairly familiar ground. But he brought more than optimism to the issue: he brought his own ideas. For, said Hopkins, increasing mechanisation and increasing leisure 'will impose a new structure upon society. This may well differ in some essentials from any of those alternative social forms of which the very names now raise antagonisms.' Indeed, 'it need not involve a revolutionary change if there is real planning for the future', planning in which 'the scientific mind must play its part'. Planning, then, could help to ensure that the social changes wrought by mechanisation would be orderly and moderate rather than revolutionary. How could such planning be effected? Gowland Hopkins turned to the New Atlantis for inspiration. One might note in passing that he stood in an old tradition: Francis Bacon had been a source of inspiration for the founders of the British Association,(32) and in his presidential address in 1858 Richard Owen had claimed that the Association was 'realising the grand Philosophical Dream or Pre-figurative Vision of Francis Bacon, which he has recounted in his New Atlantis'.(33) One might further note that a couple of months before the Leicester meeting Rainald Brightman had remarked that the Department of Scientific and Industrial Research was no substitute for the Salomon's House of Bacon's fancy and that there was no 'adequate conception ... of the extent to which scientific research can serve our industrial and social life'.(34) Independently of Brightman, Hopkins' thoughts also turned to the concept of a Salomon's House:

> When civilisation is in danger and society in transition might there not be a House recruited from the best intellects in the country with functions similar (mutatis mutandis) to those of Bacon's fancy? A House devoid of politics, concerned rather with synthesising existing knowledge, with a sustained appraisement of the progress of knowledge, and continuous concern with its bearing upon social readjustments. It is not to be pictured as composed of scientific authorities alone. It would rather be an intellectual exchange where thought could go ahead of immediate problems.(35)

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32. O.J.R. Howarth, The British Association for the Advancement of Science: a retrospect, 1831-1921 (B.A.A.S., 1922) pp.22-23; A.D. Orange, 'The origins of the British Association for the Advancement of Science', B.J.H.S., 6, (1972) 152-176.

33. O.J.R. Howarth, op. cit., p.43.

34. Brightman, 'Co-ordination in research', Nature, 132, (15 July 1933), 77-79.

35. B.A.R., (1933), 24.

It is important to consider what was and what was not contained in this suggestion. It was a very different proposition from Miles Walker's engineeringly minded oligarchy and it cannot be described, as W.H.G. Armytage describes it, as 'the very suggestion which had been rejected at York in the previous year'.[36] Firstly, Hopkins sought the cooperation of all intellectuals, not just scientists. Secondly his version of Salomon's House,[37] whilst endowed with 'such authority that no government or legislative House could ignore it'[38] - and in that respect unlike such bodies as the Committee of Civil Research - would have no executive power. He repudiated the idea that it should replace the House of Lords[39] and later emphasised that 'the special endowments acquired by the scientific investigator are not those of a politician.'[40] Rather, the function of the House would simply be to make realistic planning feasible by studying the long term social effects of intellectual developments. The scientist had a rôle to play in this task, not because of the all-conquering might of the scientific method but because 'in respect of material progress and its probable consequences Science ... has at least better data for prophecy than other forms of knowledge.'[41]

Before discussing the impact of Hopkins' address, it would be convenient to describe two other events at the Leicester meeting which indicated the British Association's concern with the relations between science and society. The first of these was the evening discourse given by Josiah Stamp with the provocative title 'Must science ruin economic progress?'[42] Defining economic progress

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36. Armytage, Gregory, p.121.

37. Hopkins consistently called it Solomon's House; Francis Bacon called it Salomon's House.

38. Ritchie Calder, The birth of the future (Arthur Barker, 1934), foreword by Gowland Hopkins, p.xiii.

39. ibid. The suggestion was Calder's.

40. In his 1935 anniversary address to the Royal Society: Proc. Roy. Soc., A153, (1936), 262.

41. B.A.R., (1933), 23.

42. B.A.R., (1933), 578-583; also in Nature, 132, (16 September 1933), 429-432.

as 'the orderly assimilation of innovation into the general standard of life', Stamp examined the various factors which tended to make that assimilation anything but orderly and dealt particularly with the effect of the accelerating rate of technological development on obsolescence of existing machinery and of human skill. He urged the importance of switching from a static to a dynamic view of society in which change was the rule rather than the exception. He discussed how the structure of society affected the accommodation of change:

> Under an individualistic form of society it is difficult to alter the social technique of change, and to make its credits really pay for the debits, and make all the people who gain by the profits on new capital pay also for the losses on prematurely displaced capital, or the gainers by cheapness and variety pay the human costs of unemployment and no-longer-wanted skill.

On the other hand, he was highly sceptical about claims that socialism could handle innovation any more successfully:

> It is sufficient to say that it needs a tour de force of of assumptions to make [a socialistic organisation of society] function without hopelessly impairing that central force of economic progress, viz. individual choice of the consumer in the direction of his demands, and an equally exalted view of the perfectibility of social organisation and political wisdom. But in the field of international relations and foreign trade, which alone can give full effect to scientific discovery, it demands qualities far beyond anything yet attainable.

An harmonious equilibrium between technological innovation and economic life would require, thought Stamp, a heightened awareness of the problems and 'large infusions of social direction and internationalism carefully introduced'. But while planning and international cooperation might achieve something, Stamp was anxious to point out the limits of planning and particularly the impotence of Walker's 'engineeringly minded' approach. Planning, he said,

> does not mean government by scientific technique, technocracy, or any other transferred technique, appropriate as these may be to the physical task of production. For human wills in the aggregate are behind distribution and consumption, and they can never be regulated by the principles which are so potent in mathematics, chemistry, physics, or even biology.

Biological truth might, in Hopkins' phrase, be 'a necessary guide to ... social policy', but neither he nor Stamp thought it sufficient.

These two widely reported speeches, coming on top of the events at the previous year's meeting, were evidence that the British

Association was a forum in which the relations between science and society could be explored. This did not go unnoticed. As J. D. Bernal condescendingly put it, 'scientists are visibly uneasy on the questions of war, unemployment and fascism, echoes of which have reached the British Association.'[43] Or, from the opposite end of the social relations spectrum, John R. Baker[44]: 'At the Leicester meeting of the British Association, the germination of the seed [sown by the Russian delegation to the 1931 International Congress] began to come apparent: the attention of scientists began to become diverted away from science towards social and economic questions.'[45] P. G. H. Boswell,[46] who thought Stamp's paper 'outstanding', later recalled that

> during the meeting, which was very successful, I had several long talks with Ritchie Calder (then of the Daily Herald) on the contribution that science might make, and the Brit. Assoc. in particular, to mitigating the effects of the economic blizzard.(47)

As a result of these talks and of the atmosphere of the whole meeting

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43. From an article in the Cambridge Left for winter 1933, reprinted in J. D. Bernal, The freedom of necessity (Routledge & Kegan Paul, 1949), pp. 348-349.

44. b. 1900. Educated at Boxgrove School, Guildford and New College, Oxford. Lecturer in zoology at Oxford, 1923-1954; reader in cytology, 1955-1967; emeritus reader since 1967. F.R.S., 1958. Editor of the Quarterly Journal of Microscopical Science, 1946-1964. Co-founder of the Society for Freedom in Science (1940).

45. John R. Baker, Science and the planned State (George Allen & Unwin, 1945), p. 62.

46. 1886-1960. Educated at a higher grade school in Ipswich. Pupil teacher, then science instructor at the Ipswich Technical School. Studied at Imperial College under W. W. Watts, 1912-1914. Demonstrator in geology at the R.C.S., 1914-1917. Professor of geology at Liverpool, 1917-1930. Succeeded Watts as professor of geology at Imperial 1930-1938. F.R.S., 1931. President of Section C, 1932 and of the Conference of Delegates, 1935. General secretary of the British Association 1931-1935; treasurer, 1935-1943.

47. Boswell, A narrative, p. 221.

the general officers of the Association - Stamp (treasurer), Stratton(48) and Boswell (general secretaries) - took the unusual step of submitting, on their own initiative, the following resolution:

> That it be a recommendation to the General Committee to request the Council to consider by what means the Association, within the framework of its constitution, may assist towards a better adjustment between the advance of Science and social progress, with a view to further discussion at the [1934] Aberdeen meeting. (49)

Impressed by the sharpening of issues during the preceding twelve months, observing the gentler tone of this as compared with the Section G resolution and, no doubt, influenced by its more respectable parentage, both the Committee of Recommendations and the General Committee accepted it, so the Council was squarely faced with deciding what and how the British Association could contribute to the solving of social problems.

Hopkins' presidential address, Stamp's evening discourse and the general officers' resolution, between them, naturally provoked a good deal of discussion and speculation about the social relations of science issue and about its relevance to the British Association. The Manchester Guardian, for example, was enthusiastic about the Salomon's House idea, an organisation 'whose place in our life no existing body, Royal Society or British Association, at present adequately fills'. It would be concerned with 'popularising the scientific approach to political and social issues among the general public, political parties and the Government'; it would 'be devoted to the objective analysis and review of the issues of statesmanship' and serve to 'popularise and put into practice the idea of scientific planning'. The paper claimed that 'the number of scientists deeply

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48. 1881-1960. Educated at King Edward's G.S., Birmingham, Mason College and Gonville and Caius College, Cambridge. Moved from mathematics to solar physics. Lt.-Colonel during the First World War; D.S.O., 1917. Assistant director of the Solar Physics Observatory, 1913-1928; professor of astrophysics at Cambridge and Director of the Solar Physics Observatory, 1928-1947. Fellow of Caius, 1906; tutor and senior tutor, 1919-1928; president, 1946-1948. F.R.S., 1947. F.R.A.S., 1905; treasurer, 1923-1927, president, 1933-1935, and foreign secretary, 1945-1955, of the Royal Astronomical Society. General Secretary of the International Astronomical Union, 1925-1935, and of I.C.S.U., 1937-1952. President of the Society for Psychical Research, 1953-1955, Chairman of the Cambridge Unitarian Church for over fifty years. General secretary of the British Association, 1930-1935. Q.J.R.A.S., 2, (1961), 44-49.

49. B.A.R., (1933), xliv.

concerned with the wider public effects of their work is large and increasing' and that an organisation through which they could express their concern was badly needed; the nascent Parliamentary Science Committee, it thought, might take on this function.[50] The value of scientific planning was defended in a slightly backhanded way: 'The remedy of greater disciplined knowledge for our ills may be a poor thing and a weak thing. But it is the only one we have.'[51]

The writer and broadcaster Gerald Heard, in an article in The Listener, prescribed two tasks for the Association. These were, in fact, the two functions which it had recognised during the 1920 debate, only stated here in a more journalistic style and with a greater sense of urgency. The first task was to counter-balance the effects of specialisation. This was not just a matter of professional interest: 'For science has to be co-ordinated or it must rupture, first, all associations designed to keep it together as a single body, and then, like an explosive gas, burst asunder society itself. ... The task is tremendous, but I am sure it is absolutely essential that it must be done and the British Association is the body to do it, if any body is.' The second task was to keep 'us, the public, conscious that there is this huge force, science, digging under our foundations and our roots, and it is asking us what we intend to do about it'. If science really was such an integral part of society, and if the ethical gap of which Ewing spoke was such a danger, then it was urgently necessary that the public should be enabled to understand science; and this was made the more urgent by public apathy and antipathy:

> Of course many people don't care much about making an effort to keep the world fit for science to go on. They feel science hasn't really done much for the world. First, hasn't it discouraged men? Hasn't it shown that

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50. cf. H.W.J. Stone, 'Science in Parliament', Nature, 132, (30 December 1930), 981-983.

51. Editorial, 'The scientist and society', Manchester Guardian, 11 September 1933, p.8.

> men have no freedom; as you are born you must remain? (52) ... the chief need and use of the British Association - to keep in front of the public a properly-proportioned picture of what science is doing.

Heard, at least, was encouraged by the initiatives taken at Leicester :

> There is a real hope here for a future which otherwise does not show many signs of being very inviting. In the British Association there is the promise of some real forward activity at last on the front where civilisation is facing chaos. (53)

Hyman Levy, in his conversations with Julian Huxley during the latter's B. B. C. series, was not quite so sure. At first he was prepared to welcome the general officers' resolution as 'clearly a very important matter and one that strikes radically at the whole problem of the use of science in society'.(54) Later, having developed the marxist critique of objective science, he dismissed the move as futile and irrelevant :

> I think the recent proposal to get scientific bodies to make pronouncements _qua_ scientists on matters of social or industrial policy must be doomed to failure, since their statements must necessarily be coloured by their social prejudices, and as soon as they become aware of them, they will separate into different political camps. (55)

By the end of the decade, however, he was ready to call Hopkins' address 'epoch-making'.(56) Huxley of course, was more enthusiastic :

> I cannot help feeling you are being too gloomy. ... With regard to the scientific bodies ... as long as they are not too ambitious, what they are aiming at is all to the good. ... If the scientific movement in this country can ... become conscious of itself,

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52. This was, of course, the 'scientific' basis for the eugenics campaign. From the late twenties onwards, evidence began to accumulate which demonstrated the significance of environmental rather than genetic factors in individual development, thus undermining the claim that eugenics held the key to social progress. In his 1933 address, Hopkins pointed out that nutritional studies constituted one source of such evidence and added : 'I cannot myself doubt that various lines of evidence, all of which should be profoundly welcome, are pointing in the same direction.' _B. A. R._, (1933), 21.

53. _The Listener_, 13 September 1933, p. 391.

54. Julian Huxley, op. cit. (n. 6 above), p. 33; _The Listener_, 11 October 1933, p. 545.

55. Julian Huxley, ibid, pp. 278-279; _The Listener_, 3 January 1934, p. 25.

56. Hyman Levy, _Modern science_ (Hamish Hamilton, 1939), p. 98.

> and of its limitations, and of its relation to the economic driving forces of society, that will be a very valuable step. (57)

The Association of Scientific Workers is, again, a source of interesting comparison with the British Association. During 1933 some of the radical Cambridge scientists, impressed by B.W. Holman, had taken control of the local branch of the Association of Scientific Workers. In February 1934 that branch 'successfully nominated Bernal as an Executive member, and, at the same Council meeting put down a resolution, urging members "to find a means which may assist towards a better adjustment between scientific advance and social progress" '.(58) The executive accepted this resolution as it stood;(59) as will be seen shortly, the Council of the British Association toned it down somewhat. It is interesting, though, that the Association of Scientific Workers should follow the example of the British Association so closely. Although the resolution came from the radical Cambridge branch, it probably represents not so much their own view-point as the maximum to which they thought the Executive would go; Werskey remarks that 'the young radicals there [i.e. at Cambridge] were unable to influence substantially the organisation's national executive, which remained firmly in the hands of older Reformist scientists.'(60) This was to change in 1935. In the meantime, the fact that two organisations then both representing 'scientists of middle opinion'(61) each expressed a concern for 'a better adjustment between scientific advance and social progress' is evidence of the growing weight of opinion in the matter.

The final important source of comment on the Leicester meeting of the British Association is the leader columns of Nature. No less than five leaders discussed the subject, directly or indirectly, during the remaining months of 1933. Brightman, for example, asserted that 'it is unquestionably true that the time is past when such a representative gathering as the British Association' could restrict itself to

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57. Julian Huxley, op. cit., p. 279; The Listener, 3 January 1934, p. 25.
58. Kay MacLeod, A. Sc. W., p. 343. According to Werskey, Visible College, p. 232n, 'no radical scientist sat on the Council [of the A. Sc. W.] between 1930 and 1935.'
59. Progress, 2, (March-April 1934), 309.
60. Werskey, Visible College, pp. 231-232.
61. Gary Werskey's phrase for non-radicals involved in social relations.

the internal affairs of science and spoke of the growing public concern which had to be accommodated:

> Many citizens will be disposed to ask that organised knowledge, and methods of acquiring knowledge represented by science, must be given place in an era of social and economic planning, and that scientific workers themselves might show how knowledge may be related to wise and beneficial action. ...
>
> More and more [the British Association] is called upon to demonstrate the way in which science can serve the general interests of the community ... and at a time when science is frequently and widely blamed for evils for which its indirect responsibility is often very small, and in consequence its share in the promotion of the common weal is often unfairly discredited, such a duty is not lightly to be evaded. ...
>
> Society has every right to expect from scientific workers both a clear and convincing statement of the industrial and social problems, and also an unequivocal lead as to the terms upon which that contribution could be rendered. (62)

Society had 'every right' to expect scientists to lend their talents to the overcoming of social problems; bodies like the British Association had a duty both to lead scientists in this direction and, by defending science against its detractors, to improve its public image so that society should learn increasingly to seek the help of science; but, Brightman continued, if the scientist was 'to devote his energy to the bringing of fresh fields under the control of mankind, to apply his methods to the reduction to order of the chaotic conditions at present existing in economics, the financial and distributive side of industry and trade, in sociology and in politics', this could only be undertaken in a manner which did not conflict with 'the loyalty and devotion of the scientific worker to the service of the truth'. For, he explained, 'shackles ... on the expansion of thought are now being imposed by the national authorities of such States as Italy, the U.S.S.R., Germany and Japan'; scientific rationalism could not help a society which, dominated by unscientific political prejudice, set no store by the truth-seeking 'spirit of science'. (63)

Nevertheless, the involvement of scientists in the problems of a non-totalitarian country could not but have a political impact,

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62. Brightman, 'Science and service', Nature, 132, (16 September 1933), 421-423.

63. ibid. cf. n.19 above.

as Brightman discussed a couple of months later. Indeed, he saw in Hopkins' and Stamp's papers at Leicester 'a fundamental challenge to the whole system of British politics, economics and education'. The challenge arose because, for Brightman, the scientific approach to social problems was built around the concept of planning, which 'may well afford men of science and inventors the widest and happiest opportunities of serving humanity', and planning could not fail to raise a large number of political hackles :

> The eagerness with which in some quarters the opportunity has been seized of rebuking scientific workers for undue arrogance in aspiring to a large share of administrative responsibility even in this scientific age suggests indeed that such rebukes have been administered less in sincerity than to avoid confronting the breakdown of unrestrained individualism in the face of the forces released by science.

Scientists had to counter-attack to generate a social atmosphere favourable to scientific planning and to repudiate 'the suggestion so sedulously sown in some quarters that a scientific worker is less qualified than his fellow men to exercise his trained intelligence in public affairs, whether as administrator, representative or elector'.(64)

While Brightman was discussing the social and political aspects of the mutual adjustment of scientific advance and social progress, another leader-writer, Louis Anderson Fenn, took up its educational aspects. He enthused over the steps taken at the Leicester meeting :

> All who are concerned about the gathering economic distresses of our time will welcome the growing conviction of the world of science, as evinced at the Leicester meeting of the British Association, that scientific men have a social mission over and above the disinterested investigation of Nature, and that it is impossible completely to detach the process which we call science from the uses to which its discoveries are put in the life of our race.

But since social problems are social and not just technical, expert analysis would be powerless to solve them in the absence of the informed understanding and cooperation of the public.

> It follows that the scientific world must conduct, pari passu with its expert discussion of social problems, a campaign of publicity and education more ambitious than it has ever attempted before. It must seek to popularise, not principally its concrete proposals for the scientific control of

64. Brightman, 'Science and the community', Nature, 132, (25 November 1933), 797-799.

civilisation, but the knowledge and method from which these proposals derive their force.

Hence the significance of the Section L research committee on science in adult education, whose report Fenn went on to discuss. (65)

Richard Gregory, having observed that Hopkins' 'Salomon's House' idea had given way to the proposal that the British Association should itself study the relations of science and society, wrote one of his comparatively rare[66] leaders in order to express his opposition. The British Association was in session but one week per year; it was run by professional scientists and 'the laity is not represented upon its Council or committees'; it was not 'in contact with the public mind or qualified to give it guidance'. A 'scientific inquiry into the causes of existing social problems' was all well and good, but Gregory was highly doubtful of 'whether the British Association, either through its Council or the Sections, is competent to undertake the proposed enquiry into the ethical and social consequences of scientific progress'. He urged that the job should be done by a committee representative of a variety of organisations able between them to command a far wider range of experience than the British Association could muster on its own and therefore able to speak with authority of both society and science. The voice of a single scientific society would be disregarded: 'Is it not true that there is a mass of important "business people" who are suspicious of the pronouncements of persons whose lives are spent in the rare and protected atmosphere of "science" ?' So, Gregory declared,

> How to adjust social and economic conditions to progressive scientific knowledge is not the function of the British Association or any other body concerned mainly with the promotion of such knowledge.

He consoled himself, however, with the thought that on its past record the British Association was unlikely to venture outside science.[67]

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65. L. A. Fenn, 'Science for citizenship', Nature, 132, (14 October 1933), 581-583. The Section L Committee is discussed in chapter X below.

66. Gregory wrote only 37 leaders during two decades of editorship. See Werskey, 'Nature and politics', p.463.

67. Gregory, 'Science and social problems', Nature, 132, (28 October 1933), 653-655.

It was reasonable to argue on tactical grounds that a single scientific organisation should not attempt to grapple with 'science and society'. There was, however, another motive behind Gregory's leader which, after all, was published just before the critical British Association Council meeting and was clearly intended to influence it. If one already existing body was going to take upon itself the study of the relations of science and society, why should that body be the British Association? When after the Council meeting, it became apparent that that was, indeed, likely to happen, Gregory was more than a little disgruntled and vented his feelings in a grumpy letter to his friend Allan Ferguson:(68)

> Though the British Association has taken up the subject of science in relation to social progress by appointing a committee, I suppose really nothing will be done until the Association meets next year at Aberdeen. As the Association only functions once a year it is scarcely the right body to deal with such a matter effectively. The British Science Guild has not taken any particular steps to deal with the subject because of the suggestion that it would be trespassing upon the field of the British Association, though if you read a leader of mine some weeks ago in NATURE (69) you will see that the Association has been urged over and over again to deal with the matter, and that the British Science Guild was founded purely because the Association would not take it up. Now, apparently, the Association proposes to do what it formerly declined to do, and without any reference whatever to the British Science Guild which grew out of its loins. (70)

Gregory, of course, had a strong affection for the British Science Guild, as was evident in the 1927-1928 talks of merger (chapter II, pp.44-45 above). Although he had long been connected officially with the British Association, the only position he held at the time this

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68. 1880-1951. Educated at the Harris Institute, Preston and University College, Bangor. Assistant lecturer in physics at Bangor, 1904-1919. Lecturer in physics at the Manchester College of Technology, 1919-1921. Lecturer, 1921-1934, and professor, 1934-1945, of physics at Queen Mary College, London. Secretary of the Physical Society, 1928-1938; president, 1938-1941. Vice-president of the Faraday Society, 1937-1943. Secretary of Section A, 1930-1935; president, 1936. Member of the Council of the British Association, 1932-1935; general secretary of the British Association, 1935-1946. - Proc. Phys. Soc., A.65, (1952), 1057-1061.

69. i.e. n.67 above.

70. Letter, Gregory to Ferguson, 27 November 1933. Ferguson papers, Sussex.

letter was written was membership of the organising committee of Section L; on the other hand, he was chairman of the committee of management of the Guild and had been since 1920. Since he was then busy reactivating the Guild, he would naturally have been very concerned about any move which threatened to cut the ground from under the Guild's unsteady feet. Ferguson, then a member of the British Association Council and recorder of Section A, replied by encouraging Gregory to attend the annual joint meeting of the sectional organising committees early in January.[71]

On the whole, however, public reaction to the Leicester meeting was very favourable : the British Association was seen to be interested in a matter of considerable public concern and it was praised for so being. Apart from Hyman Levy's equivocal comments, only Richard Gregory dissented and this, I suspect, was less out of doubts as to the British Association's possible effectiveness than out of his primary affection for the British Science Guild. Both the Manchester Guardian and Nature interpreted the meeting as providing an opening for the development of the rationalist approach to social affairs. As will be shown in a moment, the Council of the British Association took a more modest view of its proper function in enhancing the relations between science and society.

It is no surprise to learn that the November meeting of the British Association Council, due to consider the general officers' resolution, was unusually well attended : all save one of the ordinary Council members were present, together with four past presidents and secretaries (Bragg, Ewing, Myres and F. E. Smith). The meeting appointed a committee - the one referred to by Gregory in his above-quoted letter - consisting of the president and general officers (Hopkins, Stamp, Stratton and Boswell), Henry Dale, Allan Ferguson, Henry Fowler, J. L. Myres, John Russell and Henry Tizard, to examine the matter further. This was not the proverbial procrastination tactic. The importance and the urgency of the issue were fully realised : the committee was charged with considering 'what help could be invited from the Sections' and with preparing a memorandum before the next Council meeting, due one month later.[72] In its anxiety to involve the Sections as closely as possible, the Council was aware of the significance for

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71. cf. letter, Gregory to Ferguson, 13 December 1933. Ferguson papers, Sussex.

72. Council minutes, 3 November 1933.

the whole Association of its eventual decision on the resolution and of the need to secure the whole-hearted co-operation of its active membership in any proposal for action.

Indeed, the committee took its job very seriously. Boswell later recalled that towards the end of the month he had to turn down an offer of the presidency of the Geologists' Association 'because of the amount of work I had on hand - and especially because of the heavy labours involved in the efforts of the British Association at that time to apply science to the solution of economic problems, and human welfare generally'.(73)

When the Council met again on 1 December, it duly had before it the Committee's memorandum, which it adopted with one (unspecified) amendment.(74) In his Nature leader of 28 October, Richard Gregory had used, almost interchangeably, three phrases which are in fact far from equivalent. These were, firstly, 'inquiry into the ethical and social consequences of scientific progress' - i.e. how science affects society; secondly, 'a scientific inquiry into the causes of existing social problems' - i.e. the application of scientific method to the study of social problems irrespective of whether they had been generated by science; and thirdly, 'how to adjust social and economic conditions to progressive scientific knowledge' - i.e. what changes in social organisation are necessary to make maximum use of science. These three phrases, together with the observation that the object of the exercise was to create a world 'fit for science to go on', constitute between them the rationalist approach to the social relations of science. That this approach was unacceptable to the British Association at the end of 1933 was made clear in the memorandum :

> The Council have limited their interpretation of the phrase 'adjustment between the advance of Science and social progress' in the [general officers'] resolution to that aspect which appears to them to be within the purview of the Association, namely: an understanding of the relations between the advance of Science and the life of the community.

The Association was prepared neither to promote the application of

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73. Boswell, A narrative, p.223.

74. Council minutes, 1 December 1933. There are copies of the memorandum in the Council minutes and in Boswell, A narrative.

scientific method to social problems nor, though for reasons different from those given by Gregory in his leader, to 'adjust society' to science. It was willing only to study, academically as as it were, how scientific and social progress were related. And even this relatively modest ambition aroused some opposition from the sectional organising committees.

The rejection of anything so overtly activist as the rationalist line was made abundantly clear in the remainder of the memorandum. For example, the justification for the resolution itself was given not in terms of changing the structure of society but simply in terms of public pressure:

> For some time past the General Officers have become increasingly aware of the growing interest shown by the public at large in the advances of science, coupled with a widespread fear that in certain directions these advances are having the immediate consequence of dislocating industry and in other respects adversely affecting human welfare. At the Leicester Meeting it became evident to the General Officers that it was expected of the British Association that it should set out clearly what it regarded as its functions and limitations in respect of this problem.

Given the wide general interest in the subject and given the popular esteem in which the Association - 'the principal mouthpiece between science and the public'(75) - was held, some response was strongly indicated: but always 'within the framework of its constitution', written and unwritten.(76)

> While the Officers were aware that the pursuit of an inquiry into these relationships, carried to an ultimate stage, was likely to involve ethical, political and international considerations which are outside the scope of the Association, they felt nevertheless that the prestige of the British Association would be prejudiced if the earlier stages of such an inquiry were not undertaken.

The public was worried about the effects of scientific progress, and if it were not reassured on this point the social standing of science,

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75. Nature, 134, (25 August 1934) 274.

76. On the unwritten constitution, cf. Michael Sadler's address to Section L in 1906: 'Some sides of this question, political and ecclesiastical rather than educational in character, are by the rules of the Association rightly excluded from debate as being unsuitable for discussion in such an assembly as this.' - B.A.R., (1906), 764. cf. also Miles Walker's address to Section G in 1932: 'Religion ... is, however, precluded from the discussions of this Association, so I am reluctantly constrained to strike out what I should like to say.'-B.A.R., (1932), 144.

and of the British Association with it, would decline. It was not quite the vibrant self-confidence displayed by the rationalists at this time.

Having thus laid down the parameters of the exercise, the memorandum made some suggestions[(77)] as to how the Sections might proceed. Each Section was invited to devote part of its programme to a consideration of: (i) the principal developments in its discipline since the beginning of the century; (ii) which of these had exerted a significant influence on social and economic life; and (iii), the most controversial category, whether 'economic or governmental control' or 'general foresight' could have 'enabled any dislocations to have been removed' or, conversely, whether 'if machinery of direction or discrimination had been in existence, it would have had any cramping effects upon invention or initiative and the practical utilisation of scientific discovery', and whether the application of scientific knowledge had been thwarted. This third category was concerned with the controversial issue of whether the directing or planning of scientific research at any of its stages could be beneficial to either science or society; the question was to loom large at the Aberdeen meeting. After the Aberdeen meeting, the Council would decide 'whether any good generalisations could be framed within the competence of the Association and outside the contentious field of immediate political thought' - as Alfred Ewing had attempted after the York meeting (cf. chapter III, p. 58 above). Having been passed by the Council, this memorandum was circulated to the sectional organising committees prior to their annual joint meeting on 5 January 1934.

As a send-off for this meeting Nature carried a leader with the nicely double-edged compliment: 'The Association is to be congratulated upon adopting a policy urged upon it thirty years ago [i.e. by Lockyer].' Once again, the limitations of launching such a project in the British Association were pointed out, though this time the point of reference was not the British Science Guild:

> Such an analysis of the scientific factors which affect human welfare and economic life should be illuminating and afford profitable guidance for the future, but if it is to influence our legislature, the best means of promoting

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77. 'It would' the memorandum observed, 'be contrary to the practice of the Association that the Council should prescribe the way in which the subject should be approached by any Section.'

> this end will be through such a Parliamentary Science Committee as has now been established.(78)

The author of this leader was, amusingly enough, H.W.J. Stone, joint Secretary of the Parliamentary Science Committee! It is worth remarking that this leader illustrates Nature's occasional tendency to confuse its own policies with those of the British Association. The latter was concerned to safeguard its own prestige by promoting a more favourable public attitude to science; it was not primarily concerned to 'influence our legislature'.

The minutes of the 5 January meeting do not appear to have survived, but P.G.H. Boswell provides some details in his autobiography. The memorandum was met by 'some small but vocal opposition to the B.A. taking any action, led by Chalmers Mitchell and Bidder (as usual the Zoologists were awkward).'(79) Quite why zoologists as a species should be labelled 'awkward' is not clear; it does not seem that one can postulate a viable correlation between professional discipline and any given attitude to the social relations of science.(80) Anyway, Boswell himself was instrumental in overcoming their and anyone else's opposition by means of a speech of which, happily for the historian, Gowland Hopkins persuaded him to keep a copy. With perhaps greater urgency than in the memorandum, Boswell spelt out the significance of the Council's proposals for the future well-being of the Association:

> The time has come when the British Association should state unequivocally its position as regards the systematic investigation of the bearing of scientific progress on the life of the community. ... The Association cannot but lose prestige and jeopardise its future if it declares its conviction, here and now, without thorough investigation, that science as represented by the Association has nothing to offer, naught to say, in reply to the almost

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78. H.W.J. Stone, 'Science in Parliament', Nature, 132, (30 December 1933), 981-983. cf. the Manchester Guardian's leader, n.51 above.

79. Boswell, A narrative, p.224. Chalmers Mitchell was president of Section D in 1912 and a member of Council, 1906-1914, 1920-1926, 1930-1935. He described himself as a member of the 'extreme left' in later life: Peter Chalmers Mitchell, My fill of days (Faber & Faber, 1937), p.409. G.P. Bidder was president of Section D in 1927.

80. To take a simple example, John R. Baker, Lancelot Hogben and Julian Huxley were all professional zoologists, of sufficient calibre to be elected F.R.S.

> pathetic appeal of a partially disillusioned community. That appeal will not be stayed; it will bring response from other bodies less well-fitted in their constitution and traditions than the British Association.

With an eye to possible future developments he added:

> There may be those among us who see no remedy for the present economic difficulties but a fundamental re-organisation of national and international financial and political procedure, - a revolt of the competent. It is obviously outside our province to contemplate such a reorganisation, but if it ever were undertaken it would be bound to benefit from the store of information which the various Sections could make available. (81)

Boswell seems to have sympathised with Richard Gregory's philosophy, but he had always to be careful not to overstep the limits of what was acceptable to the active membership of the British Association, and these limits excluded 'the contentious field of immediate political thought'.

Subsequently, when Boswell returned to London from a brief holiday after the meeting, he discovered from O. J. R. Howarth that, to his slight surprise and obvious gratification,

> there had been much talk about the B. A.'s efforts to promote social welfare, and that it was said that on January 5th the meeting would have been opposed to taking action had it not been for my "magnificent" speech. Thus a molehill can become a mountain. The speech reads very mildly now! [c. 1945] (82)

From the minutes of Council meetings during the first half of 1934 it appears that the organising committees, having been won over by Boswell's advocacy, decided upon several courses of action. Five Sections - A, E, H, J and K - appointed sub-committees to consider the memorandum. Six others - C, F, G, I, K and M - 'indicated intention to devote time in their own programmes to discussions bearing upon the subject of the memorandum', although Section C thought also that the Council ought to appoint a committee 'representative of all Sections, to consider the whole question'. This the Council declined to do. The 'awkward' zoologists were prepared only to offer a popular lecture on 'Zoology in the service of Man'. Several Sections thought that evening lectures would be an appropriate means of dealing with the issue. Alternatively, it could be made the subject of a symposium: but although the Aberdeen local committee supported the idea and the Council then

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81. Copy of speech attached to Boswell, A narrative, p. 224.

82. Boswell, A narrative, p. 224.

resolved to go ahead, nothing seems to have come of it. On the other hand, it was mooted that the president, assisted by the general secretaries, should attempt to summarise the main trends at the conclusion of the meeting, in the same sort of way as Ewing had considered in 1932; this suggestion was dropped by the Council in June but did in fact materialise.(83) Only two Sections, B and L, are not explicitly mentioned in the Council minutes, though it is clear from their activities in Aberdeen that they were not opposed to the spirit of the memorandum.

In order to judge how the British Association interpreted its commitment to develop and lay before the public 'an understanding of the relations between the advance of Science and the life of the community', this discussion of motives, fears, hopes and statements of intent must be complemented by a close examination of what actually happened at Aberdeen, the first meeting at which they could be put into operation. Once this examination has been undertaken, it will then be possible to attempt to unravel the various trends in the debate about the social relations of science as it stood at the end of 1934.

83. See The Times, 13 September 1934, p.15.

Chapter V

1934 : The British Association's attitude to the social relations of science

The Council's first choice as president for the 1934 Aberdeen meeting of the British Association was William Hardy, but he died in the preceding January and was succeeded by the theoretical physicist James Jeans.(1) Jeans devoted the bulk of his address to an account of the philosophy of modern physics, turning aside just before the end for the by then almost traditional consideration of the relation of science and society. Herbert Dingle, rejoicing that a philosophically minded physicist should preside over the British Association, dismissively suggested that 'the task fulfilled in the concluding paragraphs - which are, at best, an attempt to employ reason in a field where reason is particularly ineffective - can be regarded as little more than an acknowledgement of a formal duty.'(2) Levy later declared that Jeans 'became escapist just at the most critical period of social stress' by delving into abstract philosophy and holding himself 'aloof from the social struggle'.(3) Whether or no Jeans really was interested in the topics discussed in the last three pages

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1. 1877-1946. Educated at Merchant Taylor's School and Trinity College, Cambridge. Professor of applied mathematics at Princeton, 1905-1909; lecturer in applied mathematics at Cambridge, 1910-1912; research associate of the Mt. Wilson Observatory from 1923; professor of astronomy in the Royal Institution, 1935-1946. F.R.S., 1906; Sec.R.S., 1919-1929. President of the Royal Astronomical Society, 1925-1927. O.M., 1939. Member of the Advisory Council of the D.S.I.R., 1924-1929, 1934-1939. Member of the British Association Council, 1917-1924; president 1934.

2. Herbert Dingle, 'The philosophy of Sir James Jeans', Nature, 134, (8 September 1934), 337-340, esp. p. 337. It was rare in the extreme for Nature at this time to carry a leader doubtful of the pertinence of reason to social problems! Jeans met with a mixed response, incidentally: The Times and the Manchester Guardian published complimentary leaders on 6 September, and Boswell thought he made a good president (A narrative, p. 231), but Dingle had reservations about his philosophy and the Ferguson papers contain a number of critical letters.

3. Hyman Levy, Modern science (Hamish Hamilton, 1939), p. 98.

of his address,[4] it is worth looking at what he had to say.

His remarks followed the pattern already seen in the addresses of his predecessors - science on the defensive, justifying itself to a sceptical public. Thus:

> We meet in a year which has to some extent seen science arraigned before the bar of public opinion; there are many who attribute most of our present national woes - including unemployment in industry and the danger of war - to the recent rapid advance in scientific knowledge. ... We cannot ignore the tragic fact that, as our President of two years ago told us, science has given man control over Nature before he has gained control over himself.

Unemployment, war, the ethical gap: the trio begins to be familiar. In each case the defence had one thing in common; a moratorium on scientific research was out of the question, not only because it was impossible to still the restless human mind but also, for Jeans, because

> it is obvious that the country which called a halt to scientific progress would soon fall behind in every other respect as well - in its industry, in its economic position, in its naval and military defences, and, not least important, in its culture.

On unemployment, Jeans pointed out that while science fostered machines which displaced men from work, it also made fundamental discoveries which formed the bases for whole new industries. When the two processes were out of balance, unemployment resulted. 'Our great need at the moment', said Jeans a little obviously, 'is for industry-making discoveries'. But they could not be produced to order: 'Unhappily no amount of planning can arrange a perfect balance. For as the wind bloweth where it listeth, so no one can control the direction in which science will advance.' On war, Jeans argued that science had contributed as much to means of defence as to means of attack and suggested that the increasing deadliness of armaments might even serve as a deterrent to war at all.

As for the ethical gap Jeans took up the cry of 'not less science but more science'. By this he meant three things. One was psychology, 'which holds out hope that, for the first time in his long history, man may be able to obey the command "Know thyself" '(!) Another was 'scientific and constructive methods of eugenics and birth control'. This suggestion was just tossed out, without further

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4. <u>B.A.R.</u>, (1934), 16-18.

comment; it is however, remarkable that it was made at all, considering the extreme political delicacy of the issue and the general desire of the British Association to avoid controversy of this sort. In 1931 Section D of the British Association staged a discussion on population during which E.W. MacBride advocated birth control and 'in the last resort compulsory sterilisation';[5] Section H had a single paper from George Pitt-Rivers on the anthropological approach to eugenics[6]; and Section L considered the subject of eugenics in education.[7] In 1934 Section H had one paper on Francis Galton, who had presided over the Section at the 1885 Aberdeen meeting.[8] But, with these exceptions, discussion of eugenics was not encouraged at the British Association during the period covered by this study, and Jeans' remarks did not find an echo.[9] What did find an echo was his third suggestion as to how more science could help society: by research into agriculture 'sufficient at least to defeat the gloomy prophecies of Malthus and enable ever larger populations to live in comfort and contentment on the same limited area of land'. By thus taking the edge off expansionism, science would weaken a major source of war.

How did the Sections implement the Council's memorandum? It will be recalled that the first two headings, under which the memorandum had suggested that an understanding of the relations between

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5. B.A.R., (1931), 397-398.

6. B.A.R., (1931), 457. George Pitt-Rivers, one-time secretary of the International Federation of Eugenic Societies, later joined the British Union of Fascists. See Donald MacKenzie, 'Eugenics in Britain', Soc. Stud. Sci., 6, (1976), 499-532, p.519.

7. B.A.R., (1931), 507-508. See further chapter XIII below.

8. B.A.R., (1934), 355-356.

9. The history of eugenics has recently generated a good deal of interest amongst sociologically- minded historians of science. See Lindsay Farrall, The origins and growth of the English eugenics movement, 1865-1925 (Ph.D. thesis, Indiana, 1969); Donald MacKenzie, art. cit.; G.R. Searle, Eugenics and politics in Britain, 1900-1914 (Noordhoft International Publishing, 1976); and Lawrence S. Waterman, The eugenic movement in Britain in the nineteen thirties (M.Sc. thesis, Sussex, 1975). Searle is working at the moment on the inter-war period. The attitudes of radicals and rationalists to eugenics are discussed later in this chapter.

the advance of science and the life of the community might be explored, were (i) the recent history of each of the sciences and (ii) how their development had influenced social and economic life. Within these two categories the papers given at Aberdeen were so many and so diverse that mere enumeration must suffice for the majority of them. Thus the presidential address to Section A dealt with the history of theories of light and the same Section heard a paper from Norman Campbell and C. C. Paterson on the development and applications of the photo-electric cell; the geology Section held a detailed discussion on the supply of underground water, a topical subject in view of the 1933 drought (which generated as much public concern as did that of 1976); the economists heard an address on the past, present and future of railways; the engineers had an address on cheap electric power and discussed the ever contentious issue of reducing noise from motor vehicles; the presidential address to Section H was an intriguing account of the social effects of yerba maté, a tea-like drink much used in South America; the president of Section J discussed psychology and social problems, dealing particularly with intelligence testing; Section L spent a morning on the development of post-primary education since 1902; Section M staged a public lecture on 'science and the animal industry'; and, finally, one may note Lawrence Bragg's evening discourse on X-rays. Although the British Association had a long tradition of offering items of public interest, the Aberdeen meeting was marked by an unprecedentedly conscious effort in this direction and, in some of these papers at least, by an attempt to explain their social relevance.

Campbell and Paterson's paper on the photo-electric cell was singled out for publication in full in the annual <u>Report</u> of the Association.(10) It opened with some interesting remarks on social relations which are particularly relevant in the present context:

> We are not quite so sure that science is the unmixed blessing that we once believed it to be. Some bold spirits have no qualms. They conduct a vigorous counter-attack and urge that such evils as have arisen are due to a half-hearted use of science. ... Many of us feel that there is another side to the question, and should be happier if

10. The presidential addresses and the evening discourses were always published in full in the annual <u>Report</u>, and one or two other papers were usually accorded the same privilege; all other contributions were published in brief abstract, if at all.

> our champions were readier to distinguish between the values of science and the merits of scientists.

Campbell and Paterson, at least, were sensitive to the public's misgivings about the social benefits of science and were critical of those like Miles Walker who seemed oblivious to such doubts. While they argued that 'the business of scientists is to provide the means; the determination of ends belongs to the political institutions of the state' they thought that scientists could do something to ameliorate the social effects of science:

> We get pleas for a scientific truce, during which no more advances in science should be made. The objection to such a plan is, of course, that it is impracticable; its execution demands a greater, not a less, unity and consistency of purpose than some less drastic method of control ... A better plan may be to exercise a greater foresight. ...
> If we want to guard ourselves against surprise in the future, we should study the past and apply its lessons. It is for this reason we have been asked to invite your attention to-day to the history of one particular invention or discovery.(11)

This was very much the line of thought behind the memorandum, which no doubt promoted the Council to sanction its full publication in the Report.

Most subjects falling within the first two categories of the memorandum were dealt with in a single paper or a single discussion. One topic however, came up several times and is worth a closer look. That was nutrition - a politically sensitive issue, certainly, but one with a large purely scientific component which came within the acknowledged scope of the British Association. Thus the chemists spent a morning on Vitamin C, whose investigation was then attracting a good deal of public attention and whose structure had been elucidated as recently as April 1933. The discussion was in fact largely technical, though it was opened by a paper on its history suitable for a lay audience. A joint session was also arranged with Section M on the chemistry and nutritional properties of milk. This, again, was a subject of popular interest in view of the campaign launched by the Ministry of Agriculture in 1931 to induce people to drink more milk and the activities of the recently established Milk Marketing Board(12) in organising the Milk in Schools scheme.(13) Again,

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11. B.A.R., (1934), 445-446.

12. Mowat, Britain, pp. 438-439.

13. Under this scheme school children could buy, (cont.over)

however, the discussion was strictly technical, apart from the observation that official regulations about the quality of milk should not be made in advance of sufficiently precise scientific knowledge.

The agriculturists held another joint session, this time with Section I., on 'nutrition in relation to disease'. The symposium presented an authoritative review of the exponential growth of knowledge in this field during the previous twenty-five years and several speakers, notably John Boyd Orr(14), May Mellanby and S.J. Cowell, went out of their way to indicate the practical implications of their findings. Boyd Orr, indeed, suggested that 'nutrition as determined by diet is now probably the most important factor affecting the health of the community.' It was, however, stressed that 'the construction of ideal diets requires greater knowledge than is available at the present time.' Interestingly enough, the symposium was attended by Walter Elliot, the Minister of Agriculture, who contributed to the discussion.(15)

A somewhat different aspect of nutrition - the question of preserving food - was the subject of another symposium

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13. (cont.) on every school day, one third of a pint of milk for a halfpenny. Necessitous children were given the milk free, and those who showed signs of malnutrition were in many cases given two thirds of a pint. H.C.Dent, 1870-1970: Century of growth in English education (Longman, 1970), p.110. At that time 200,000 children were already receiving free milk under the Education Act, 1921: 'the new arrangement is certain to increase these figures greatly'. The Times, 27 September 1934, p.13. By October 1938, 53% of children in elementary schools were taking advantage of the scheme. Ministry of Education, Pamphlet no.2: A guide to the educational system of England and Wales (H.M.S.O., 1945), paras.159-161.

14. 1880-1971. Trained for the Scottish Presbyterian Church but switched to medicine at Glasgow University. Director of animal nutrition research at Aberdeen, 1914-1945, turning his department into the world famous Rowett Research Institute. Professor of agriculture at Aberdeen, 1942-1945. F.R.S., 1932. Heavily involved in campaign against malnutrition. M.P.(Ind.) for the Scottish Universities, 1945-1946. Director-General of the U.N.F.A.O., 1945-1948; Nobel Peace Prize, 1949. M.C., 1916; D.S.O. 1917. Peer, 1948. President of Section M, 1925. - Biog.Mem.F.R.S., 18, (1972), 43-81.

15. B.A.R., (1934), 363-368; Nature, 134, (13 October 1934), 557-558. According to Crowther, Social relations, p.625, Elliot chaired the symposium.

in Section I, at which the physiological problems associated with the various methods of preservation were described and the practical applications of recent discoveries were indicated. Criticising the papers as 'far too condensed', the Nature correspondent observed a trifle sardonically that they 'obviously represented an attempt, which we understand was made at request, to provide a review of the underlying problems of food preservation'.[16] The botanists discharged their social obligations with a 'semi-popular' lecture on the cold storage of fruit and vegetables, while a similar topic, the transport and storage of food, was the theme of an evening discourse[17] delivered by F. E. Smith[18] as a memorial to William Hardy, the original president for the meeting. Smith was naturally keen to extol Hardy's achievements in this field, but the main purpose of his discourse was to demonstrate the enormous impact that science had on the daily life of the nation. Not only had the science of refrigeration virtually abolished the seasonal variations of both the quantity and the quality of food available in this country, but also, in conjunction with the development of synthetic fertilisers, it had upended the Malthusian thesis 'to such an extent that fear of scarcity has been banished for hundreds of years to come'. And this in a very short time: as recently as 1898 William Crookes had been warning that 'England and all civilised nations stand in deadly peril of not having enough to eat.'[19] In a sense, Jeans need not have bothered to call for more research into agriculture: the problem was rather that of over-production, or so it seemed from the perspective of well-fed Britain. Or, as J. B. S. Haldane put it: 'We are producing more food than can be consumed under capitalism, and it would be silly to find out how to produce still more.'[20]

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16. Nature, 134, (24 November 1934), 798.
17. B.A.R., (1934), 419-436.
18. 1876-1970. Left school at 14. Later won a scholarship to the Royal College of Science. Research worker at the N.P.L., 1900-1920. First director of the Admiralty Research Laboratory, 1920-1929. Secretary of the D.S.I.R., 1929-1938. Scientific advisor to Anglo-Iranian Oil (later B.P.), 1938-1955. F.R.S., 1918; Sec. R.S., 1929-1938. President of the Physical Society, 1924-1926. General secretary of the British Association, 1922-1929; president of Section A, 1930. Smith was 'a remarkable example of a scientist who successfully turned to administration'. - Biog. Mem. F.R.S., 18 (1972), 525-548.
19. B.A.R., (1898), 4.
20. Quoted in Werskey, Visible College, p. 196.

The third social relations category in the Council's memorandum was concerned with the issue of whether and how relations between science and society could be organised. At the Aberdeen meeting this question resolved itself into a number of discussions on planning, especially economic planning. Section F in fact, orchestrated by Josiah Stamp, held three sessions on the subject. The first of these[21] was on 'the need for a technique of economic change' and was opened by Stamp with a paper dealing with the respective merits of the 'planned society' and the 'individualistic society' in handling the problem of technological innovation and unemployment in the context of a stationary population. As in his Leicester discourse he contented himself with an analysis of the advantages and disadvantages of each system and refrained from indicating where his own preferences lay; he did, however, remark that 'the new conditions [i.e. stationary population] make some modification essential.' He was followed by N.F. Hall, senior lecturer in political economy at University College, London, who commented that 'the economic system does not sufficiently rapidly avail itself of the new knowledge placed at its disposal by scientific research, and that consequently society ... is deprived of benefits'; but rather than develop this 'frustration of science' theme he proceeded to a dispassionate examination of the economic problems generated by technology, which he felt might be alleviated by the 'centralisation of part of the economic intelligence services of finance'.[22] The third speaker was the National Labour M.P. Kenneth Lindsay, who more forthrightly called for a national survey to consider 'how far can planning of social services anticipate economic changes?'[23]

In a second discussion Section F dealt with the more general topic of 'economic planning'.[24] The key issue was seen as the survival of

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21. B.A.R., (1934), 341-343.

22. Nature, 134, (13 October 1934), 579-580. It is a little curious that this was the only contribution to the discussion to be published in Nature.

23. In a paper in the A.S.L.I.B. conference a fortnight later, Lindsay stressed more emphatically 'the necessity of planning so as to preserve liberty and flexibility'. - Nature, 134, (6 October 1934), 542.

24. This was not published in B.A.R., but see Nature, 134, (29 September 1934), 503.

private enterprise. D.H. Macgregor, the Oxford professor of political economy, was very anxious that it should survive, especially when he surveyed the alternatives. 'Deprecating dramatic talk about a new order of things', he maintained that

> While it is admitted that mistakes and waste occur under private enterprise, yet under planning any mistake that is made would be much more serious and might involve very great losses and waste.

Josiah Stamp, following, thought that 'the change now going on is rather greater than Prof. Macgregor was prepared to admit', but once again he confined his remarks to the respective strengths and weaknesses of the two economic systems. Neither was perfect: 'the question is, which muddle are we going to deal in?' 'Most persons to-day', Stamp felt, 'would seem to hanker after the middle line between unrestricted individualism and complete national planning.' W.F. Bruck, a refugee professor from Münster, pointed out that such a middle line was already in operation: 'The economy of our States is a mixture of both capitalism and socialism, and they only differ in the degree of the intensity of this mixture.' The local professor of political economy, Alexander Gray, was puzzled by the whole issue, saying that though he was 'not necessarily opposed to planning, it is difficult to know what exactly it is all about'. Planning could only shift the focus of competition; it could not eliminate competition, nor could anything 'short of making people consume to plan'. Neither could planning logically be confined only to the industrial and economic sphere: 'If the State be the planner, it must have a population policy. A planned State demands planning, not merely in industry, but also in all the diverse elements of national life' - a scenario he evidently regarded with distaste.

Section F held a third discussion on planning - i.e. the devising of what the Council's memorandum called 'machinery of direction or discrimination' to guide affairs - this time in conjunction with Section L on 'planning a national policy of technical education and industrial recruitment'.(25) It was to some extent a follow-up to Henry Tizard's presidential address to the Education Section, in which he had suggested that one way of mitigating the unemployment of science graduates would be 'deliberately to keep the supply somewhat short of the demand', on the grounds that 'the world will not appreciably suffer

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25. B.A.R., (1934), 397-399; Nature, 134, (24 November 1934), 819-920.

if any particular application of science to industry and agriculture develops rather more slowly than the enthusiast could wish.'[26] The Nature correspondent indicated mildly that this idea might not be 'altogether acceptable to industry', an alternative being 'to attempt some definite planning of technical education both quantitatively and qualitatively in relation to industrial recruitment' - i.e. the very discussion now under consideration.[27] The joint F and L session, however, failed to come up with such a viable alternative, to Nature's vexation: 'While exploring a number of important aspects, [it] was rather disappointing as a definite contribution to the solution of the problem'.[28] Indeed, with one exception, none of the speakers had much to say on the concept of planning a national policy. That exception was the industrialist A.P.M. Fleming, who will be remembered from his paper to Section G in 1932 (chapter III above). He described in some detail how his own firm, Metropolitan Vickers, handled the problem of technical training,[29] but on the national level he showed much greater awareness of the limited feasibility of planning than he seemed to have had two years earlier:

> The planning of a policy of technical education ... involves a consideration of economic and social conditions, which at the present time are in a state of flux. ... The difficulties of such planning are obvious, and at best it is only possible to discern the general trend of industrial requirements and be sensitive to variations in demand and supply which can never be completely synchronous.

Though the fact of the discussion is of some significance in the context of the British Association's social relations policy, its content was accurately described in Nature as making 'little definite contribution to immediate progress'.

Finally the planning of agriculture was raised in Section M.[30]

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26. B.A.R., (1934), 215.

27. Nature, 134, (24 November 1934), 819. See also a letter from J.B.S. Haldane [ibid., (13 October 1934), 571] and Tizard's reply [ibid., (20 October 1934), 629]. See further chapter XIII below.

28. Nature, 134, (24 October 1934), 819.

29. Its method of selection, incidentally, depended rather on the judgement of trained staff than on the use of vocational and intelligence tests, whose development had been a source of continuous interest to Section L during the previous ten years.

30. For a guide to the variety of governmental expedients then being tried to strengthen the farming community, see Mowat, Britain, pp. 436-441.

The Sectional president, J. A. S. Watson (Oxford professor of rural economy), devoted his address to 'scientific progress and economic planning in relation to agriculture and rural life'.[31] He was sympathetic to the idea of planning and sketched out the directions it might take, but at the same time had no illusions as to the difficulties involved, both theoretical and practical. 'Some people feel that these objections to planning are insuperable'; Watson disagreed, but he did 'protest most strongly against any notion that economic planning is a panacea for our ills or is any substitute for education and research'. That planning could not go ahead of knowledge and skill Watson took to be the moral of the failure of Soviet agriculture. Even if planning were successfully realised, he warned against the danger that it might simply become a weapon in the armoury of aggressive economic nationalism. Watson's approach was similar to that of Stamp and Fleming: his support for planning was tempered by too deep an appreciation of its difficulties to turn into advocacy. In this he differs from Daniel Hall,[32] who followed the presidential address with a paper setting out more forcefully the case for agricultural planning, outlining what he considered an appropriate plan and calling for an advisory body to provide guiding principles for future policy.[33]

Such, then, were the efforts of the British Association at its 1934 Aberdeen meeting to promulgate an understanding of the relations between the advance of science and the life of the community. The Association was sensitive to the suggestion that these relations were not automatically to the benefit of society and it recognised that some members, at least, of the non-scientific public were distinctly wary of science. It set out to mollify them firstly by conceding that science

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31. B.A.R., (1934), 223-232.

32. 1864-1942. Educated at Manchester Grammar School and Balliol College, Oxford. Schoolmaster, 1885-1891. University Extension Lecturer, 1891-1894. Founder and principal of Wye Agricultural College, 1894-1902; director of Rothampstead Experimental Station, 1902-1912; member of the Development Commission 1910-1917; secretary of the Board of Agriculture, 1917-1920; chief scientific advisor to the Ministry of Agriculture, 1920-1927; director of the John Innes Horticultural Institute, 1927-1939. F.R.S. 1909. President of Section M, 1926; member of the British Association Council, 1908-1915, 1920-1926, 1929-1933.

33. B.A.R., (1934), 401-402; cf. E.H. Tripp, 'Economic planning and agricultural production', Nature, 134, (10 November 1934), 713-715. See further Hall's more strident article 'Science and agriculture' in A.D. Hall et al., The frustration of science (George Allen & Unwin, 1935), pp.13-29.

was not an unmixed blessing and then by demonstrating all the social advantages for which science could in fact take credit. The various sciences which contributed to knowledge of human and animal nutritional needs and to a secure supply of food provided particularly apposite material for propaganda of this sort: whatever the political controversies surrounding malnutrition and distribution of food during the nineteen-thirties, it could not be argued that the sciences of nutrition and food supply were anything other than socially beneficial. In his speech to the joint meeting of the sectional organising committees, Boswell had claimed that a 'partially disillusioned community' looked to 'science as represented by the Association' for a better ordering of social affairs. This led into a series of discussions on planning: planning of technological innovation and economic change, planning of technical education, planning of agriculture. In dealing with the concept of planning as the means to the better conjunction of scientific advance and social life, the Association was on tricky ground. The subject was not one that could be avoided but the Association on the whole approached it dispassionately, discussing equally its merits and demerits and assessing it in terms of feasibility rather than political desirability. This accords with the overtly apolitical tradition of the British Association and with the Council's line on social relations as the non-judgemental <u>understanding</u> of the relations between the advance of science and the life of the community.

The Council of the British Association was pleased with the achievements of the Aberdeen meeting; so pleased, in fact, that it sent an appreciative memorandum to the sectional organising committees congratulating them and saying that

> the efforts of the Association in this direction were widely recognised and esteemed. ... Membership figures were substantially higher than was foreseen,(34) and it is reasonable to suppose that the Association materially expanded the circle of its appeal. The Press generally took favourable note of the tendency to emphasise the practical applications

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34 2938, as compared with the 1932-1938 average of 2375. Only the 1938 Cambridge meeting surpassed this total during these years. cf. the treasurer's report for 1933: 'The expansion of the Association's membership and the strengthening of its financial foundations should be the object of all those who would further its interests.' - <u>B.A.R.</u>, (1933), xxv. See also <u>B.A.R.</u>, (1936), vi.

> of Science which was apparent in the programme, and there was a conspicuous absence of the kind of criticism which (however mistakenly) was formerly directed against the supposed barriers between Science and the public interest.(35)

The memorandum also expressed relief that the Aberdeen meeting had not confirmed the 'apprehension' which had earlier been voiced that a greater emphasis on the Association's function of obtaining 'a more general attention to the objects of Science' would weaken its function of promoting 'the intercourse of those who cultivate Science'; the two functions had not proved mutually exclusive. The memorandum further urged that 'in future, [the sectional organising committees] will maintain a similar outlook, which, in so far as it involves any reorientation of their programmes, appears to the Council to be fully justified by results.'

The Press generally may indeed have taken favourable note of the meeting, but The Times was not so easily impressed:

> Before the meeting there was some talk of trying to arrange the proceedings so as to present a kind of defence of science against criticisms that have been made by some scientific men and many others. In fact the programme differed in no salient respect from that of other meetings.(36)

Such a view, however, was atypical: even Nature voiced its appreciation. For example, before the meeting it welcomed the fact that 'the public is offered a fuller opportunity than ever of appreciating specific applications of science to its welfare and interest'(37) and remarked that 'the Aberdeen meeting of the British Association may come to be regarded as a landmark.'(38) Afterwards, it observed: 'That it has been an unqualified success is the opinion of the chief officials of the Association, other members, and the public generally.'(39) Occasional references to 'the development of a social conscience by the British Association'(40) are indicative of the post-Aberdeen image of the Association. Nevertheless, such comments should be read in conjunction with the criticisms of individual discussions offered by Nature and with the tendency of its leader-writers, particularly

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35. Council minutes, 7 December 1934. See also B.A.R., (1935), xxv.
36. The Times, 13 September 1934, p.11.
37. Nature, 134, (25 August 1934), 274.
38. Brightman, 'Progressive science and social problems', ibid., (1 September 1934), 303.
39. ibid., (22 September 1934), 448.
40. ibid., (27 October 1934), 670.

Rainald Brightman, to confuse their own, rationalist, view of the social relations issue with the position actually adopted by the British Association. This point will be elaborated in a moment: suffice it here to refer to Brightman's statement that 'much of the original impetus towards the consideration of the social consequences of scientific discoveries was derived from Section G'[(41)], which illustrates his failure to understand how far removed was the attitude of the Council generally from that of Miles Walker.

The Association of Scientific Workers provides another source of commentary on the British Association. As has already been mentioned, the former, in February 1934, had accepted the general officers' 1933 resolution in its original wording. At the same time the older members of the Association's executive agreed to organise a meeting during the British Association week at Aberdeen on 'What can scientists do?' In this they were frustrated, so instead they organised a separate meeting under the chairmanship of Daniel Hall on 'a Future Policy for Science'. This meeting 'not only signalled the public reappearance of the A. Sc. W., but also provided an opportunity for framing a new policy for the Association'.[(42)] Thus it would seem that the British Association was too tame for the enthusiasts of the Association of Scientific Workers, even before the radicalisation of the latter had been carried through.

The suggestion that the British Association, for all its new-found 'development of a social conscience', was not approaching the social relations issue in a spirit of sufficient urgency was also made in another and somewhat unexpected quarter. The Bishop of Carlisle, H. H. Williams, produced a rather startling sermon on the Sunday of the meeting :

> Is not the time fast approaching when science should abandon something of that severe spirit of isolation which keeps it aloof from moral inquiries and still confines it to the austere analysis of natural events? Is it, for example, to remain content with the provision of antidotes to poisons which it has itself created, to meet the menace from the air [i.e. bombing] only by more skilfully constructed methods of defence? (43) Or is it to come down into the arena where men strive and groan to free themselves from perils that are not natural but are perversions of the authentic human spirit?

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41. See n.38 above, p.302; also Brightman, 'Industrial and social interactions', Nature, 134, (13 October 1934), 549.

42. Kay MacLeod, A. Sc. W., pp. 343-344.

43. cf. James Jeans' presidential address at the beginning of this chapter.

> I do not believe that by prayers and supplications alone men can wholly free themselves from those moral diseases which paralyse our economic and social life. These need for their cure the bold and skilful analysis of the scientific mind. ... May not [science regard] ... not only truth but justice and liberty as equally relevant to its great concerns? Certain it is for all men that where these great needs are not secured there will be little room for science, and truth will hide its head.(44)

What a contrast to the Bishop of Ripon's sermon, delivered a mere seven years earlier! Then science had been accused of disorienting man's ethical perspectives, now it was accused of ignoring him; then the British Association had heard the (albeit tongue-in-cheek) suggestion of a ten-year moratorium on research, now it was being urged to involve itself not only in the pursuit of truth but also in justice, liberty and economic and social life; then it was doing too much, now, having done more, it was doing too little. During the interval between the sermons, conditions in the arena 'where men strive and groan' had, of course, deteriorated enormously through the economic depression and the establishment of fascism in Germany and Italy. The 'bold and skilful analysis of the scientific mind' had become something of a rallying cry. Brightman naturally applauded the appearance of a kindred spirit.(45)

I have described the Aberdeen meeting in what may seem extravagant detail because it is important to form as precise an idea as possible of how the British Association interpreted the social relations issue. I should now like to gather together the various comments on social relations scattered through the foregoing pages and attempt to discern the several attitudes manifested. Historians have spoken of 'the social relations of science movement of the nineteen-thirties', but the sets of ideas here under discussion were far less homogenous than the use of such a broad phrase would suggest. There were three quite distinct philosophies involved in 'the movement', each of which was at odds with the others. The movement was far too incoherent to establish a society which could command the support of the majority of those involved - as, for example, the eugenics movement succeeded

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44. The Times, 10 September 1934, p.7.
45. Brightman, 'A scientific approach to peace', Nature, 134, (17 November 1934), 749-751.

in doing - although such bodies as the British Association, the British Science Guild, the Association of Scientific Workers and the Parliamentary Science Committee all expressed corporate opinions on the subject. Important contributions were just as likely to be made by independent thinkers as by organised societies. It is more helpful to think in terms of a debate than a movement.

Gary Werskey has analysed the debate into two components, which he labels 'Radical' and 'Reformist'.(46) The radicals believed that 'only a society transformed along socialist lines would be prepared to make the fullest and most humane use of scientists and their discoveries. They presented their plea for an improvement in the cultural and political status of the scientist as an essential but subsidiary clause in their demand for a broad social revolution.' The principal radicals are identified(47) as J. D. Bernal, P. M. S. Blackett, J. B. S. Haldane, Lancelot Hogben, Hyman Levy, Joseph Needham, C. H. Waddington(48) and W. A. Wooster.(49) Of these, Bernal, Haldane and Levy were at various times paid-up members of the Communist Party of Great Britain(50) and Blackett, Needham, Waddington and Wooster expressed sympathy with its ideology,(51) though Needham (a committed high Anglican) and Hogben preferred to remain on the left wing of the Labour Party. While there were considerable differences in outlook amongst these men,(52) they are placed together as members of the so-called 'Visible College' on the basis of their common interests in science and in left-wing politics.

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46. Werskey, Visible College, chap. VI C and idem., 'Outsider politics', passim.
47. Werskey, 'Outsider politics', p. 71 n.
48. 1905-1975. Educated at Clifton and Sidney Sussex College, Cambridge. Postgraduate work in palaeontology and in philosophy at Cambridge. Demonstrator in zoology and Fellow of Christ's College. Active in Cambridge life. War-time work with Blackett on operational research. Professor of genetics at Edinburgh, 1945-1975. F.R.S., 1941. President of the International Union of Biological Sciences, 1961-1967. Biog. Mem. F.R.S., 23, (1977), 575-622.
49. Born c. 1903. B.Sc., London, 1924; Ph.D., 1928. Crystallographer. Lecturer in mineralogy and petrology at Cambridge during the thirties. Founder and director of Crystal Structures Ltd., a Cambridge based company. Secretary of the A.Sc.W., 1935-1957 and president, 1965-1968. Close friend of Bernal. See Kay MacLeod, A.Sc.W., p. 332 n.
50. Werskey, Visible College, pp. 207-210.
51. Wood, Communism, p. 79 n.
52. Werskey, Visible College, chap. VII C, describes the (cont. over)

The reformists, on the other hand, were 'for the most part prepared to accept the social order as it was, provided that they and their kind were given a greater voice in public affairs'. They tended to be established scientists, almost a generation older than the radicals. Their political affiliations were to the Labour Party or the progressive elements in the Conservative Party. Werskey identifies six leading reformists. Of these, two (Richard Gregory and Daniel Hall) had between them served on the Council of the British Association for a total of thirty-two years, and though by 1934 neither were on the Council they were still much in evidence on the research committees and the sectional organising committees; two others were very influential in determining the character of the Aberdeen meeting, Gowland Hopkins as 1933 president and therefore chairman of the Council at the time it was debating its social relations memorandum, and Josiah Stamp who not only held sway in Section F but also, as general treasurer since 1928, was the senior general officer of the Association; another, Julian Huxley, was shortly to become a member of the Council; while the sixth, John Boyd Orr, had been a member of the British Association since 1909 and had recently begun to use it to further his campaign against malnutrition. A comparison of reformist policies with those of the British Association should, therefore, provide some insight into the non-radical elements of the social relations of science debate.

Such a comparison needs to be prefaced by two comments. The first concerns the problem of elucidating reformist policies. Werskey overcomes this by picking out Gregory as 'the chief spokesman for the Reformists' cause', which enables him to equate that cause with the journal _Nature_. As a practical expedient this course has obvious advantages, but it also has the severe disadvantage that in Werskey's analysis the non-radical approach is confined, as an inevitable consequence, to the creed of scientific rationalism advocated by _Nature_, so that the possibility of non-radical social relations based on other considerations does not emerge. In my own work I have found it more useful to talk of 'rationalists' where Werskey refers to 'reformists': the rationalists were those who held that social progress depended upon the greater use of reason and who identified reason with scientific method (defined, if at all, tautologically). Rationalism was also the

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52. (cont.) ideological differences between Bernal and Hogben.

basis of an anti-religious movement dating from the nineteenth century, which was in evidence during the period of this study chiefly through the activities of the Rationalist Press Association.[53] My use of the term rationalist, however, is intended neither to imply nor to deny any connection between the scientistic and the anti-religious schools of thought; to examine such a connection would take me too far from the focus of my study, though it could undoubtedly be interesting.

The second prefatory comment is that the following analysis of the debate relates to the end of 1934 : it is not necessarily appropriate to the second half of the decade. To make this point is to emphasise the value of a rigorously chronological approach to the subject, which enables one to discern how the social relations of science debate developed as the issues upon which it was focussed were affected by social, political and economic events.

One may begin an analysis of the debate by considering the motivation of the various groups involved. The radicals felt that science was grossly under-valued and consequently 'frustrated' by British society and that this situation was a built-in feature of capitalism; socialism on the other hand, or so it seemed, was geared to the fullest possible exploitation of science. The advancement of science appeared therefore to depend upon the advent of socialism. Moreover, the marxist interpretation of science taught that scientific activity was determined by the social and economic needs of the community. For each of these reasons the scientist was professionally bound to be closely concerned with social affairs. Within the radical group there seems to have been some confusion as to whether the involvement of the scientist <u>qua</u> scientist in social affairs was the means and the creation of a socialist society the end, or <u>vice versa</u>. Blackett and Levy, for example, insisted that the salvation of society depended on the coming of socialism and that the scientist could help only insofar as he worked for socialism; whereas for Bernal, 'Marxism and communism are not ends in themselves, but the best available means of achieving the transfer of power to the scientist. Dictatorship by the scientist is the apotheosis of control, complete and totalitarian.'[54] Perhaps Bernal should be classified as an extreme rationalist rather

53. For the anti-religious rationalists, see Susan Budd, <u>Varieties of unbelief. Atheists and agnostics in English society, 1850-1960</u> (Heinemann, 1977), chaps. VI - VIII.

54. Wood, <u>Communism</u>, p.142.

than a radical.

The rationalists, too, were sensitive to the 'frustration of science', but however much this was bound up with the inefficiencies of parliamentary democracy they were not prepared to work for socialism. In Nature at least, the exaltation of rationalism was generally tempered by reference to the 'spirit and service of science'[55] which was so conspicuously absent from Bernal's harsh rhetoric. The journal also saw itself as a champion of the freedom of the individual scientist from dictatorial control and was therefore 'horrified by the relatively complete integration of scientists into the differing political systems of Germany and the Soviet Union' because 'the fervent nationalism which informed the science policies of the two countries was inimical to the maintenance of an international scientific community' and because of 'their conscious curtailment of the intellectual freedom of individual scientists'.[56] Besides, 'nothing revolutionary can be proposed on any rational basis.'[57]

While socialism was unacceptable, the rationalists were prepared by the middle of 1934 to concede the radical view that 'the form and direction of science itself are largely determined by the social and economic needs of the place and period'.[58] At the same time they insisted that science could in turn influence those needs. Not merely could: it was a question almost of moral duty. Nature was continually advocating an 'expansion of the area within which a rational or scientific direction functions in place of prejudice, if mankind is to avert disintegration and regain control over events'.[59] Social problems were the result of unthinking prejudice and needed for their cure the ministrations of that professional practitioner of cool, unbiassed

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55. See eg. Brightman, 'Progressive science and social problems', Nature, 134, (1 September 1934), 301-303.
56. Werskey, 'Perennial dilemma', p.531.
57. W.G. Linn Cass, 'Unemployment and hope', Nature, 125, (15 February 1930), 225.
58. Brightman, 'The planning of research', Nature, 134, (28 July 1934), 119 ; cf. Julian Huxley, chapter IV n.15 above. Werskey links this concession, though not necessarily causally, with Huxley's B. B. C. series : 'Outsider politics', pp. 74-75.
59. Brightman, 'Industrial and social interactions', Nature, 134, (13 October 1934), 550.

thought, the scientist. After all, 'any subject is capable of examination by the scientific method.'(60) The rationalists were inspired by the 'vision of the new and greater social possibilities if that knowledge is sincerely and courageously applied, and the faith that human reason by using wisely the scientific method can give us the control of our destiny'.(61) The rationalist involvement in social relations was therefore a matter of bringing scientists to this missionary view of their social responsibilities and of educating the public in the virtues of scientific rationalism : 'The scientific world has to popularise, not merely or even chiefly, its proposals for the scientific control of civilisation, but also the knowledge and method from which those proposals derive their force.'(62) 'Once science had been placed at the centre of social consciousness, statecraft would become "mainly a question of making humanity fit for science, or at least of modifying the political and economic systems of the world to enable its inhabitants to enjoy the fruits of scientific endeavour".'(63) In such a happy world the rational scientist would, of course, be duly esteemed.

Neither socialism nor the desire to gain 'control of our destiny' formed any part of the motivation for the British Association's interest in the social relations of science. The evidence all points to the conclusion that the British Association became involved in the debate primarily because of the need to defend science against the growing antagonism towards it displayed by that nebulous entity the general public. Thus the Bishop of Ripon, surveying the unsatisfactory position of social ethics, suggested that scientific progress had converted an unsatisfactory situation into a positively dangerous one; whereupon British Association presidents began to speak of science as a supremely ethical activity (William Bragg, 1928; J.C. Smuts, 1931; Rowland Hopkins, 1933).(64) Then, more specifically,

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60. Brightman, 'The planning of research', Nature, 134, (28 July 1934), 118 ; cf. Julian Huxley, chapter IV n.7 above.

61. Brightman, ibid., p.119.

62. Brightman, 'Progressive science and social problems', Nature, 134, (1 September 1934), 302 ; cf. Fenn's leader of 14 October 1933, chapter IV n.65 above.

63. Werskey, 'Nature and politics', p.466, quoting from a Nature leader of January 1932.

64. On science as a source of ethics, see J.R. Ravetz, Scientific knowledge and its social problems (O.U.P., 1971/Penguin, 1973), pp. 311-313 and Leslie Sklair, Organised knowledge (Paladin, 1973), chap. IV.

science was identified as a generator of unemployment and a bringer of new horrors on an unprecedented scale to the ancient art of waging war; so presidents from Thomas Holland onwards tried to modify this image by speaking of science as the creator of new employment, the liberator of man from soul-destroying drudgery and a powerful force for world peace. In the discussions following the general officers' 1933 resolution it became apparent that the accusation of indifference to social problems was being levelled against science in addition to the charges just mentioned; so the Council urged the Association to show the public how scientific progress contributed to its welfare. At Aberdeen especially a concerted effort was made to impress upon the public how much it owed of its comfort and security, indeed of its very existence, to the advance of science.

By a loose analogy with 'negative' and 'positive' eugenics - i.e. (i) preventing undesirables and (ii) encouraging desirables, respectively - one may coin the phrases 'negative' and 'positive' social relations of science. By negative social relations I mean the attempt to demonstrate that the effects of science on society were, on the whole, not to the disadvantage of society. The main thrust of the British Association's defence of science lay in this direction. With Campbell and Paterson admitting 'We are not quite so sure that science is the unmixed blessing that we once believed it to be' and with some non-scientists putting it rather more strongly, it was important to examine just how far science did in fact exacerbate social problems. The British Association strove to convince the public that science reinforced rather than threatened the cultural values of liberal democracy; that it generated employment, communal wealth and leisure rather than unemployment, unequally distributed wealth and poverty and more spare time than was good for the soul; that it did not, of itself, stimulate war. By allaying public apprehension on these issues and, in addition, by advertising the contributions of science in more obviously beneficial fields such as communication, health, nutrition and general comfort, the Association sought to persuade the public that on balance science was a Good Thing, deserving of its continuing support.

By positive social relations I mean the notion that science as a school of thought should actively seek a greater involvement in social affairs. Positive social relations were embodied in such concepts as technocracy, planning and the social sciences. In the British Association the idea of positive social relations may be discerned in Walker's 1932 address to Section G, in Hopkins' 1933 presidential address, in the general officers' resolution and in Boswell's speech to the joint meeting of the sectional organising committees in which he hinted that some members of the public looked to science to provide a way through social problems. The British Association was, however, distinctly wary of becoming too closely involved in such delicate matters. The Section G resolution was given short shrift and in 1933 Josiah Stamp emphasised the futility of 'government by scientific technique'. Hopkins' Salomon's House seemed to be a blueprint for the planners, but as the idea was elaborated it became clear that the only social rôle which Hopkins envisaged for the scientist was that of thinking about the relations between science and society and making known such insights as he gained. It is significant that the Parliamentary Science Committee, which claimed a closer involvement for the scientist in policy making, failed to secure the support of the British Association at this time. The general officers' resolution about 'a better adjustment between the advance of Science and social progress' was toned down by the Council to 'an understanding of the relations between the advance of Science and the life of the community': the issue of what constituted 'social progress' was avoided and the passive 'understanding' was substituted for the more active 'adjustment'. And the whole exercise was couched in terms not of redeeming society but of redeeming the image of science.

The British Association's somewhat ambiguously cool attitude to social sciences is perhaps best assessed in the following chapter, as the issue did not really arise until 1935. At this stage it is already clear that it was not too keen to expose itself to the sort of controversies which positive social relations seemed to invite. It may be that individual members - the general officers, for example - regretted this caution to a greater or lesser extent, but they were bound by the limits of what might be acceptable to the Council and what would not alienate the general public.

Positive social relations was, of course, the hallmark of the rationalists' outlook. The severity of social problems was used to justify arguments that science itself should be planned so as optimally to contribute to their overcoming and that scientists should participate in the planning of social enterprises in all sorts of non-scientific spheres. It was wholly consistent with the basic rationalist philosophy that the scientist should determine 'not only the scientific criteria but also to some extent the social priorities which govern a nation's science policy'. The concept of a national science policy involved the controversial assumption that 'science as a social phenomenon is susceptible to some form of planning' and that such planning could 'assist in both the growth of knowledge and the solution of social problems' - though Gregory, wishing to have his cake as well as eat it, clung simultaneously if illogically to the traditional autonomy of the pure scientist.(65) The natural extrapolation of rationalist planning was the highly acceptable one that 'the scientific expert ... would come to occupy "a position of increasing responsibility, and the security of our civilisation largely depends upon his effective participation in public as in industrial affairs".'(66)

But when Nature paused for a moment from its worship of the rational to consider just what was meant by planning in, say, the industrial sphere, it had little positive to offer beyond such slogans as 'consumption is just as much a problem for scientific research as is production.'(67) While advocating 'the large-scale planning of industry',(68) the journal rejected both nationalisation and the 'wholesale socialisation of the means of production'.(69) So it was left with calling for a spirit of class unity, for harmony and objectivity,(70) which strikes me as something short of an identifiable policy of economic planning. One sympathises with Alexander Gray's plaintive 'it is difficult to know what exactly it is all about' ! The British Association, faced with the necessity of mounting a public defence of science, could hardly afford to adopt the rationalists' uncritical faith in a vague panacea called 'scientific method' : it moved with far greater caution in the positive social relations of science. The rationalists rushed in where the British Association feared to tread.

This last point is further illustrated by the issue of eugenics.(71) If human qualities were determined largely by inheritance rather than

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65. Werskey, 'Perennial dilemma', pp. 529-530.
66. Werskey, 'Nature and politics', p.466, quoting from a 1933 Brightman leader.
67. Brightman, 'The planning of research', Nature, 134, (28 July 1934), 118.
68. ibid.
69. Werskey, 'Nature and politics', p.466.
70. ibid.
71. For a discussion of Nature's views on eugenics, see Werskey, 'Nature and politics', pp. 467-468 and idem., 'Outsider politics', pp. 72-74.

environment, then the rationalist could, and at this time (i.e. the end of 1934) frequently did, argue that social progress could be accelerated by, or even depended upon, control of inheritance. So, in an editorial which has already provided a number of quotations, Brightman observed: 'Notably does the study of population with the view of controlling it offer attractive possibilities.'(72) Such examples could be multiplied. The radicals fiercely attacked the eugenics programme because of their own emphasis on controlling the social environment rather than controlling inheritance and because eugenics was coming to be associated with fascism. With the few exceptions mentioned at the beginning of this chapter, the British Association tended to steer clear of eugenics altogether. It was the sort of positive social relations that it could very well do without.

Finally, who were the leading members of the rationalist and the British Association camps? The most important scientific rationalists were Rainald Brightman, Richard Gregory, Daniel Hall and Julian Huxley. Of those whom Werskey identifies as reformists, the others are Gowland Hopkins, Boyd Orr and Josiah Stamp. Hopkins believed that there was a rôle for science in the conduct of public affairs but recognised that it was a strictly limited one. Although he became president of the by then radical Association of Scientific Workers in 1937, he was soon warning them 'to keep their efforts as free from political bias as possible The present need is to emphasise the scientific aspects of the A. Sc. W. and to steer clear of any political implications.'(73) Boyd Orr saw very clearly the need for governmental action to secure the effective application of the findings of nutritional science and spent his whole life campaigning towards this end; but this was a case of the social value of science as a body of knowledge, not of science as a way of thought. It was advocacy of the latter which distinguished the rationalists ; the former only was acceptable to the British Association. Again, Josiah Stamp, at least in his capacity as a member of the British Association, was always careful to indicate the limitations of scientific planning and not to fall into an uncritical advocacy of its possibilities.

The reformists, then, may be divided into rationalists and non-rationalists. All reformists argued for a greater involvement

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72. Brightman, 'The planning of research', Nature, 134, (28 July 1934), 118-119.

73. Kay MacLeod, A. Sc. W., p. 382.

of scientists in public affairs; the division is based on whether it was science as a way of thought or science as a body of knowledge which was held to justify their arguments. With the exception of Brightman, all the men mentioned in the previous paragraph were prominent members of the British Association. Clearly, they were not all in agreement with the British Association line on the social relations of science. What determined this line? It was a compromise between a number of competing forces : the enthusiasm of those who wanted the Association to seek a more active involvement in social affairs, the more cautious attitude of the majority of the Council, the apparent feelings of the lay public on whom the Association depended for financial support and the accumulated traditions of the Association. Put another way, it was a compromise between those who thought that science was socially important because of the universal applicability of the 'scientific method', those who claimed a more modest social function on account of the value of scientific knowledge and those who did not aspire to any social function at all beyond that of the pursuit of truth ; between those who felt that the public needed reassurance about the existing relations between science and society and those who felt that the public demanded a greater involvement of science in social affairs.

Although the British Association line on social relations can be identified fairly readily, it cannot straightforwardly be equated with the views of a single coherent group of people. Its policy was determined by the variety of established scientists who made up its Council. The leaders of the Association could not assume that the Association would conform to their own views; they had to carry the Council and the ordinary membership with them, and this may sometimes have necessitated the soft-pedalling of their own ideas in favour of what would be generally acceptable, as Boswell in particular seems to have recognised. The Association was therefore not a very effective pressure group for any view of science which departed too drastically from the received tradition. On the other hand, it did offer a tempting target, especially for stalwarts like Gregory and Hall who had ready access to its inner workings. Gregory had Nature, of course, in which he could publicise his own ideas, but a British Association meeting would attract many who were not necessarily readers of his journal. He also had the Association of Scientific Workers, of which he, Hall and Huxley were then all vice-presidents and which was beginning to show signs of life : but, for the moment anyway, it was friendly to the rationalists. There was not that much virtue in preaching only to the converted : the British Association presented an opening for Gregory's missionary zeal and, especially after 1933, it seemed a promising opening, despite the considerable differences between its official attitude to the social relations of science and that of the rationalists.

Werskey's analysis of the social relations of science debate needs, then, to be expanded if the British Association is to be accommodated - and after the Aberdeen meeting it was certainly seen to be involved in the debate, as even Nature agreed. Three groups may be distinguished, most simply on the basis of their motivation. The radicals saw the social commitment of scientists as a means of furthering the advance of socialism, either as an end in itself or as the mechanism for the ultimate apotheosis of the scientist. The rationalists, whatever their doubts about the efficacy of liberal democracy and the feasibility of captalism,[(74)] accepted the prevailing order and pinned their faith in the power of reason - i.e. 'scientific method' - to overcome social problems; they therefore urged scientists to work on such problems and society to let them, but at the same time insisted that scientists could not serve society under conditions which compromised their prior commitment to freedom of intellectual inquiry. The British Association was motivated to interest itself in the relations between science and society by the apparent public demand that it should do so, in order to demonstrate that these relations were on the whole beneficial to society and to avert the additional accusation against science that it was indifferent to the human condition.

It should be noted that, as in 1920, catering for the lay public was only part of the British Association's work and, in terms of time devoted to it at the annual meeting, not even the major part. The Council was relieved to find that its interest in the social relations of science did not seriously interfere with the Association's function of advancing science at the professional level.

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74. Werskey, 'Nature and politics', p.465; Armytage, Gregory, p.97.

Chapter VI

1935 : The British Association's attitude defended

A constant thorn in the side of those concerned about the public image of science is the quality of the press coverage of scientific affairs. In 1926 the British Association and the British Science Guild had explored the possibility of setting up a 'science news service', but the move had come to nothing (see chapter II above). In the spring of 1935 a second attempt was made, with the American 'Science Service'[1] as the explicit model. The founder of Science Service came over to speak to 'a small group of us, including [Boswell], Howarth, Richard Gregory, Wm. Bragg, Eccles, Tizard and Sir Albert Howard'.[2] Although all these men were officials of the British Association, the British Science Guild or the Association of Scientific Workers,[3] this meeting seems to have been an informal gathering of interested people rather than an officially sponsored event : it is not, for example, mentioned in the British Association Council minutes. Richard Gregory had used his 1934 presidential address to the Association of Special Libraries and Information Bureaux to push for some such plan as was now being considered.[4] Once again, however, the initiative proved fruitless, coming unstuck on the structure of the British press : 'It was reluctantly decided that the press in Britain did not bulk sufficiently largely, and take enough syndicated articles, to support a Science Service.'[5]

Officially, the British Association considered other ways of enhancing the publicity given to science in general and to its social relations in particular. At its meeting on 7 December 1934, the Council decided against acting on a proposal from the General Committee that 'a collection of communications bearing on the above

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1. For Science Service, see Ronald C. Tobey, The American ideology of national science, 1919-1930 (U. Pittsburgh P., 1971), chap. III.
2. Boswell, A narrative, pp. 237-238.
3. Boswell was general secretary of the B.A.; Howarth was permanent secretary of the B.A.; Gregory was chairman of the B.S.G. and vice-president of the A.Sc.W.; Bragg was president of the B.A. (1928) and vice-president of the A.Sc.W.; Eccles was president of the A.Sc.W.; Tizard was a B.A. Council member; and Howard was secretary of the B.S.G.
4. Armytage, Gregory, pp.127-128 ; A.A. Eldridge, 'The service of scientific news', Nature, 134, (29 September 1934), 473-474.
5. Boswell, A narrative, p. 238.

subject [i.e. social relations] might be published by the Association'; 'but', hedging its bets, 'without prejudice to future reconsideration of the suggestion'.[6] Reconsideration came perhaps sooner than expected : in March 1935 the Council appointed a committee to investigate the idea of a series of quinquennial reports on the state of science. The committee reported back at the next Council meeting, recommending

> the production of a quinquennial review of the trend of progress in science in general, without special reference to the proceedings at meetings of the Association. ... contributions by experts ... a book of about 150 pages ... The relations between science and public welfare would find suitable incidental expression in such a review.
>
> The Committee further recommend the preparation of a summary report on the activities of the Association itself, especially with reference to Science and the community, to be issued gratuitously with the preliminary programme. ... The Committee consider that this report would usefully extend the public knowledge of the work of the Association.(7)

These recommendations were duly enacted, the summary report being issued in April 1936 under the title 'Five years' retrospect, 1931-1935'[8] and the review appearing early in 1937.[9] That the recommendations met with a positive response was, according to Boswell, 'thanks largely to my happening to be on form and pressing the matter hard'. He adds that the review was 'very successful, although some of the articles were too advanced'.[10] It was, in fact, mainly technical in character, though written for the non-specialist; only two chapters, by A. C. Haddon an anthropology and A. Gray Jones on educational science, made any significant attempt to deal with social relations. The summary report, too, was basically factual, but it included an interesting reference to

> the strong demand recently encountered in the press and elsewhere that in the programmes of the Association more

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6. B.A.R., (1935), xxv.
7. Council minutes, 7 June 1935. cf. B.A.R., (1935), xxv-xxvi, and (1936), xl.
8. B.A.R., (1936), v-xv.
9. British Association, The march of science. A first quinquennial review, 1931-1935 (B.A.A.S./Pitman, 1937). cf. E.H. Tripp, 'Science and culture', Nature, 138, (19 September 1936), 479-480.
10. Boswell, A narrative, p.239.

> systematic attention should be paid to the bearings of scientific progress upon the welfare of the community. Efforts have been made and are being made to meet this demand. (11)

Boswell recalls in his autobiography that

> in the early months of the year [1935] we were again very concerned over the problem of science and social service, and the part that the British Association ought to play in bringing the advances in science to bear on the welfare of the community. (12)

As part of his campaign to confirm the Association in its interest in social relations, he began, in June 1935, to explore the possibility of amalgamation with the British Science Guild. The matter was not raised officially in Council until December and will be discussed in detail after the annual meeting has been considered: it is mentioned here in illustration of the Association's developing concern and of Boswell's rôle in stimulating it. He was, indeed, so active that 'T. H. Holland said that B.A. stood now for Boswell's Association.'![13] In one hope he was frustrated. Through his advocacy, his fellow geologist W. W. Watts had been appointed president of the British Association for the 1935 Norwich meeting.[14] He now made strenuous efforts to persuade Watts to devote his address to an economic theme such as the geology of the coalfields 'which would justify geology in the eyes of the world at this time when we were emphasising the importance of the influence of science on the welfare of the community'. But to no avail: the address was strictly geological, without even the customary passing reference to contemporary social conditions. 'I think he knew I was disappointed', commented Boswell laconically, 'but such was, I fear, the result of electing a good man when he had passed his prime.'[15]

Having described the 1934 meeting in detail, it would be tedious to repeat the process for 1935. Suffice it to say that social relations were at least as prominent at Norwich as at Aberdeen, and in much the same manner: i.e. an emphasis on how the development of factual scientific knowledge had benefitted the community. Whether such a

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11. B.A.R., (1936), vi.
12. Boswell, A narrative, p.237.
13. ibid., p.244.
14. ibid., p.244.
15. ibid., p.236. Watts was 75 in the year of his presidency.

programme discharged the Association's social obligations depends on the commentator. The Times, for example, was once again disparaging, even to the point of reversing its verdict on Aberdeen :

> This aim was to a considerable extent realised last year at Aberdeen; but this year it has been more honoured in the breach than the observance. ... The policy inaugurated at Leicester has broken down at Norwich. ... Only slight success has attended the policy of promoting the social outlook section by section.(16)

The Manchester Guardian, however, was more complimentary : 'The anxiety which everyone feels so acutely at present in the face of international affairs[17] was mirrored again and again.'[18] Nature, too, was not unappreciative. Before the meeting it observed that 'there is no lack of subjects of public interest in the Norwich programme',[19] and afterwards :

> This year's programme for the meeting of the British Association has shown that in many ways the isolation of the scientific worker is breaking down and to an increasing extent he is considering the relation between his work and the society in which he finds himself. ... [Numerous examples] demonstrate over how wide a front this gathering of scientific workers considered the way in which the application of scientific knowledge can assist in the solution of social and industrial and economic problems.(20)

Gowland Hopkins gave a detailed analysis of the Norwich meeting in his Anniversary Address to the Royal Society on 30 November 1935.[21] He agreed that an interest in the negative social relations of science was 'certainly proper to the defined functions of the Association', but he thought that what could be done in this direction had now been done and that the matter should be allowed to drop. Science had been on the defensive long enough :

> Although one may well believe that the recent extensive public discussion of the less happy social repercussions of science has had its uses, it has now fulfilled any purpose it may have had, and one may hope that on present lines at least it will now cease.(22)

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16. The Times, 11 September 1935, p.13. cf. chapter V, n.36 above.
17. Hitler introduced conscription in Germany in the spring of 1935. Mussolini spent all year preparing for his assault on Abyssinia, which was finally launched on 3 October 1935. See Mowat, Britain, pp. 542-546.
18. Manchester Guardian, 6 September 1935, p.4.
19. Nature, 135, (11 May 1935), 779.
20. Brightman, 'Social science', Nature, 136, (14 September 1935), 409.
21. Proc. Roy. Soc., A 153, (1936), 247-267, esp. pp. 258-263. cf. Gregory, 'Humanistic science', Nature, 136, (7 December 1935), 885-886.
22. ibid., p.262.

Hopkins agreed with The Times that the Norwich meeting had done little to further the application of scientific thought to social problems. He regarded this, however, not as a criticism of the British Association but as evidence of the futility of the rationalist approach to positive social relations of science :

> Many, and not journalists alone, have called upon devotees of science to play some special part in helping to correct the social dislocations which their work is held to have caused, but I know of no concrete suggestions as to how, if as specialists, and not merely as good citizens, they are to set about it. (23)
>
> The tendency of late has been not so much to reiterate the theme of science's gifts to the powers of destruction, but rather, with the supposed default of the British Association in illustration, to urge in a more general sense that scientific workers have not shown sufficient interest on the social implications of their work, or in the public responsibilities of their calling. We have only to look closely into this view as usually expressed to realise that, after all, its basis is vague, and, did it involve any charge against the individual worker, unreal.
>
> It is after all not surprising, though the attempt was fully justified, that in the final issue members of the Association failed to find grounds for any very serious discussion of the subject. The individual investigator must realise that, *qua* scientist at least, he has little opportunity for effective action. ... The special endowments acquired by the scientific investigator are not those of a politician or of a missionary. (24)

In terms slightly mellower than those of his 1933 Leicester address, Hopkins suggested that there was, indeed, a place for positive social relations : but it consisted simply in being prepared to offer advice on matters where factual scientific knowledge was relevant - such as food policy - and in encouraging research in areas of obvious social importance - such as nutrition. It did not extend to staking unrealistic claims for the pertinence of scientific method to the solution of problems of social organisation.

This was, of course, the British Association line on positive social relations. The Association often offered technically-based advice - its recent record on this was told in the summary report just mentioned[25] - but it was not interested in the rationalists' 'scientific' study of society. Watts and Boswell defended this policy at a press conference given at the end of the Norwich meeting.[26]

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23. ibid., pp. 258-259.
24. ibid., pp. 261-262.
25. B.A.R., (1936), vii-ix.
26. The Times, 12 September 1935, p.17.

In answer to the above-quoted Times leader Watts listed all those discussions during the meeting which he believed were indeed 'important contributions to questions of human welfare', and he insisted that 'a good deal has been done - possibly quite as much as could reasonably be expected.' Boswell supported him in this and met another Times criticism by pointing to the forthcoming summary report and quinquennial review.

Naturally, not everyone accepted the sort of argument put forward by Gowland Hopkins. The Times, for one, was keen on the science of society and thought the British Association should do something about it:

> It may be urged that the simplest method ... would be by the creation of a new Section for Sociology. But this would in fact be no remedy. Sections are bound to specialise ... The obvious method would be by the creation of a General Section of the Association, in which the representatives of any branch of science could participate, not in virtue of this or that specialised " - ism" , but as citizens interested in the implications of their scientific activities. (27)

Brightman, too, had some ideas on the subject. In a Nature leader unusually conciliatory towards the British Association, he praised its efforts at Norwich and claimed that discussions of the sort listed by Watts at the press conference 'are commonly regarded as contributions to the development of social science'. He did, however, consider that they should be more deliberately organised: 'Can such haphazard discussions lead to the evolution of either policy or technique permitting of the solution of social problems in anything like the way in which problems of physical science are solved?' It is interesting that he felt the need to justify the notion that science should be organised and that at that particular time he was even prepared consciously to accept the accompanying modicum of restraint on individual intellectual freedom. His point of reference was the international crisis[(28)]:

> With the very continuance of civilisation itself in doubt, something in the nature of a mobilisation of scientific effort in its support becomes an urgent need. ...
> From this point of view, the right of society in a time of emergency to prescribe the directions in which scientific effort shall first be made can scarcely be challenged. (29)

The British Association also faced a call from within its own ranks

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27. The Times, 11 September 1935, p.13. Section N, sociology, was founded in 1960. For Section X, general, see chapter II n.12 above.

28. cf. n.17 above.

29. Brightman, 'Social science', Nature, 136, (14 September 1935), 409-410.

to adopt a more activist line on positive social relations. At the Aberdeen meeting, the sectional committee of Section F, on the initiative of its recorder K.G. Fenelon, appointed a committee to examine the 1933 general officers' resolution.[30] This committee presented its report at Norwich.[31] The report remarked that the 1933 resolution had been inspired mainly by 'the fears expressed that the advances of science are in certain directions reacting unfavourably upon the life of the community and adversely affecting human welfare'. It observed that the British Association could quite properly focus attention on 'the stimulation of inquiry into and the better understanding of such economic and social dislocations as may be thought due to the advances of science in certain directions' and continued:

> In general this may be held to be part of the subject matter of the social sciences and it is clear that a number of the sections already deal with subjects of this kind.
>
> The Committee recommends that the Association might indicate the importance which it attaches to the development of the social sciences by appointing a third General Secretary, who would be specially associated with this group of studies. This emphasis would convey to the public that the Association has always regarded this form of scientific inquiry as it regards the mathematical, physical, and biological sciences.(32)

The report also suggested that 'the Council might consider the separate publication of groups of papers which deal particularly with the bearing of new constructive ideas and new inventions upon the technique of production, the technique of consumption and similar subjects.' Finally, the report expressed concern about the fact that 'the titles and synopses of papers, as given in the programmes, often afford but slight indication to [press] reporters of the importance of a paper or of its possible interest to the general public' and urged that something should be done to advertise such papers.

The report as a whole was forwarded to the Committee of Recommendations.[33] The psychology Section decided to support 'any

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30. Section F minutes, 7 September 1934.

31. Section F minutes, 9 September 1935. The members of the committee were H.M. Hallsworth (Section F president, 1934), J.G. Smith (Section F president, 1935), R.B. Forrester, D.H. MacGregor and K.G. Fenelon.

32. The two general secretaries of the Association were traditionally drawn one each from the physical and biological sciences. The Royal Society had a similar arrangement.

33. Section F minutes, 9 September 1935.

resolution of [Section] F regarding the appointment of a third general to deal with the social & mental sciences'.[34] That part of the Section F report beginning 'The Committee recommends .... ' emerged as a distinct resolution and as such was accepted by the General Committee and passed on to the Council.[35]

The resolution's claim that the social sciences had always been held in equal esteem with the natural sciences by the British Association calls for some comment. The chequered history of the economics Section has already been sketched in chapter I above ; the most recent attack on it had been launched in 1921, when the suggestion that its work was 'not properly within the scope of the Association' and that it should be disbanded gained the support of a minority of a six-man investigating committee appointed by the Council.[36] As to the prestige of economics : up to 1935 no presidential address to the Association had ever been devoted chiefly to economic matters. If anthropology be a social science in the sense of the resolution, then a second social science Section (then out of eight Sections altogether) was founded in 1884, anthropology having been a sub-department of biology (Section D) since 1865. This was followed by the foundation of the education Section in 1901, of which it is relevant in the present context to point out the earlier involvement of Section F in education, the failure of an attempt to establish the Section in 1890, the caution with which the Council finally moved in 1900[37] and the attack made on the Section in 1921.[38] Lastly, the Benjamin of the Sections, that for psychology, was set up in 1921, having since 1896 been joined to physiology ; again the move was not accomplished without difficulty.[39] By the time of the Section F resolution, then, four out of thirteen Sections of the British Association treated of subjects which could loosely be labelled as 'social science' ; but three of them were of comparatively recent origin and all save Section H were periodically criticised as unscientific and outside the proper scope of the Association. Between 1901 and 1935 the only representative of these four Sections to preside

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34. Section J minutes, 10 September 1935.
35. B.A.R., (1935), xlviii
36. Chapter II, n.34 above.
37. The great bulk of the Association's educational work was conducted in Section F until the end of the 1880s, after which this rôle was increasingly assumed by Section B under the influence of the chemists H.E.Armstrong and J.H.Gladstone. For the attempt to found an education Section in 1890, see B.A.R., (1890), lxxxvii and (1891), lxxiv. When Section L was founded, the Council decreed that it 'shall not necessarily meet each year' : B.A.R., (1901), lxxxviii.

38 and 39 (cont. overleaf)

over the whole Association was the archaeologist Arthur Evans, excavator of Knossos. The social sciences did have some sort of place at the British Association, but it was not one of particularly long standing and it was certainly not one of equal esteem. The resolution's statement to the contrary is a rhetorical gambit rather than a statement of fact.

The resolution predictably divided the Council. In fact, at a well-attended meeting on 1 November 1935, it divided the Council exactly and W. W. Watts in the chair used his casting vote to pass a motion appointing a committee to deal with the resolution. It was decided to postpone choosing the members of this committee until the December Council meeting, presumably to allow tempers to cool off a little, and in the same spirit the wording of the resolution was altered to read' .... by appointment of a third General Secretary or by other appropriate means'.(40) Eventually twelve Council members were appointed to the committee : four physical scientists - Boswell, Ferguson, A. M. Tyndall and Watts ; three biological scientists - Balfour-Browne, Viscount Bledisloe and F. T. Brooks ; and five who might loosely be called 'social scientists' - R. B. Forrester and Josiah Stamp of Section F, J. L. Myres of Section H, James Drever of Section J and W. W. Vaughan of Section L.(41)

When the committee reported back, in February 1936, it completely ignored the invitation to promote the development of the social sciences as a distinct field of intellectual endeavour and chose instead to concentrate on the by now familiar theme of the relation of scientific progress to the life of the community. In other words it reaffirmed the policy of the Association to limit its involvement in the social relations debate to exploring the social significance of actual developments in the natural sciences, and it refused to press in addition for the 'scientific' study of society. The committee would not even comment on the appointment of a third general secretary. It simply proposed that :

> Certain selected communications in the programme at the Annual Meeting should be distinguished, by inclusion in a separate group with a collective series-title or other appropriate means, as of special bearing upon the relations between Science and the interests of the community.

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38. See n. 36 above.
39. <u>B. A. R.</u>, (1919), lxxv and (1920), xii, xxviii.
40. Council minutes, 1 November 1935.
41. Council minutes, 6 December 1935.

> The Committee believe that this procedure, without involving any violent reform of the programmes, would provide the evidence which public opinion demands that the Association does in fact discharge its functions of 'obtaining a more general interest for the objects of Science'.(42)

In March the Council discussed the terms of an introduction to the projected series; reference was again made to 'the growing strength of the public demand for a more systematic presentation of selected subjects of scientific investigation in their bearing on the life of the community'.(43) In the event the idea of a separate grouping was abandoned in favour of marking with an asterisk the relevant items in the programme.

The minutes of the Council meeting of 6 June 1936 contain a reference to 'correspondence relating to the establishment of a sub-section or other division of the Association to deal with Sociology'. The Council decided, however, that individual Sections already had adequate machinery for including sociological topics in their activities if they so wished, and nothing ensued from the correspondence.(44) At the 1937 Nottingham meeting Morris Ginsberg suggested to the sectional committee of Section F that it might consider 'the possibility of changing the title of the Section in order to make possible the inclusion of papers in Social Science'. The Section was 'unwilling' to take quite so explicit a step in opposition to the Council's lack of enthusiasm for the subject, but it recommended that its organising committee should try to include 'a paper or papers in sociology in the Section programme at future meetings and help in the organisation of joint discussions on the social implications of science'.(45) Formal recognition by the British Association of sociology came with the establishment of Section N in 1960.

Thus pressure from within the British Association for greater involvement in positive social relations was resisted by the Council in favour of what it interpreted as public demand for the sort of approach it was already offering. It should be borne in mind that unlike a society with a specialist audience - professional or political - the British Association was particularly dependent for its continued existence on the financial and moral support of the general public and

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42. Council minutes, 7 February 1935; cf. B.A.R., (1936), xxxiii-xxxiv.
43. Council minutes, 6 March 1935.
44. Council minutes, 6 June 1936.
45. Section F minutes, 8 September 1937.

consequently had carefully to discern and satisfy its needs. The net result of the Section F resolution was to confirm the Association in its existing social relations policy and to decorate the programme with a score of asterisks.[46]

This decision by the Council may be set against the background of the Association of Scientific Workers, which during 1935 moved decisively towards the radical cause.[47] The process was highlighted by the publication early in the year of a collection of essays under the title The frustration of science.[48] Six of the seven contributors were connected with the Association,[49] and four of them were radicals.[50] They set out to demonstrate how numerous social problems were caused by the restrictions which vested capitalist interests placed in the way of the application of scientific knowledge and to argue that it was the duty of the scientist not to study society objectively but to be 'directly concerned with the great political struggles of the present day'.[51] Brightman, reviewing the book in Nature, was impressed by much of the evidence it contained but, of course, felt that its main thesis ' will no doubt disappoint many who believe that the study of difficult political, social and economic questions by the scientific method is a most fruitful line of advance'.[52] During the same year, the rationalist B.W. Holman was replaced as general secretary by the radical W.A. Wooster[53]; a new policy statement, drawn up by the Cambridge branch under Bernal, was published by the Association[54] and its journal, which since August 1932 had been published jointly with the British Institute of Social Service under the title Progress and the scientific worker[55], once

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46. The asterisks seem to have been appreciated. See Nature, 137, (9 May 1936), 767 and ibid., 138, (15 August 1936), 274.
47. See Kay MacLeod, A.Sc.W., pp.341-355 and Werskey, Visible College, pp.231-238.
48. A.D.Hall et al., The frustration of science (George Allen & Unwin), 1935).
49. Kay MacLeod, A.Sc.W., pp.346-347. The six were J.D.Bernal, P.M.S.Blackett, Enid Charles (wife of Lancelot Hogben), J.G. Crowther, Daniel Hall and V.H.Mottram.
50. Bernal, Blackett, Charles and Crowther.
51. A.D.Hall et al., op.cit., p.130.
52. Nature, 135, (16 March 1935), 414.
53. Werskey, Visible College, pp.231-232.
54. The scientific worker, (December 1935), 1-7.
55. Kay MacLeod, A.Sc.W., p.338.

more appeared independently as The scientific worker. The rationalists' 'objective' study of society was rejected both by the British Association, as beyond its ambit, and by the radicalised Association of Scientific Workers, as politically irrelevant. The latter began to attract new members, particularly among the younger scientists, and in the next four years doubled its strength in the universities.(56)

Meanwhile, important changes were taking place in the British Association hierarchy. At the Council meeting in March 1935 Josiah Stamp was elected president of the Association for 1936, thus opening the way for the first ever presidential address to be centred on an economic theme. The economists could have one of their number as president, even if they could not have a general secretary! Stamp, incidentally, was the first president of the British Association since 1842, and only the second in the Association's history, who was not a Fellow of the Royal Society.(57) On 17 February, when this was still in the offing, the permanent secretary O. J. R. Howarth suggested informally to Boswell that he might consider succeeding Stamp as general treasurer. 'This surprised, but attracted, me', wrote Boswell, 'for the opportunity it offered for me to pull the B. A. finances together.'(58) Boswell had first attracted attention by the work he put into organising the 1923 Liverpool meeting, he being then professor of geology at Liverpool : this 'caused the Council and officers to keep their eye on me, ready for when J. L. Myres, the General Secretary on the B. side, came to retire'.(59) He had had ample scope to demonstrate his 'flair for administration and organisation'(60) during his term as general secretary. The other general secretary, F. J. M. Stratton, retired at this time through ill-health, so both general secretaryships fell vacant simultaneously.

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56. Werskey, Visible College, p. 233.
57. O. J. R. Howarth, The British Association for the Advancement of Science : a retrospect, 1831-1921, (B. A. A. S., 1922), p. 283, lists the 1842 president, Lord Francis Egerton, as an F. R. S., though in the table of meetings published annually in B. A. R. he is only described as F. G. S. Egerton's entry in the D. N. B. gives no mention of the Royal Society and he is not included in the list of Fellows given in The Record of the Royal Society of London (Royal Society/O. U. P., 3rd ed., 1912).
58. Boswell, A narrative, p. 236.
59. ibid., p. 201.
60. See Boswell's entry in the D. N. B.

'Chubby' Stratton was succeeded by Allan Ferguson, at 6 ft 6 in and 21 stone distinctly unchubby! Ferguson was recorder of Section A, 1931-1936; he had been a member of Council since 1932 and he had hinted to Boswell that he would like the job of general secretary when the opportunity arose.[61] In his professional life he 'devoted himself to those tasks of organisation and committee attendance which are so necessary but so shunned by most scientists'. ' In politics Allan Ferguson was a Liberal, of the Manchester school, but he had a good deal of sympathy with the Labour movement, and an appreciation that there was much that is valuable in the doctrines of the traditional enemies of the Liberals, the Conservative party. He believed very strongly in the League of Nations.'[62] Boswell's old post went to Frederick Tom Brooks[63], the Cambridge professor of botany. He had been secretary of Section K, 1919-1927, and was president of the section in 1935. He, too, was a very capable administrator. Politically, he was a Conservative.[64] In principle, political affiliations were irrelevant to eligibility for office in the British Association - Bernal, for example, was elected to the Council in 1946[65] - as, indeed, was only consistent with its apolitical traditions : they are mentioned here by way of background information. The chief quality sought in a general secretary was administrative and organisational ability, which Boswell, Brooks, Ferguson and Stratton all possessed abundantly. Having been agreed by the Council, these appointments were formally ratified by the General Committee at Norwich.

While the Section F resolution was passing through Council, another set of negotiations, of probably greater significance, was also in progress. This concerned the amalgamation of the British

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61. Boswell, A narrative, p.240.

62. J.M. Awbery, 'Allan Hitchen Ferguson', Proc. Phys. Soc., A65, (1952), 1057-1061.

63. 1882-1952. Educated at Sexey's School, Bruton and Emmanuel College, Cambridge. Demonstrator in botany at Cambridge, 1905-1913; lecturer in botany, 1919-1931, reader in mycology, 1931-1936, and professor of botany, 1936-1948, at Cambridge. F.R.S., 1930. 'Brooks showed administrative ability of a high order.' Secretary of Section K, 1919-1927; president, 1935. General secretary of the British Association, 1935-1946. - Ob. Not. Roy. Soc., 8, (1952), 341-354.

64. Boswell, A narrative, p.258.

65. See chapter IX, n.87 below.

Assocation with the British Science Guild. In 1927 such a move had foundered, partly because Richard Gregory insisted on regarding the two bodies as of equal status and partly because the General Committee of the Association thought that it should concern itself 'with scientific work only, and not with the social consequences'.(66) Differences between the two were emphasised again in 1932-33 by their respective attitudes to the Parliamentary Science Committee.(67) By the summer of 1935, however, both factors had changed. On the one hand, the Guild's bargaining power had weakened. It had assets of £4,355, 355 life members or fellows and 242 annual subscribers, as compared with the Association's assets of over £70,000, annual income of nearly £5,500 and an average attendance at its annual meetings well in excess of 2,000. Moreover, the Parliamentary Science Committee had taken over the Guild's most distinctive line of work - the parliamentary lobby. On the other hand, the Association had explicitly accepted that, in its own interests, it should consider some, at least, of the social ramifications of science and it was increasingly being seen by the public as fulfilling this rôle. As Gregory had feared, the Guild was having the ground cut from under its feet.

On 5 June 1935 an informal meeting was held between Richard Gregory and Albert Howard (respectively chairman and secretary of the executive committee of the Guild) and Watts and Boswell (of the Assocation) to consider a fresh set of proposals put forward by the Guild. F.J.M. Stratton later wrote that Gregory was 'largely responsible for merging the Guild with the Association'.(68) It was, however, Boswell who at this meeting

> outlined a scheme for incorporation, fair treatment of Science Guild members, and the establishment of an annual lecture : the Lockyer lecture, to keep the name of the Guild and its Founder alive.(69) These were welcomed and I later hammered out the details when I became General Treasurer in September.(70)

The Council of the British Association was formally appraised of these

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66. See chapter II, pp.44-45 above.

67. See chapter III, pp. 66-77 above.

68. F.J.M. Stratton, 'Richard Arman Gregory, 1864-1952', Ob. Not. Roy. Soc., 8, (1952), 410-417, p.416. cf. Manchester Guardian, 10 September 1936, p.4 : 'The amalgamation is especially due to the devoted efforts of Sir Richard Gregory.'

69. The Norman Lockyer lecture was, in fact, founded by the Guild in 1925. It was retained rather than established at the amalgamation.

70. Boswell, A narrative, p.241.

moves in December and received a full report in February 1936. Briefly, life membership of the Association was offered to existing life members of the Guild; the financial assets of the Guild were handed over to the Association; and a 'British Science Guild Committee' of three Guild and three Association nominees (respectively Lady Lockyer, L. C. Bernacchi and Richard Gregory; Allan Ferguson, Daniel Hall and W. W. Vaughan) was constituted to carry on the Guild's programme of public lectures. Boswell was pleased with his effort :

> The scheme eventually passed Council [in March 1936] and General Committee [at Blackpool] without a dissentient - which was a triumph of negotiation on my part, according to Gregory and Howard - the latter saying to my amusement that I ought to have been Chancellor of the Exchequer'.(71)

So astute a negotiator was Boswell that in May he persuaded Lady Lockyer, who 'practically speaking ... had been financing the the British Science Guild for some years' and who had intended to leave it a legacy of £1000, to make the money over to the British Association instead.(72)

In view of the ideological differences between the rationalists and the British Association, this amalgamation of the two organisations calls for a certain amount of comment. In the year or two after Aberdeen, their differences had been lessened, though by no means eroded, through developments in both practical and ideological spheres. The British Science Guild, bluntly, was now facing extinction. It was losing support and, with the formation of the Parliamentary Science Committee on the one hand and the 'activating' of the British Association on the other, it was losing its claim to be supported. Gregory realised this : in 1927 he held out for a merger on equal terms, whereas now he was prepared to accept that the name of the Guild should be perpetuated simply through a committee of the Association's Council. If the Guild was fading and Gregory and his colleagues still wanted an organisation other than Nature through which they could carry on their self-imposed mission of awakening scientists to their social responsibilities, they had little option but to turn to the British Association. The Association of Scientific Workers, having for a brief while been under rationalist control, was heading towards the radical outlook, whither Gregory would not follow. The British Association, on the other hand,

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71. ibid.
72. ibid., p.249. On the whole episode see also B.A.R., (1936), xxxvi - xxxviii and (1937), xxii -xxiii; Armytage, Gregory, pp.125-126, 133-136.

was becoming more deliberately involved in the social relations debate, even if not on rationalist terms. A more appreciative attitude towards the Association is detectable in Nature leaders about this time.

The rationalists themselves, moreover, were beginning to mellow in their approach to positive social relations. Their vociferous if muddled enthusiasm for planning, for example, was dampened by their realisation of 'the extent to which political organisations can affect the direction of scientific research, and even frustrate its efforts,'[73] as was made especially evident by developments in the Nazi and Soviet blocs. Scientific freedom and scientific internationalism were, in the end, more important. These were values that were shared in British Association circles. The rationalists' approval of eugenics was also starting to wane, under the impact of the Nazi use of eugenics and of the increasing emphasis among biologists on the significance of environmental rather than genetic factors in character formation. They remained at this time committed to the notion that scientific method held the key to the solving of social problems, but they began to grow more sensitive to the difficulties of trying to work out their beliefs in practice.[74] Amalgamation with the British Association became correspondingly a more palatable prospect.

What was in it for the British Association? The stated object of the British Science Guild was 'to promote the application of scientific method and results to social problems and public affairs' ; its slogan : 'We are a band of missionaries.' Judging by its history over the previous few years, the British Association was not an obvious customer for such wares. Yet key positions on the Council were filled by men like Boswell, Ferguson and Howarth who were sympathetic to Gregory's aims. In 1933 they could not carry the Council with them and practised instead 'the art of the possible' : that is, they argued only for the sort of interest in positive social relations which they thought the Association would buy. After the Norwich meeting they were emboldened to raise the stakes. When the general officers reported to the Council on the amalgamation in February 1936, they claimed that the Guild's stated object was 'implicit in those of the Association' and added :

> It is believed that the proposed union of the two bodies would strengthen the Association in the discharge of its

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73. Brightman, 'The protection of scientific freedom', Nature, 137, (13 June 1936), 963.

74. Werskey, 'Outsider politics', pp. 73-77; idem, 'Perennial dilemma', pp. 531-532; idem, 'Nature and politics', pp. 467-468.

> public functions, and it is suggested that through the Committee proposed below [i.e. the British Science Guild Committee] the Council might be assisted in keeping itself informed as to matters concerning the application of scientific method and results to social problems and public affairs.(75)

The amalgamation would reinforce the hand of those members of Council who wanted the Association to play a larger public rôle. That Boswell's success in steering the proposal through Council should be described by Gregory and Howard as 'a triumph of negotiation' indicates that they expected fairly stiff opposition. That he did succeed was a landmark in the history of the Association's involvement in the social relations of science.

Sentiment would also have played its part in the return of the prodigal Guild to the Association from which it had sprung. By the mid-nineteen-thirties, the Association was prepared to play a larger part in public life than it had been in 1903. The Guild meanwhile, had fallen on hard times. The two bodies overlapped in personnel ; one quarter of the permanent members of the Guild also belonged to the Association. Arnold Wilson, president of the Guild, gave a public lecture at the Norwich meeting of the Association; Josiah Stamp, president-elect of the Association, delivered the 1935 Norman Lockyer lecture of the Guild. There is a certain tidy logic in the proposition that the two should re-unite.

However compelling the case for amalgamation, however active he himself had been in promoting it, Richard Gregory could not but mourn the passing of the British Science Guild. After the General Committee had given its formal approval at Blackpool, the Journal of Education, which Gregory had edited for many years, carried the following doleful comment :

> The incorporation of the British Science Guild in the British Association will, it may be hoped, not restrict the educational activities of the Guild. ... It would be idle to suggest, however, the whole field of work covered by the Guild will still be covered. There is an element of tragedy in the extinction of a Guild whose task was to vitalise many educational and scientific movements.(76)

In his 1953 Alexander Pedlar lecture, Harold Hartley wondered whether

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75. Council minutes, 7 February 1936 ; B.A.R., (1936), xxxvi. In a Nature leader of October 1933, Gregory had argued that the British Association was too out of touch with public affairs to handle the application of scientific progress to them. See chapter IV, n.67. above.

76. J. of Ed., 68, (October 1936), 664; cf. Armytage, Gregory, p.136.

Gregory should not, after all, have stuck to his views of the two bodies as fulfilling essentially different rôles : 'I question whether the fusion was in the best interests of science. Has not Gregory's original objection been fully justified by the results ?'(77) Whatever the long-term consequences of the amalgamation, the Guild seemed to have little option at the time, and it could certainly be argued that it was in the best interests of the British Association to accept Gregory's overtures.

An early symptom of the Guild's presence in the Association was the latter's decision to join the Parliamentary Science Committee. On 10 January 1936, while the terms of the amalgamation were still being thrashed out, H.W.J. Stone, secretary of the Committee, had an informal discussion with O.J.R. Howarth as to the possibility of the British Association being persuaded to join. Howarth gave his 'private and personal opinion' that such a move would be 'both premature and inopportune' while negotiations with the British Science Guild were still in progress. As soon as these negotiations had been successfully concluded, Stone approached Howarth again.(78) This time more fruitfully : on 4 December 1936 the Council 'resolved that an annual subscription of ten guineas should be paid to the Parliamentary Science Committee, to stand for a period of three years after which the arrangement should be reviewed'. Ferguson was appointed as the Association's representative on the Committee.(79) Since the Guild had been instrumental in establishing and running the Committee, it would have been difficult for the Association not to join; but one should note how its support was qualified.

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77. Harold Hartley, 'The life and times of Sir Richard Gregory, Bt., F.R.S., 1864-1952', Adv. Sci., 10, (1953-54), 275-286, p.283. cf. Chapter II, n.17 above.

78. Letter, H.W.J. Stone to O.J.R. Howarth, 21 September 1936. Ferguson papers.

79. Council minutes, 4 December 1936. The Council curiously omitted to mention this in its annual report to the General Committee. See also Armytage, Gregory, p.136.

Chapter VII

1936-1937 : Further developments

The 1936 Blackpool meeting of the British Association was characterised by a concern with the relations of science and public welfare unprecedented in its scope, its sense of urgency and its closeness to issues of political controversy. This was widely recognised, even by the hitherto unimpressionable Times, which described the meeting as 'the first at which the decision ... to pay more attention to the bearing of science upon public welfare was fully carried out'.[1] The Manchester Guardian was also impressed :

> This year's meeting of the British Association ... should have effectually dispelled any idea that the modern scientist is a race apart, mewed up in his hermit cell of quiet, oblivious of what the world does with his test tubes and equations. ... On many great issues of the modern world the Blackpool meeting has made it plain where most British scientists stand. (2)

Nature echoed this last sentence[3] and proclaimed :

> The Blackpool meeting of 1936, it is probable, will stand out as a whole, certainly in popular memory, as the one meeting above all others which from the inception of the Association up to that date has endeavoured to address itself on a united front to a diagnosis of the current ills of human society. (4)

Such was the journal's enthusiasm, indeed, that from 12 September no less than five of its next eight leaders dealt with some aspect of the

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1. The Times, 17 September 1936, p.13. The paper had two days previously published a bit of doggerel celebrating the Association's efforts :

   Hoc stagno gaudens congressa Britannica turba
   Nunc immersa nigro pulchrior eveniet.

   Which may crudely be rendered :

   The British Ass in Blackpool gladly met
   Will leave it looking beautifuller yet.

2. Manchester Guardian, 17 September 1936, p.10.

3. Brightman, 'The social mission of science', Nature, 138, (24 October 1936), 697.

4. E.N. Fallaize, 'Human tendencies', Nature, 138, (26 September 1936), 521.

Blackpool meeting. Bernal and Crowther[5] also recognised the Blackpool meeting as a landmark in the growth of consciousness about social relations,[6] as did John R. Baker, though in his case it was not a cause for rejoicing :

> The movement against the pursuit of science for its own sake and against freedom in the practice of science suddenly began to become influential in this country in 1936, when the economist, Sir Josiah Stamp, gave the Presidential Address to the British Association at Blackpool.(7)

With the incorporation of the British Science Guild into the British Association, the Blackpool meeting was bound to show a lively interest in the social relations of science. Developments in wider spheres, however, were probably a more potent factor in ensuring that public attention would be focussed on Blackpool and would demand a response from the spokesmen of science. Since the Norwich meeting, Mussolini's threatened invasion of Abyssinia had not only become a reality but had also been carried to completion : on 9 May 1936 Abyssinia was declared part of the Italian empire.[8] Meanwhile, Hitler, having introduced conscription in Germany in March 1935, dramatically re-occupied the Rhineland twelve months later.[9] Britain thereupon 'began to rearm more vigorously though still without full conviction'.[10] None of this, however, had as great or as immediate an impact on the British public as the outbreak of the Spanish Civil War in July 1936.[11] Not only did this personify the struggle between communism and fascism, but it compelled awareness of the real danger of a European war and of the horror of war. On the day

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5. b.1899. Journalist and author in the fields of science, the history of science and science-and-society. Science correspondent of the Manchester Guardian, 1928-1948. Director of the science department of the British Council, 1941-1946. 'A particularly prolific and influential figure. A Marxist ..... an important force in the creation of the World Federation of Scientific Workers.' (Kay MacLeod, A.Sc.W., p.325 n.). First secretary-general of the W.F.S.W., 1946-1954.

6. See J.D. Bernal, The social function of science (Routledge, 1939), p.399 and Crowther, Social relations, pp.625-626.

7. John R. Baker, Science and the planned State (George Allen & Unwin, 1945), p.62.

8. Mowat, Britain, p.561.

9. ibid., pp.564-568.

10. ibid., p.568.

11. ibid., pp.572-582. For the effect of the Spanish Civil War on the outlook of many intellectuals, see Wood, Communism, pp.53-57. Its influence on the radical scientists is described in Werskey, Visible College, pp.233-234.

before the Blackpool meeting opened, The Times was condemning both the 'irresponsible butchery' of the republicans and the 'ruthless cruelty' of the nationalists. What with the use of poison gas in Abyssinia and aerial bombing in Spain,(12) war was very much a factor which influenced the public image of science and not surprisingly it was a major feature of the Blackpool meeting. On the home front, unemployment was falling but it remained severe in the depressed areas : the greatest of the hunger marches was staged in November 1936. 'No matter how much the statistics pointed to a general increase in real income there was no doubt, as the uneasy social conscience discovered, that very many families were still ... ill fed, ill housed, ill cared for when illness struck', and the investigations of men like Seebohm Rowntree on poverty and John Boyd Orr on consequent malnutrition served to bring home the facts.(13) Against this background the British Association not only went to great lengths to discuss the social relations of science but also found itself conducting an even more concerned defence of science than hitherto.

Josiah Stamp's presidential address was an economic analysis of 'The impact of science on society' along lines fairly similar to those developed in his 1933 evening discourse.(14) As before, he did not offer any grand scheme for moderating the impact, preferring instead to give an account of why this was difficult. In particular he was anxious to stress how numerous quite unpredictable variables made accurate forecasting enormously tricky in a democratic society.

> Of course, in a world where people go where they are told, when they are told, do what they are instructed to do, accept the reward they are allotted, consume what is provided for them, and what is manifestly so scientifically 'good for them' these difficulties need not arise. The human problem will then be the 'Impact of Planning'.(15)

'Few scientists', Stamp reminded his audience, 'have enjoyed the responsibility of making practical decisions as to what the public will want far ahead.' The pundits of 'scientific' economic planning should

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12. The outstanding example of this was the obliteration of Guernica on 26 April 1937.

13. Mowat, Britain, pp.502-512. A very different but possibly more conscience-stirring survey, George Orwell's The road to Wigan pier, was published in 1937. Note also Walter Greenwood, Love on the dole (Jonathan Cape, 1933).

14. B.A.R., (1936), 1-26.

15. ibid., p.18.

be more modest in their ambitions: 'It does not provide automatically the secret of correct prevision.' The specialist scientist does not have any particular authority in areas outside his own specialism : as Stamp rather laboriously put it, 'It seems still a matter for investigation whether the development of a specialist's thinking on balance impairs or improves the powers of general thinking.'(16) The Manchester Guardian was delighted :

> Sir Josiah Stamp's presidential address ... was the reply of the 'active world' to the impatience (not to say occasional arrogance) of the scientist venturing into fields not his own. We have heard much during these years of world depression of the frustration of the scientist and engineer, capable of turning civilisation upside-down, ... but hampered by the futility of politicians and men of business, the conservative public, the conventional forms of government, and an illogical economic system. Sir Josiah Stamp tried to bring him back to a more equable temper by reminding him that he is here dabbling in a foreign technique.(17)

Apart from attacking the simplistic rationalist approach to planning, Stamp did have two suggestions to make. One, in the context of technology and unemployment, was that the industrial applications of scientific discoveries might somehow be restricted. This he encapsulated in the unfortunate saying 'Perhaps birth control for people demands ultimately birth control for their impedimenta'(18) - unfortunate because it could be, and was, readily quoted out of context. Lancelot Hogben leapt at the bait, warning Stamp that 'the younger men of science will not be slow to respond to [i.e. reject] a revival of the machine-wrecking mentality' and accusing him of being an 'intransigent individualist'.(19) Recalling earlier historical examples of the exaltation of 'pure science to the neglect and disparagement of its applications', Hogben mused : 'When a Director of the Bank of England [i.e. Stamp] appeals to the British Association for a moratorium on inventions we may justifiably wonder whether history is not repeating itself.'(20) Stamp protested that he did not believe that the progress

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16. For a discussion of transfer of training, see chapter XIII, pp.341-343.
17. Manchester Guardian, 10 September 1936, p.10.
18. B.A.R., (1936), p.13.
19. In the Section L discussion on the cultural and social relations of science described later in this chapter. See Manchester Guardian, 11 September 1936, p.5 and Crowther, Social relations, p.626.
20. In the same discussion. See John Boyd Orr et al., What science stands for (George Allen & Unwin, 1937), pp.111-132, esp. pp.114-115. See further Lancelot Hogben, The retreat from reason (Watts, 1936), pp.30,58.

of invention should be stopped.

Stamp's second and more substantial suggestion had to do with the social sciences - i.e. 'modifying the nature of man to meet the impact' of science, as opposed to modifying the impact to suit man. Though rationalist planning was condemned to futility, yet, somehow, 'there must be optimal lines of change which are scientifically determinable.' But these would yield, if at all, only to a concerted effort : 'An attack all along the front from politics and education to genetics and human heredity is long overdue.' Given that resources were finite, a re-thinking of priorities was essential :

> If a wise central direction were properly allocating research workers to the greatest marginal advantage, it would make some important transfers. There is not too much being devoted to research in physics and chemistry ... but there is too much relatively to the research upon the things they affect, in physiology, psychology, economics, sociology. We have not begun to secure an optimum balance.(21)

> We have spent much and long upon the science of matter, and the greater our success the greater must be our failure, unless we turn also at long last to an equal advance in the science of man.(22)

Once again Stamp's phraseology got him into trouble: John R. Baker accused him of advocating 'a "wise central direction" to allocate research workers to their tasks'[(23)] - which seems a bit rough on the 'intransigent individualist'!

Baker apart, Stamp's call for the upgrading of the social sciences found much support. A Nature leader approvingly reiterated many of the phrases from this portion of his address.[(24)] The Manchester Guardian described it as an 'admirable exposition of the case for sociological and economic study' which 'should help a great deal to create the opinion that will redress the present uneven balance between the sciences'.[(25)] Lord Horder, opening a discussion in the physiology Section on 'The strain of modern civilisation', declared : 'Amongst the remedies for the ill effects of the strain of modern life, then, I place first more Science and especially Science directed towards the study and development of the mind and the spirit of man.'[(26)] The

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21. B.A.R., (1936), 21.
22. ibid., p.26.
23. John R. Baker, Science and the planned State (George Allen & Unwin, 1945), p.62.
24. Brightman, 'Science and the community', Nature, 138, (12 September 1936), 417-419.
25. Manchester Guardian, 10 September 1936, p.10.
26. B.A.R., (1936), 467; Nature, 138, (26 September 1936), 530.

geographer H. J. Fleure, too, 'pleaded for the scientific study of mankind as essential if society is to advance'.[27] Commissioner David Lamb of the Salvation Army, who during the thirties was in the habit of preaching on the Sunday of British Association meetings and attacking the Association for its lack of social conscience, called for the formation of a social science Section in his Blackpool sermon.[28] When Josiah Stamp gave a press conference at the end of the meeting, this last point came up again. Though sympathetic, he had, in view of the outcome of the 1935 Section F resolution, to be cautious :

> .... such an obligation, like marriage, was not lightly to be undertaken. The Association had had seriously in mind the question how sociology and social science could be dealt with. These were wide subjects, and the Association did not wish to draw on the strength of existing sections unduly. The matter was receiving attention, but the creation of new sections could only be done with very great care.(29)

The extent of the British Association's real commitment to the social sciences is difficult to pinpoint : on the one hand it made many appreciative noises and it did have Sections which it claimed were free to discuss the social sciences, but on the other it would not recognise the field in its official structure.

An example of a science generating a body of knowledge which seemed to have far-reaching consequences for the organisation of society is the already familiar one of nutrition. At Blackpool, John Boyd Orr led off in Section M with a paper drawing on the material in his famous Food, Health and Income published six months earlier, in which he demonstrated that 'the cost of an adequate diet ... is beyond the purchasing power of one-third of the community.'[30] Criticisms that his standards were too high he dismissed with the highly provocative remark that although they were discounted by the experts, such criticisms were

> well received by certain political and vested interests which would be seriously inconvenienced and embarrassed if there were a widespread demand to bring a sufficient amount of the relatively expensive protective

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27. In a paper not published in B.A.R.; but cf. Brightman, 'The social mission of science', Nature, 138, (24 October 1936), 697-699.

28. Manchester Guardian, 14 September 1936, p.5; The Times, 14 September 1936, p.7.

29. The Times, 17 September 1936, p.6.

30. B.A.R., (1936), 438.

foods within the purchasing power of the poor.(31)
There had, in fact, been attempts by 'certain political and vested interests' to suppress Orr's book on the grounds that it would be damaging to national policy.(32) To overcome what he described as 'probably the most important and the most difficult domestic political problem at the present time', Orr proposed that the existing agricultural policy should be replaced by 'a national food policy based on subsidised consumption and reorganisation of distribution'; this 'would constitute the greatest social reform of our age'. Daniel Hall, following, also urged the necessity of 'a comprehensive plan that will take the nutritional needs of the people into account',(33) and other speakers discussed how the quantities of meat and of milk implied by the new standards of nutrition could be produced. The next day Section M considered in greater detail the economic problems of milk production.(34)

Political considerations of another sort lay behind the joint discussion between the zoology and anthropology Sections on 'Genetics and race'.(35) It was, ostensibly, a technical debate between two groups of specialists (geneticists and anthropologists) who had been using the term 'race' to denote apparently different concepts and who needed to clear up the resulting confusion by pooling their respective knowledge. But, as Nature pointed out,

> no one at this crowded meeting was unaware that the speakers

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31. John Boyd Orr et al., What science stands for (George Allen & Unwin, 1937), p.24. This book was made up of Orr's paper, J.C.Philip's address to Section B, the contributions of Richard Gregory, Daniel Hall and Lancelot Hogben to the Section L discussion on the cultural and social values of science and a radio broadcast by A.V.Hill. The book's preface begins: 'The Blackpool meeting of the British Association was plainly notable for an awakening sense of social responsibility among English men of science.' Although Josiah Stamp announced its intended publication at his concluding press conference - Manchester Guardian, 17 September 1936, p.5 - the book was issued on the authority of its authors and not under the official aegis of the British Association. It was reviewed by E.H.Tripp in Nature, 139, (12 June 1937), 981-982.
32. At Norwich the previous year he had set out the main findings of Food, Health and Income and, with the help of Ritchie Calder, had secured maximum press coverage of his paper in order to forestall its suppression. The book duly appeared in March 1936. See Lord Boyd Orr, As I recall (MacGibbon and Kee, 1966), pp.116-117 and Biog. Mem. F.R.S., 18, (1972), 60; also E.H.Tripp, 'Food and the nation', Nature, 136, (16 November 1935), 771-773.
33. B.A.R., (1936), 439.
34. ibid., pp.441-443.
35. ibid., pp.458-463.

> were indirectly commenting upon the exploitation of the race concept by politicians who apparently are deliberately confusing linguistic terms such as 'Aryan', cultural terms such as 'germanic' and genetic terms like 'Nordic' by using them synonymously. It undoubtedly is the case that the term 'race' is now being used in a pseudo-scientific sense to further purely political interests, and this being so, it behoves all scientific workers - anthropologists, ethnologists and the rest - to respond to the demand on the part of the general public for guidance concerning the quality of the pronouncements of those who claim scientific endorsement for their own peculiar attitudes toward such matters as territorial readjustment, immigration quota or the relative intellectual pre-eminence of certain national groups.(36)

If these papers give a picture of science actively seeking to cope with social problems, other papers leave one with a distinct impression of science, again, on the defensive.(37) As Lord Horder told the physiologists, 'there is a notion afoot that, in the last analysis, Science is largely responsible for the extent and persistence of much of the [chiefly mental] strain of modern life' - which 'unloading upon Science' he condemned as 'a mere pusillanimity'.(38) Observing that 'in the popular mind, and indeed by many who, to judge from their position, should be better informed, the chemist is still frequently associated merely with pharmacy or warfare', and that 'a just estimate of the chemist's function is almost impossible for those who associate him chiefly with explosives and poison gas and regard him as a particularly devilish kind of scientist', J. C. Philip(39) attempted in his presidential address to Section B to modify this unflattering image by explaining the 'fundamental and widespread character of the service which the chemist renders to the community'.(40) The discussion which followed included a paper entitled 'The benign gifts of organic chemistry',(41) while later in the meeting a session on chemistry

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36. Nature, 138, (12 December 1936), 988-989; cf. E.N. Fallaize, 'The Aryan doctrine', Nature, 134, (18 August 1934), 229-231.
37. cf. E.N. Fallaize, 'Human tendencies', Nature, 138, (26 September 1936), 521-523.
38. B.A.R., (1936), 466.
39. 1873-1941. Educated at Aberdeen Grammar School and Aberdeen University. Demonstrator and lecturer at the Royal College of Science, 1900-1909; assistant professor of chemistry at Imperial College, 1909-1913; professor of physical chemistry, 1913-1938. F.R.S., 1921. Secretary of the Chemical Society, 1913-1924. President of the Science Masters' Association, 1930. President of Section B, 1936. Member of Council, 1937-1941.
40. B.A.R., (1936), 43-56; What science stands for, pp.39-71.
41. B.A.R., (1936), 337-338; Nature, 138, (26 September 1936), 557-558.

and food science ended by extolling the 'co-operation between chemist, physicist and engineer in the service of the community'.(42) The engineers, too, were busy burnishing their image. 'Verily for the promotion of peace and understanding, engineering easily out-classes every religion', quoth their president, William Cramp, 'and for battle, murder, and sudden death it has no equal.' But :

> In its purest form, engineering is the greatest instrument of civilisation that the world has ever seen, in the sense that it continually tends to promote a closer contact, a greater intimacy, and therefore a more profound understanding between individuals and nations. Three-fourths of the work of the engineer is devoted to the development of communication. ... Left undisturbed by the politician, the scaremonger, and the patriot, the engineer would demolish the Tower of Babel and render war impossible.(43)

Cramp would not go all the way with Miles Walker, but he did insist that the engineer should be accorded professional and social status on a par with the lawyer and doctor. Instead of which he stood accused - unjustly, of course - of rendering war more destructive, of contributing to economic chaos and of failing to stimulate industry in the depressed areas.(44)

Some speakers were, however, more willing to admit that the case against science was not wholly insubstantial. Allan Ferguson, for example, in his presidential address to Section A :

> We are most of us ready enough to discuss the 'Impact of Science on Society', so long as we restrict ourselves to an enumeration of the benefits which science has bestowed upon mankind. ... But we have to remember actively that there are dysgenic applications of scientific knowledge, and if the scientist claims, as he rightly does, that place in the counsels of the nation which the importance of his work warrants, he must cease his worship of what Professor Hogben calls the 'Idol of Purity', (45) must be prepared to discuss all the social implications of his work and to educate himself, as well as his less fortunate brethren trained in the humanity schools, in a knowledge of these implications.
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> Our Association is peculiarly fitted to develop and discuss such knowledge. (46)

The fullest admission of difficulties came in the Section L discussion

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42. B.A.R., (1936), 344.
43. ibid., p.142. cf. Nature, 138, (3 October 1936), 574-575.
44. ibid., pp.146-148.
45. cf. Werskey, Visible College, p.190.
46. B.A.R., (1936), 41-42.

on the cultural and social values of science,[47] which had much to say on other than strictly educational matters. Indeed, Josiah Stamp described it as the 'outstanding' session of the Blackpool meeting.[48] Richard Gregory, opening the discussion, outlined the social cost of the growth of mechanisation and confessed :

> It is little wonder that ... the suggestion should be made to call a halt to discovery or mechanical improvements which increase production at the expense of labour. ... It is an ironical comment upon modern civilisation that the social reaction to the gifts of plenty thus made possible is not an increase of human welfare, but distress and unemployment. (49)

Easy speeches about the long-term benefits to society were beside the point: 'It is almost a mockery to suggest to men who find themselves unwanted through the introduction of particular machinery that the ultimate effect will be increased employment. The thought, however sound it may be in industrial economics, affords poor satisfaction for present needs.'[50] The problem was far too deep for the 'obviously useless' expedient of a research moratorium : its solution was political. In the short term, the victims of mechanisation had a right to be supported by those whom mechanisation profited. In the long term,

> Modern technical achievement and scientific thought foreshadow a new economic structure for society in which they should be used to exercise decisive influence upon the major policies of the State as well as upon their administration. (51)

Science certainly bore a measure of responsibility for the 'distress and unemployment' of the age, but these, Gregory insisted, were not inevitable corollaries of scientific progress. They were, rather,

> due to the neglect of the application of scientific methods to the solution of social problems. Our distributive and economic system remains on the basis of a pre-scientific era, wholly unadjusted to the change, and unable to bear

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47. B.A.R., (1936), 429-432; Nature, 138, (3 October 1936), 594-596; and What science stands for (op. cit., n.31 above), chaps. IV - VI.

48. Manchester Guardian, 17 September 1936, p.5.

49. What science stands for, pp.91-92, 95.

50. ibid., p.94.

51. ibid., p.94. cf. Hopkins' 1933 address, pp.78-79 above.

> the burdens placed upon it by the problem of new and almost incredible abundance.(52)

Daniel Hall, too, took the public image of science as the starting point for what became a political paper :

> Yet for all the paeans with which the progress of science has been accompanied, people are beginning to look at it with distrust. ... to many good souls science is taking on the aspects of the enemy, threatening not only the enjoyment of the benefits that it confers but the simpler joys of existence before its arrival.(53)

The dangers of governmental appropriation of science for anti-social and anti-democratic ends were real and urgent. Education was a vital factor in averting these dangers, but in itself it was not enough. Even dissemination of scientific method was not enough.

> The working men of science are called upon to organise in order to make their point of view prevail in the affairs of the State. ... Is there any hope of obtaining a body of men of science who will express a corporative opinion upon public affairs ? The existing representative organisations like the Royal Society and the British Association are by charter and custom debarred from participation in politics, and ... it is probably right that both bodies should refuse to express an opinion except when it is invited on some specific matter of science. It is to be recognised also that many, perhaps the majority of men of science, refuse to claim any greater right than that of the ordinary citizen to an opinion upon affairs. ... Again, very few men of science have the time ... (54)

Despite such unpromising omens, Daniel Hall believed that the most effective antidote to totalitarian control of armaments and of the techniques of persuasion and propaganda would be the insights that could be produced by an 'institution for the study of the social aspects of science', though whether such an institution could become operative 'before the menace of war sweeps aside all other considerations' was another matter.

Lancelot Hogben's contribution to the Section L discussion was, as one might expect, a lively one. He, too, began with the reaction against science :

> To-day western civilisation is threatened by a widespread reaction against democratic institutions. ... Our newspapers and bankers are blaming science for the poverty which persists amid the plenty which science has made possible. There is a present danger that public opinion

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52. ibid., pp.95-96. The latter sentence made its first public appearance in Brightman, 'The contribution of science to the future', Nature, 130, (3 September 1932), 326. Rationalist rhetoric often has this déjà-vu character. The passage is quoted, though misplaced, in Armytage, Gregory, p.124.

53. What science stands for, pp.102, 103.

54. ibid., pp.108-110.

> will learn to identify science with the latest horrors of mechanised warfare.(55)
>
> Complacent acceptance of its prostitution to destructive ends and ignorance of the constructive alternatives which existing knowledge places at our disposal will have disastrous consequences for all of us if the helplessness and horror of modern war is canalised in a revolt against science, a repudiation of the benefits which science can confer and a retreat to a lower level of civilised living.(56)

What with 'frozen patents, armament races, chaotic over-production, mass unemployment, or subsidies to destroy the fruits of the soil', it was a 'manifest absurdity' to believe that 'advancing scientific knowledge of itself guarantees the continued welfare of mankind'. Such simplistic faith should be rigorously excluded from the teaching of science: 'Education for citizenship demands a knowledge of how science is misused, how we fail to make the fullest use of science for our social well-being, and, in short, a vision of what human life could be if we planned all our resources intelligently.' What could save both science and society was 'scientific humanism',(57) and Hogben called for a course of general science 'permeated with the historical outlook' and 'orientated towards the elucidation of the major constructive achievements of natural knowledge'.

Whatever the variety of anxieties displayed and of solutions sought in these papers, they all had one thing in common: they demonstrated forcefully to the public that scientists - meaning the British Association - were as concerned as the rest of the community about the social effects of their work. Nowhere was their concern more deeply felt or clearly expressed than on the issue of war, which was the most prominent feature of the meeting.

> Nothing has been more striking in the recent meetings of the British Association at Blackpool than the general indignation at the prostitution of the results of scientific inquiry for purposes of warfare, and the concern at the spread of political systems which reduce science itself

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55. ibid., pp.115-116.

56. ibid., p.121.

57. '... a term used to describe social thinkers like [Julian] Huxley and Hogben who were influenced by Bacon, Wells and Marx. They were certainly not Marxists, but their ideas about the role of science in society and the scientific organisation of society were shared by the orthodox Marxists Levy, Bernal and Haldane.' Wood, Communism, p.149. See further Lancelot Hogben, Dangerous thoughts (George Allen & Unwin, 1939), chap. I: 'The creed of a scientific humanist'.

> and other of the richest elements in our intellectual heritage to servitude.(58)

Only William Cramp disclaimed involvement: 'The engineer is in such matters exactly on a par with the rest of mankind.'(59) Otherwise, scientists spoke out emphatically and unequivocally, as scientists, against the applications of science in warfare :

> I think I speak for the vast majority of my fellow-chemists in saying that we dislike intensely the present world-wide prostitution of knowledge and skill to destructive ends.(60)
>
> There can be no difference of opinion as to the inhumanity and insane misuse of science in the extension of aerial warfare to the destruction of cities, and the killing and maiming of women and children by poison gas, incendiary bombs, and high explosives, against which the only real defence is retaliation. Unless science repudiates such methods of cultivated barbarism, it must lose whatever right it now possesses to be a spiritual force.(61)

Hogben, too, warned that the future of science, and of society with it, was at stake. Again and again speakers urged that liberal values of freedom of speech, freedom of research, internationalism, all the cultural and humanist qualities that could be associated with science, were dangerously threatened by the rise of totalitarian regimes. Events in Russia, Italy, Germany and, most recently and most immediately, Spain proclaimed that scientists could not remain above the battle if democracy and liberalism (or even Liberalism - see Lord Horder's paper) were to survive. As J. C. Philip told Section B,

> It is time for chemists and scientists in general to throw their weight into the scale against the tendencies which are dragging science and civilisation down and debasing our heritage of intellectual and spritual values.(62)

Philip's address had the 'strong support' of the chemistry Section. Comments like the one just quoted were greeted with 'especial bursts of applause'. Robert Robinson, proposing a vote of thanks, added his own protest against the identification of chemistry with destruction. Josiah Stamp, too, expressed 'entire agreement' with the address.(63) Given such encouragement, the chemists put forward the following

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58. Brightman, 'The social mission of science', Nature, 138, (24 October 1936), 697. For similar comments see Manchester Guardian, 17 September 1936, p.10 and J. of Ed., 68, (October 1936), 658.
59. B.A.R., (1936), 146.
60. J. C. Philip, presidential address to Section B, B.A.R., (1936), 48.
61. Richard Gregory, Section L discussion, What science stands for, p.99.
62. B.A.R., (1936), 49.
63. Manchester Guardian, 11 September 1936, p.4; Nature, 138, (26 September 1936), 557.

resolution :

> The members of Committee of Section B, in agreement with the views expressed in their President's address regarding science and warfare, request the General Committee to secure all possible publicity for the following : (1) The extent to which Chemistry is applied for beneficent purposes in connection with the industry of the British nation and the health of its citizens, is enormously greater than the scope of its employment for purposes of warfare. (2) Whilst the individual must remain free to determine his own action in relation to national defence, chemists as a body view with grave concern the increasing use of science for destructive ends.(64)

It is significant that such a resolution should emerge from Section B rather than from any other Section, for memories of the 'chemists' war' were still deeply embedded in the popular imagination, and the development of thermite incendiary bombs and high explosives and the use of poison gas in Mussolini's Abyssinian campaign reinforced these memories. It was this image which Philip was anxious to dispel. In this he was not alone. The Dean of St. Paul's had suggested that scientists 'should make it a point of honour, a matter of professional ethics, to keep secret any discovery that might be utilised for the purpose of war'.[65] The Technical Committee of the Disarmament Conference had considered the proposal that 'the chemists of the world should include in their code of ethics an undertaking not to work knowingly on the development and production of any prohibited method of warfare, and to expose publicly anyone who was detected in such work', and this had also been put to the International Council of Scientific Unions and to the Society of Chemical Industry.[66] Whether or not such ethical codes would be effective devices in preventing war, they would at least emphasise that chemists <u>were</u> anxious to prevent it.

The General Committee having endorsed the resolution, it came before the Council of the British Association. The Council took the unprecedented step of convening an extraordinary meeting on 9 October 1936 to discuss it.[67] On 5 October Howarth sent a memorandum[68] to the general officers indicating that 'a sharp division of opinion exists

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64. <u>B.A.R.</u>, (1936), lxi.
65. See Daniel Hall in <u>What science stands for</u>, pp.102-103.
66. Brightman, 'A scientific approach to peace', <u>Nature</u>, <u>134</u>, (17 November 1934), 749-751.
67. The first Council meeting after the annual meeting was normally held in November.
68. There is a copy of the memorandum in the Ferguson papers at Sussex.

as to whether the Council should act on this', and it is clear that the Council meeting was extraordinary in more senses than one. The minutes, as usual, give simply a bald statement of the outcome, but, fortunately for the historian, three Council members who were unable to attend and one who at the time was unsure of attendance put their views in writing to Howarth,[69] so it is possible to identify some, at least, of the arguments which would have been aired at the meeting. The four letter-writers were Viscount Bledisloe[70], Robert Robinson[71], Lord Rutherford[72] and W. W. Vaughan[73].

Bledisloe wrote to express his 'very particular interest' in the resolution, but did not elaborate. Robinson's letter was much more detailed. He was critical of the wording of the resolution, especially the second part which could be interpreted as being opposed to conscription. 'This is certainly not the intention of the framers of the resolution' who, he thought, had been trying to indicate 'a certain toleration for those of us who can reconcile it with our consciences to see that we

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69. The letters, too, are preserved among the Ferguson papers.

70. Charles Bathurst, first Viscount Bledisloe (cr. 1935): 1867-1958. Educated at Sherborne, Eton and University College, Oxford; and at the Royal Agricultural College, Cirencester, 1893-1896. Barrister, 1896-1910. M.P. (Cons.), 1910-1918. Parliamentary secretary to the Board of Agriculture, 1924-1928, P.C., 1926. Governor-General of New Zealand, 1930-1935. 'Always kept up to date in the application of the latest scientific methods to running his own estate.' (D.N.B.) President of Section M, 1922. Member of Council, 1922-1929, 1935-1945.

71. 1886-1975. Educated at Fulneck School and Manchester University. Professor of organic chemistry at Sydney, 1912-15; at Liverpool, 1915-21; at St. Andrews, 1921-1922; at Manchester, 1922-1928; at University College, London, 1928-1930; and at Oxford, 1930-1955. Director of Shell from 1955. F.R.S., 1920; P.R.S., 1945-1950. Nobel Prize for work on alkaloids, 1947. O.M., 1949. President of Section B, 1924; member of Council, 1935-1937; president of the British Association, 1955.

72. 1871-1937. Educated in New Zealand and at Trinity College, Cambridge. Worked under J. J. Thomson at Trinity, 1895-1898. Professor of physics at McGill, 1898-1907 and at Manchester, 1907-1919. Cavendish professor of physics at Cambridge 1919-1937. F.R.S., 1903; P.R.S., 1925-1930. Nobel Prize for chemistry for work on radioactivity, 1908. O.M., 1925. Baron, 1931. President of Section A, 1909; member of Council, 1914-1919; president of the British Association, 1923.

73. 1865-1938. Educated at Rugby and New College, Oxford (classics). Assistant master at Clifton, 1890-1904; headmaster of Giggleswick, 1904-1910, of Wellington, 1910-1921, and of Rugby, 1921-1931. President of the Science Masters' Association, 1919. President of Section L, 1925; member of Council, 1934-1938.

do not fall behind other nations in our defences against chemical attacks'. Robinson felt that 'the general tenor' of the resolution would command 'complete agreement' but, in a fit of chauvinism, concluded :

> On the whole I do not think that much useful purpose will be served by giving great publicity to these resolutions - certainly not in their present form - and I deprecate the focussing of the limelight on the chemist in this matter of the use of science for destructive ends.
>
> A more general resolution, covering mathematicians (ballistics), engineers and exponents of protective medicine, inter alia, all of whom do more damage than chemists, might have some point.

Rutherford thought that some action on the first part of the resolution would be an 'excellent thing' ; he was, however,

> doubtful what could be done with regard to (2) unless the chemists as a body hope to put down the use of lethal gases and of explosives. It seems to me difficult for the Association to chase such a hare. In any case, I cannot imagine any useful result would be achieved by it. I can well imagine there would be wide difference of opinion on this question among scientific men in general.

Vaughan expressed his 'dislike of the resolutions of Section B as they stand' on the grounds of their narrowness and proposed the following amendments :

> in (1) the word '<u>Science</u>' should be substituted for the word Chemistry and the word <u>World</u> for the British nation and (2) should be substituted the following <u>The Association would welcome international cooperation towards limiting the use of Science for destructive purposes</u>. [emphasis in original]

It was indeed a divisive issue. The chemists were obviously eager to improve their public image and, insofar as this meant advertising the 'beneficent purposes' for which they worked, they had the Council's sympathy. But whether chemists, in isolation from other scientists, could effectively adopt a common position on the relation of their activities to war was quite another matter ; and whether the British Association - 'the spokesman of British science' - could usefully issue any pronouncement on the relation of science in general to war was another matter still. Rutherford clearly thought the latter to be futile. Robert Robinson objected that chemists were not uniquely implicated in the application of science to war and Vaughan, less defensively, agreed, stressing the need for a wider approach which would take the whole range of science for its subject, the world for its arena and international co-operation as its means.

Whether science is viewed primarily as the disinterested pursuit of truth and beauty or as the means to the fulfillment of mankind's material needs, the inescapable fact that the development of science had led, via technology, to the production of armaments of a terribleness and on a scale inconceivable only a few decades earlier meant that the scientist was forced to consider carefully the relation of his work to war. The attitude which regarded this as none of the scientist's business was becoming increasingly difficult to maintain in the face of a growing sector of public opinion which seemed to link science - especially chemistry - with warfare and in the face of the international situation. The experiences of scientists in Nazi Germany especially indicated the need to work out the relation between the scientist and his national community : on the one hand the commitment to the national ideology required in that country produced such tight controls over the scientist's activities as to obliterate all notion of freedom of research, while on the other the concept of Aryan science made nonsense of scientific internationalism.[74] One way out was to restate the scientist's internationalism with more conviction than ever, to reaffirm the belief that science as a system of ideas was the common property of all mankind and not the preserve of any one nation, and to draw from this the lesson not that the scientist was above the struggle but that somehow his membership of an international intellectual community equipped him with just the sort of perspective that was needed to counter-balance the narrowly nationalistic, war-engendering outlook. This line had been taken by Thomas Holland in 1929 and J. C. Smuts in 1931, and by A. V. Hill in his 1933 Huxley memorial lecture and in the radio broadcast which he published in <u>What science stands for</u>.[75] This was the attitude which W. W. Vaughan took in his above-quoted letter to O. J. R. Howarth and, since he did manage to attend after all, which he proposed at the 9 October Council meeting.

A different view of the scientist's responsibility in war-time - that he should actively turn his hand to the technical and scientific problems of defence (and, of course, of the proverbially best means of defence) - was at least adumbrated, if not advocated, by Robert Robinson. It was also advanced by William Cramp in his presidential address to Section G at Blackpool.[76] But this brought its own problems for the scientist, in the shape of a conflict between his loyalties

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74. cf. F. J. M. Stratton, 'Nazi-socialism and international science', <u>Nature</u>, <u>136</u>, (14 December 1935), 927-928.

75. op. cit., pp. 36-38.

76. <u>B. A. R.</u>, (1936), 146.

to his country and to the traditional conditions of his work. For, 'while most scientific workers would not wish to avoid participating in the task of national defence',[77] yet the intensification of rearmament, even at the relatively half-hearted scale which it had then reached in Britain,[78] 'has tended to strengthen the fetters on freedom of investigation and exposition which dictatorships in many countries have already riveted on industrial and academic workers alike'.[79] Brightman's way out of this conflict was to urge scientists independently and authoritatively to assess and to publicise the effectiveness of the defence measures proposed or actually taken by the government. This, however, was itself fraught with political overtones, as the A.R.P. controversy illustrated.

A third approach was to abjure war and the involvement of science in war and to opt for pacifism. This, crudely, is what the second part of the Section B resolution was implying. It was, however, a position of great political controversy. Just as the teachers had their Teachers' Anti-War Movement with an aptly named publication The Ploughshare,[80] so, too, the scientists had the Cambridge Scientists' Anti-War Group (C.S.A.W.G.). The early thirties were a period of considerable pacifist sentiment in this country.[81] The C.S.A.W.G. seems to have been founded in 1932, though it first came into prominence in the summer of 1934.[82] Its prime mover was J.D. Bernal. Despite a fair amount of publicity and propaganda against war, there was, by the outbreak of the Spanish Civil War in July 1936, 'so little ideological consensus among its members that its few corporate statements supported little more than the proposition that war was a Bad Thing'.[83] The

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77. Brightman, 'War, science and citizenship', Nature, 137, (9 May 1936), 757.

78. Mowat, Britain, p.568.

79. Brightman, 'Science and the community', Nature, 138, (12 September 1936), 418.

80. See Edward Upward, In the thirties (1962), the first of his trilogy of novels, The spiral ascent (Heinemann, 1977). The Teachers' Anti-War Movement would make an interesting research project for someone. Upward was on the editorial board of The Ploughshare.

81. Mowat, Britain, pp.537-538; A.J.P. Taylor, English history 1914-1945 (Clarendon Press, 1965), pp.361-364, 379.

82. On the C.S.A.W.G., see Kay MacLeod, A.Sc.W., pp.334-335; Werskey, Visible College, pp.229-231, 234-240; and E.H.S. Burhop, 'Scientists and public affairs', in Maurice Goldsmith & Alan Mackay, eds., The science of science (Scientific Book Club, 1964), pp.32-34.

83. Werskey, Visible College, p.231.

C.S.A.W.G. caucus had, however, been responsible for reactivating the Cambridge branch of the Association of Scientific Workers and through it the whole Association. The new policy statement - again master-minded by Bernal - issued by the Association in December 1935 pledged it 'To endeavour to secure that the results of scientific research are not applied for purely destructive purposes'.(84)

The pacifist movement embraced men of all shades of political opinion and of none : it was not uniquely left-wing. Its political composition changed during the decade. The Spanish Civil War brought crisis to the C.S.A.W.G., in the shape a conflict between loyalty to pacifism and solidarity with the Spanish Loyalists. The latter proved the stronger, thus establishing the C.S.A.W.G. (and the Association of Scientific Workers with it) as ideologically left wing and changing its blanket anti-war attitude. Vague noises about the evil of war were replaced by active support for those fighting against Franco, who by March 1937 had 80,000 Italians and 30,000 Germans in his army.(85) Interestingly, the more the left wing became involved in the struggle, the more the Government held aloof. As Mowat puts it, 'non-intervention and pacifism crossed over from the opposition to the government : "no war" became the slogan, not of the left, but of the right.'(86) At home, the C.S.A.W.G. turned their attention to the Government's Air Raid Precautions programme, which had been initiated in 1935 with advice to householders on how they might render their homes proof against gas bombs. Inspired by the ubiquitous Bernal, the C.S.A.W.G. carried out a series of experiments in the last two months of 1936 which demonstrated that 'the Home Office's provisions were technically unsound and would discriminate against the urban working class.'(87) Nature accused the Group of perverting 'scientific theories ... for political ends'.(88) A.R.P. became a full-scale political issue. Although the C.S.A.W.G. campaigned vigorously for the idea that protection was needed not against gas but against high explosive bombs, it was not until after the Munich crisis that the Government responded.(89)

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84. The scientific worker, (December 1935), 6.
85. Mowat, Britain, p.573.
86. ibid., p.578.
87. Werskey, Visible College, p.237
88. ibid., pp.237-243.
89. ibid., pp.238-240 ; A.J.P. Taylor, op.cit., pp.433-434.

An International Peace Congress was held in Brussels the week before the Blackpool meeting.(90) At this Congress a 'science sub-commission' under the chairmanship of, inevitably, Bernal produced the following statement :

> We recognise that war is fatal to science,(91) not only by breaking up its fundamental international character, but even more by destroying its ultimate purpose of benefiting the human race.
>
> We are therefore resolved to do our utmost as scientists for the preservation of peace. We realise that such a general resolution is by itself of little use and requires to be implemented by definite practical activity. ....
>
> We can assist in the task of removing the causes of war by subjecting them to scientific and historical analysis and by exposing the theories of those who strive to excuse and justify war.

The Congress agreed unanimously to establish a permanent Science Commission 'with the general object of uniting all scientists in the struggle for peace'. Its tasks would include carrying out Bernal's 'scientific and historical analysis', supporting scientists who were victimised for refusing to do war work and 'propaganda for a peace oath by all scientific workers and the incorporation of such a declaration in the oaths of those taking university degrees and diplomas'.(92) The radicals' approach to the relations of science to war was an incoherent mixture of the proclamations of this Congress and the varying reactions of the C.S.A.W.G. to the issues of pacifism, Spain and A.R.P.

The rationalists' philosophy was not all that different, although, as mentioned already, Nature was suspicious of the motives behind the A.R.P. campaign. In November 1934 Brightman wrote a leader in which he sympathised with the proposal that 'the chemists of the world should include in their code of ethics an undertaking not to work knowingly on the development and production of any prohibited method of warfare, and to expose publicly anyone who was detected in such work', but at the same time he complained that no scientists had made a 'real attempt to secure a real step towards the problem of disarmament

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90. Nature, 138, (19 September 1936), 516-517 ; J.D. Bernal, The social function of science (Routledge, 1939), pp.186-187, 458-460.

91. cf. The statement in Crowther, Social relations, p.652 that a socially responsible scientist should, in war, 'consider which side is the less inimical to science, and then do what is possible to see that it is not defeated'.

92. Bernal, op. cit., p.187, claimed that the Congress 'did not call on all scientists to refuse to have anything to do with war preparations'. It came pretty close to it.

by a scientific analysis of the process of armament' and emphasised the 'need for unprejudiced study of the economic, political and psychological factors making for war'.(93) Three years later, however, Richard Gregory dismissed the proposal concerning the ethical code as 'altogether impracticable'. He argued instead, firstly that scientists should ensure that A.R.P. was as efficient as possible - despite his strictures against the C.S.A.W.G. - and secondly that 'it is by the applications of scientific methods and of the scientific spirit in these fields [international trade] that there is hope of discovering the causes, and averting the consequences, of international disputes.'(94)

The burden of the last ten paragraphs has been that, in the autumn of 1936, the issue of how a scientist should appropriately understand his rôle in the build-up to war and in war itself was one of great complexity and great controversy in both moral and political spheres. Even the proposition that the scientist as scientist was in a position to influence events was disputed. It is not surprising, then, that 'after full consideration, and examination of the wording as affecting all Sections' the Council of the British Association decided 'by a majority that no action be taken' on the Section B resolution.(95)

By way of a postcript to the foregoing, it is interesting and perhaps not entirely irrelevant to consider the ages of some of those involved. Bernal observed in private that 'the majority of younger research students have taken a definite line on the question of war, including opposition to the use of science in war; the Senior Staff either refuse to venture an opinion or take an opposing view.'(96) Hogben, too, remarked that middle-aged scientists were liable to preach 'a sermon on the text that young scientific workers should keep clear of politics'(97) and Levy similarly commented that opposition to involvement in political controversy 'came, naturally, from the older men'.(98) I would

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93. Brightman, 'A scientific approach to peace', Nature, 134, (17 November 1934), 749-751. cf. n.66 above.

94. Gregory, 'Defence and economic adjustment', Nature, 140, (27 November 1937), 907-908.

95. Council minutes, 9 October 1936; B.A.R., (1937), xix.

96. Unpublished manuscript quoted in Kay MacLeod, A.Sc.W., p.335.

97. Lancelot Hogben, Science in authority (Unwin University Books, 1963), p.117.

98. Hyman Levy, Modern science (Hamish Hamilton, 1939), p.97.

hesitate to suggest that a social conscience, anxiety about war or even an interest in radical politics are functions of age;(99) but it is a fact that the average age of those attending the October Council meeting was over 60 years, as compared with 38 years for Gary Werskey's radicals and under 30 years for the C.S.A.W.G. caucus.(100) It may be that increasing age renders one less liable to issuing forthright pronouncements on controversial matters - if a young man may speculate on the processes of maturity!

The 1937 meeting of the British Association was held in Nottingham under the presidency of Edward Poulton, who beat Ewing's record as the oldest president by four years. He celebrated the occasion by giving an account of the development of evolutionary thought as traced through meetings of the British Association since he had first attended in 1881. The programme as a whole again placed a special emphasis on the relations between the advance of science and the life of the community. Most conspicuous among the social relations items were those of Section L, whose work was entirely given over to discussions of this sort and at times veered once more notably close to political controversy. The educational debates of the meeting, which besides Section L also took place in the mathematical, geological, engineering, physiological and botanical Sections, will be considered in later parts of this thesis.

One non-educational item in the social relations part of the programme stands out: a discussion between representatives of no less than six Sections on 'Planning the land of Britain'.(101) Some speakers dealt with conservation schemes - with which the British Association had for some years been actively involved - while others considered more controversial issues. For example, the geographer L. Dudley Stamp, director of the Land Utilisation Survey, mentioned towards the end of his paper the Royal Commission under Montague Barlow on the siting of industry and suggested that its task 'implies a complete planning of the whole country'. This, he argued, in turn called for the services of a 'permanent advisory scientific committee' and he urged

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99. cf. Werskey, Visible College, p.334: 'Few, if any of those researchers influenced by Marxism in the 1930s have reneged on their earlier political commitments.'

100. See appendix IV.

101. B.A.R., (1937), 486-499; cf. Nature, 140, (6 November 1937), 791-792.

that the British Association should set up such a body. He repeated this when reporting the discussion for Nature :

> It is surely the duty of the scientific community to maintain a permanent committee among themselves and to present a considered, if not unanimous, opinion on all aspects of the land and its future.

The economist J. H. Jones felt that the planning involved in the Royal Commission's work would necessitate 'research of a different character from that which has hitherto been regarded as within the scope of the existing Sections of the British Association' - with the implication that the traditional scope of the Association might be widened in order to handle the many difficulties of effective planning. The 'bomb of the evening', however, came at the close of Daniel Hall's contribution. Having examined the various steps needed to improve British agriculture, he concluded :

> We can see very easily how, if all this land of ours in Great Britain were under skilful management, under one hand, it could be put to much better use than it is at the present time; but all these reforms which have been suggested will never be realised until, in some way or other, the State owns all the agricultural land of the country.

The 'contentious field of immediate political thought' seemed after all to have found its way into the British Association! This trend may also be discerned in J. M. Caie's presidential address to Section M on 'State intervention in agriculture'.(102) As Nature perhaps a trifle condescendingly remarked :

> State intervention in a particular industry is one of those subjects which most probably would have been rejected by the Council of the British Association had it not happily decided to include within its ambit the interactions of science and the life of the people. (103)

There was no formal resolution through the usual channels as a result of the joint discussion, but the minutes of the Council meeting of 5 November 1937 refer to 'a proposal that the Council should appoint a committee to deal with matters relating to planning'. The verdict on the proposal was that 'no action should be taken unless and until the Council should be invited to deal with any specific question in this connection.' Offprints of the official report of the planning discussion

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102. B. A. R., (1937), 249-264.

103. E. H. Tripp, 'State intervention and agriculture', Nature, 140, (9 October 1937), 601-602. The leader continued in typical rationalist style : 'It is true that this development tends to bring the sciences into closer touch with economics and politics, but one day economics may be established as a fully inductive science, and knowledge obtained by impartial scientific inquiry will be the basis of political action.'

were, however, 'widely circulated to planning authorities and organisations interested in this subject'.[104]

Shortly after the Nottingham meeting the British Association staged another public event : the first Radford Mather lecture. Impressed by 'the increasing interest shown by the Association in the social implications of advances in science' and wishing to encourage it, Radford Mather, a retired engineer and life member of the Association, put up £250 to endow a triennial lecture on this theme.[105] The first such lecture was given by Ramsay MacDonald at the Royal Institution on 22 October 1937[106] - the ex-prime minister's last public appearance. He began with a succinct account of some of the motivations that lay behind the contemporary interest in the social relations of science, emphasising two in particular. One was the defence of democracy :

> If Democracy is to triumph in the attack now being made upon it, it must have a method, and I believe that the methods of the scientific worker and the way he sets about his work will clarify and steady the popular mind not only to complain eloquently but to conclude wisely.

The other was the defence of science :

> If at the end of a generation the most advertised contribution that scientific activity, particularly in physics and engineering, has made to the life of the community, is that it has produced power of destruction which can be used to appal the most indifferent to human suffering and injustice, the labours of the scientist of our time run the risk of being permanently deplored. This, I am glad to say, is now being widely recognised by scientists themselves.

He discussed some of the achievements of science and technology of manifest social value, especially in the fields of nutrition, health and industrial research, to set against that 'most advertised contribution'. But he then reverted to the attack on science :

> Further investigation by the scientist is not universally welcomed. The reason is that physical science and machinery mean pretty much the same thing in the public mind -

and the public mind had two objections to machinery. The first was that it generated unemployment. MacDonald was particularly struck by the displacement by the reaping machine of agricultural labourers 'singing happy songs and dressed so as to be bright points for catching and reflecting the warm unclouded sun'. He was, nevertheless,

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104. <u>B.A.R.</u>, (1938), xx.
105. <u>B.A.R.</u>, (1937), 511.
106. <u>B.A.R.</u>, (1937), 500-511.

convinced that the mitigation of manual drudgery was 'all to the good', despite the hardship suffered by the unemployed, and he felt that direct benefits could ensue from an increase in leisure, 'the enjoyment and use of which are amongst the most pressing of social problems to-day'.(107) 'In any event', MacDonald added, 'Science cannot cease to follow the exhortation of Carlyle to "produce in God's name", and it would be bad for humanity generally, if it tried.' Echoes of the Bishop of Ripon's 1927 sermon were still apparent a decade later!

The second popular objection to machinery was its military potential. Council members opposed to the Section B resolution must have been heartened by the line MacDonald took on this issue. The preservation of peace, he insisted, was the responsibility of the diplomat, and in the event of his failure it was 'both a false judgement and a very cowardly one to blame the scientific engineer and worker'. Their achievements, for example in aviation, could not simultaneously be applauded for their civil value and deplored for their military value. Consequently :

> Peace or war are not the responsibilities of scientists _as scientists_, except in very special cases, so long (and it will always be) as the discoveries which increase our peaceful and beneficial resources can be used for war machinery. [emphasis on original]

If the scientist could not be held responsible for war then, by the same token, neither could he, _qua_ scientist, do much to prevent war :

> We can go back to bows and arrows but that will not remove the grievances of nations for which they will fight, nor supply the enlightened diplomacy which can keep the peace without injury to a nation's sense of injustice. Do not let us be misled by thinking that the scientists as such can stop or cause war. The military leader can use the triumphs of science as he likes to horrify us with warfare. That is all.

MacDonald insisted that 'this misuse of scientific discovery is the concern of the political organisation of citizens.'(108) On such a premise, the fact that, in the words of the Section B resolution, 'chemists as a body view with grave concern the increasing use of science for destructive ends', was irrelevant to the cause of peace. If scientists wished to lessen the chances of war, they could only do so by joining political organisations as private citizens. A primarily scientific body such as the British Association could not usefully work against war ;

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107. On the 'problem of leisure', cf. Ewing's and Hopkins' presidential addresses above.

108. Richard Gregory, for one, disagreed. See Armytage, _Gregory_, p. 140.

all it could do, and what it was trying to do, was to impress upon the public that the scientist was not to be damned for the fact that his discoveries could be used in the waging of war. The first part of the Section B resolution was a step in this direction, but the second part went beyond it.

At this time this issue was a source of considerable controversy within the Association of Scientific Workers. Although in December 1935 the Association had condemned the use of science for destructive purposes, there was much debate as to whether it should restrict itself to scientific questions or take a definite political stand as well. Indeed, in October 1937, its Council was told that resignations had occurred 'because the Association is too political, and because it is not political enough'. It tried, a little arbitrarily, to steer a middle course and to avoid connection with any overtly political group, though the presence of radical activists within its ranks made it difficult to project a neutral image.(109)

At the end of the Nottingham meeting the Times leader-writer, having praised 'its customary high standard of usefulness and interest', was prompted to wonder

> Is it the business of a body like the British Association to discuss such impacts and implications of science? Should it discuss them at all, or should it go further and deliberately organise its discussion of them?(110)

'Opinion on these matters is much divided, both within and without the Association', continued the editorial, which proceeded to analyse the possibilities in a manner reminiscent of the 1920 debate (chapter II above). Some thought that the Association should restrict itself to strictly 'internal' scientific matters; 'they, however, are in a minority.'

> Then came those who, while agreeing that prominence should be given to the practical applications of science, object to the discussion of its implications, since these are bound to affect questions of general political and social organisation. Discussions of the implications of science may become "politics", and politics should be kept out of science. [my emphasis]

A third category held that discussions of implications were legitimate, but that 'the Association should not direct too much of its attention to them or deliberately encourage them.' The fourth and last category was of 'politically minded scientists, mostly but by no means wholly

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109. Kay MacLeod, A.Sc.W., pp.381-384.

110. The Times, 9 September 1937, p.13.

among the younger generation,[111] who disagree entirely with this view. For them the discussion of the political implications of science is ... an essential function of the Association.'

These thoughts on the implications of science were, presumably, provoked by remarks such as Daniel Hall's concerning the nationalisation of the land. Having identified the various possible views on the propriety of discussing such implications, the leader-writer then proceeded to confuse the issue by harking back to his favourite positive social relations theme of the scientific study of society :

> Sectional meetings are clearly not suitable places for discussing the social implications of science as a whole. ... Either a new section of Sociology must be erected, or a "general section" must be formed in which matters affecting science as a whole can be treated. Alternatively a new body can be organised where such questions can be discussed, leaving the British Association to pursue traditional courses. ... The march of political events and the rise of social science will render the problem increasingly more pressing.(112)

The leader drew an immediate reply from Richard Gregory, who argued that social implications and positive social relations were both proper to the aims of the British Association and that this was so both because of the British Association's concern with the defence of science and because of the rationalist attitude to the improvement of society.

> [Scientists] can no longer remain indifferent to the social consequences of science and invention, or be silent while they are blamed for increasing powers of production of food supplies,(113) providing means of superseding manual labour by machines, and discovering substances which can be used for destructive purposes.

And again,

> As citizens men of science have a duty towards the community in endeavouring to promote the use of methods of impartial scientific inquiry in the study of social and political questions involved in the structure which has been built up from the materials provided by them and which their discoveries may be used to destroy.
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> One of the prime needs at the present time is the development of research in the social and biological sciences on a scale commensurate with the prosecution of research in

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111. cf. nn.96-100 above.

112. ibid. cf. the 1935 Times leader, chapter VI, n.27 above.

113. Sic. The point was that despite increased supplies, some people were still ill-fed and, at the same time, food was being dumped in order to stabilise prices at an adequately high level. Plus ça change, ...

> the physical sciences, which has brought about the present position of material civilisation. The British Association is moving with the times by giving attention to these aspects of scientific study.(114)

The social science trumpet, which had been blown loudly at Norwich and at Blackpool, was sounded again at Nottingham not only by Gregory but also by Ramsay MacDonald, who ended his Radford Mather lecture with the confident assertion : 'It must be evident to everyone who has thought about the social consequences of advances in scientific research that they call for a reinvigoration of social science.'[(115)]

The attempt about this time of the Trades Union Congress to set up its own Scientific Advisory Committee illustrates some of the hazards involved in giving practical expression to ideas about the social relations of science.[(116)] Gregory had been trying to arouse the interest of the Unions in science since the end of the First World War; more recently Hogben and Calder had been pushing the same idea. Within the T.U.C. it had the strong support of Ernest Bevin. By the summer of 1937, when Hogben and Calder wrote to Boswell asking him to join a proposed committee as its geological member, Bernal, Blackett, F.G. Donnan[(117)], A.C.G. Egerton[(118)] and Gregory had already agreed to serve and overtures were being made to J.B.S. Haldane, Gowland Hopkins and Boyd Orr. Bevin was chairman of the T.U.C. for 1936-37 and in his address to the annual conference at Norwich made the 'interesting announcement' that the Advisory Committee was being

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114. Letter in The Times, 10 September 1937, p.13; cf. Armytage, Gregory, pp.138-139. See also Lord Bledisloe's letter, The Times, 15 September 1937, p.13.

115. B.A.R., (1937), 511.

116. Boswell, A narrative, pp.255-261; Armytage, Gregory, pp.137-144; other sources as indicated.

117. 1870-1956. Educated at the Belfast Royal Academy, Queen's College, Belfast and Leipzig University. Lecturer in organic chemistry at R.C.S., Dublin, 1903-1904; professor of physical chemistry at Liverpool, 1904-1913; professor of chemistry at University College, London, 1913-1937. Research consultant to I.C.I., 1926-1939. F.R.S., 1911. President of the A.Sc.W., 1939-1940. President of Section B, 1923.

118. 1886-1959. Educated at Eton and University College, London. Instructor at the R.M.A., Woolwich, 1909-1913. Reader in thermodynamics at Oxford, 1921-1936; professor of chemical technology, Imperial College, 1936-1952. F.R.S., 1925; Sec. R.S., 1938-1948. Member of the Advisory Council of the D.S.I.R.

contemplated. 'They were not, Mr. Bevin explained, inviting scientists to frame their policy for them' : rather, it would be 'a practical way of bringing science and social progress into a more harmonious relationship and of enabling the community to obtain the full benefit of the work carried out by men of science'.(119)

Bevin's address was delivered on 6 September 1937, the Monday of the British Association meeting at Nottingham. Ritchie Calder, who had been covering the T.U.C. conference for the Daily Herald, accordingly hurried over to Nottingham to canvas support for the proposal. The function he envisaged for the Committee was that of 'collecting factual evidence relating to location of industry,(120) natural local resources, developments and tendencies in industry, decentralisation of light industries, demands for products, defence, health, etc.' : that is, supplying the T.U.C. policy-makers with relevant data. A discussion in Section L on the report of Pickard-Cambridge's committee on adult education provided H.G. Wells, president of the Section that year, with the opportunity to comment. He proposed that the resolution accepting that report should be extended as follows :-

> "In view of the rapid development of opinion upon this question of the introduction of science and the scientific spirit into adult education, this section is of opinion that further steps should be taken to establish liaison with the T.U.C. in its organisation of research." There was a danger on the T.U.C. side, he said - and the same thing had appeared in the section - of propaganda of the very narrow, doctrinaire type masquerading as scientific research. (121)

Wells remarked that the T.U.C. was turning towards 'the correction, so to speak, of its political activities by the organisation of scientific research' which, he hoped, would lead to the 'scientification of a good deal of their political conceptions'.(122) He seems to be suggesting that a dose of scientific rationalism would counteract certain political tendencies in the T.U.C., though of which colour is not clear. Either way, it was somewhat different from the rôle Ernest Bevin or Ritchie Calder had in mind. Gregory had to remind his friend that such a resolution could only be handled by the British Association Council and not by a mere Section. He also stated that the initiative for the Scientific Advisory Committee had come from the T.U.C. itself, that its consti-

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119. The Times, 7 September 1937, p.6; Nature, 140, (11 September 1937), 457-458.

120. cf. the Barlow Commission on the location of industry, then sitting.

121. The Times, 8 September 1937, p.17. J.D. Bernal, The social function of science (Routledge, 1939), p.407 n, states that this was the first public announcement of the T.U.C.'s move; while untrue, this does suggest that Wells made an impact.

122. ibid.

tution 'had already more or less been decided upon' and that it would contain 'six very distinguished scientific people suggested by others and himself'.[123]

After the Nottingham meeting Calder had a talk with Walter Citrine. Subsequently Boswell and Gregory were invited to lunch at the Marsham restaurant on 22 October by Ernest Bevin, Citrine and H. H. Elvin - respectively chairman (1936-37), general secretary (1926-46) and chairman (1937-38) of the T. U. C. - to explore how scientists could assist in setting up the Advisory Committee. Hogben and Calder had already made arrangements for the scientific personnel of the Committee, but it seems that the T. U. C. was not altogether happy with a privately assembled group of individuals, either because it would lack the authority of a more formally nominated group or because it might be subject to political manipulation. Despite having a ready-made team of scientists, and 'doubtless inspired by Gregory, the T. U. C. people hoped that the British Association would help by nominating the experts.'[124] Boswell realised that he was 'evidently being looked to as a liaison officer' but could not, in his own authority, commit the Association; he promised, however, to explore the possibilities. As an essential preliminary condition for cooperation, Boswell insisted that

> the Advisory Council[125] must be non-political, or we could not ask leading scientists to act, for there was a great and understandable prejudice against the association of scientists with political party programmes. This was agreed, as amended by a suggestion from Citrine - to be non-party political.(126)

At the end of that month the T. U. C. Council gave its official approval to the project[127] and on 23 November a more formal meeting was held, this time at the Holborn réstaurant, at which a dozen scientists and a dozen trade unionists were present. The scientists were George Barger, Bernal, Blackett, Boswell, Donnan, Egerton, Gregory, J. B. S. Haldane, Daniel Hall, Hogben, Hopkins and Orr. This list includes all those already involved before the Nottingham meeting,

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123. ibid. The six scientists were, presumably, Bernal, Blackett, Boswell, Donnan, Egerton and Gregory.

124. Boswell, A narrative, p. 258.

125. Boswell consistently called it a 'Council' ; the T. U. C. itself used the word 'Committee' ; and The Times used both.

126. Boswell, A narrative, pp. 257-258.

127. The Times, 29 October 1937, p. 9.

together with Barger and Hall. The Marsham lunch had been a private, exploratory affair ; the Holborn dinner was more official and was reported in the press.[128] It was decided to set up a small committee from among the scientists to inquire into methods of cooperation. This committee met on 3 February 1938 and recommended that in order to

> ensure the political independence and scientific disinterestedness of the proposed Advisory Committee, the British Association for the Advancement of Science should be asked to nominate its members.(129)

As Boswell was shortly to discover, the T.U.C. was 'a strongly Conservative body, and looked askance at people like J. B. S. Haldane and Bernal because of their Leftish and pro-U.S.S.R. sympathies'.[130] From the T.U.C.'s point of view, therefore, turning to the British Association may well have been a ploy to prevent the radicals dominating the Advisory Committee. A letter was duly drafted and, having been vetted by Boswell, reached the British Association in time for its Council meeting on 4 March 1938.

The general officers of the Association - Boswell, Brooks and Ferguson - were agreed on their course of action, hoping that the assistance given by the British Medical Association in setting up the T.U.C. Medical Advisory Committee[131] would serve as a favourable and respectable precedent. But they failed to carry the day against the opposition of Lord Rayleigh (president of the Association for 1938) and T.H. Holland : 'the political prejudices of the older folks were strongly in evidence', grumbled Boswell. He was unable to convince his colleagues that the T.U.C. was, and the Advisory Committee would be, non-party political, 'for the association of the leaders with the labour movement was well known'. Yet while the British Association Council was anxious to avoid what might be seen as involvement with a political organisation, neither did it wish to be accused of recalcitrance in what could, after all, prove an opportunity for 'bringing science and social progress into a more harmonious relationship', as Ernest Bevin

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128. eg. The Times, 23 November 1937, p.16.

129. Report of proceedings at the 70th annual Trades Union Congress, Blackpool, 1938, p.233.

130. Boswell, A narrative, p.259.

131. Report of proceedings at the 69th annual Trades Union Congress, Norwich, 1937, p.130. A proposal that the Socialist Medical Association should be approached as well as the 'individualistic and unprogressive' B.M.A. found no support at all. ibid., pp.343-344.

had put it. So the Council instructed the general officers to advise the T.U.C. informally.(132)

Boswell was furious. He felt that the Council had 'wriggled out of their responsibility for making a clear decision'(133) and threatened his resignation. His position was particularly delicate since Gregory wanted him to be chairman of the Advisory Committee, which would have been awkward while he was still treasurer of the British Association and the Association's support was so half-hearted. Gregory, who at the time did not hold office in the Association, agreed, however, to become chairman himself; Boswell remained treasurer of the British Association and settled down to producing the required list of names.

This was not a straightforward task. The T.U.C. was particularly suspicious of J.B.S. Haldane's political sympathies and did not want him on the Committee; Boswell thought it prudent to omit Bernal as well. Whereupon Lancelot Hogben, who had been one of the prime movers, made his own membership conditional on that of Bernal. 'So political prejudice hampered me in both directions.' When his preliminary list was complete, Boswell arranged an informal meeting, on 24 May, between himself, Calder and Ferguson and Bevin, Elvin and Tewson (then assistant secretary of the T.U.C.), Gregory and Citrine both being away. The list as agreed at this meeting was : Blackett, Boswell, Winifred Cullis (the T.U.C. was keen to have a woman member), Cyril Desch, Donnan, Egerton, Ferguson, Gregory, Hall, G.T. R. Hill and Boyd Orr.(134) Of the scientists who attended the Holborn dinner, Barger, Bernal, Haldane and Hogben had been dropped : the scientific half of the Advisory Committee was now considerably less radical and more to the T.U.C.'s taste.

Thereafter exactly nothing seems to have happened. A meeting scheduled for the autumn was 'unavoidably postponed', and it was not until Walter Citrine wrote to Boswell in May 1939 that things started moving again. On 13 June 1939 Boswell, Ferguson, Gregory and

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132. Boswell, A narrative, p.258; Council minutes, 4 March 1938. If this was a tactic designed to keep a respectable distance between the British Association and the T.U.C. Committee, it failed : all commentators credit the Association with officially nominating the scientists to the Committee. In addition to the sources mentioned already, see Alan Bullock, The life and times of Ernest Bevin (Heinemann, 1960), vol. I. pp.603-604.

133. Boswell, A narrative, p.258.

134. ibid., p.259.

O.J.R. Howarth met with Bevin, Citrine, Elvin and J. Hallsworth (then chairman of the T.U.C.)[135] and a week later the first and only full meeting of the T.U.C. Scientific Advisory Committee was held. By this time Bernal and Hogben were once more on the Committee, whose scientific members were now Bernal, Blackett, Boswell, Cullis, Donnan, Egerton, Ferguson, Gregory, Hall, Hogben, Orr and J.S. Wilson.[136] It was agreed that the Committee should endeavour to feed the T.U.C. with data to enable it to formulate a policy 'with regard to planning and the reorganisation of industry' and to produce expert evidence to Commissions of Enquiry; that 'through its influence' it should 'facilitate T.U.C. representation on national research bodies'; and that it should keep the T.U.C. informed of scientific developments, 'so that the social effects of such developments may be foreseen, and technical progress be achieved without detriment to the welfare of the workers'. Sub-committees were set up to study occupational diseases and industrial fatigue, nutritional needs 'and their relation to public health, agricultural policy and the standard of living' and the effects of new industries and new materials (especially plastics) on the 'distribution, displacement and character of labour'.[137]

War broke out before any of these schemes got off the ground, and the Committee went into abeyance. During the war the Association of Scientific Workers reverted to its origins, re-registered as a trade union and affiliated to the T.U.C. Just as Boswell was completing his autobiography, he heard that the Association was preparing to act as the T.U.C. Scientific Advisory Committee, without the original Committee being recalled or dissolved. He was, understandably, disgruntled, to say the least:

> After all the work that some of us put in and the prejudice we had overcome, one feels disappointed and disillusioned. As I, in particular, was responsible for persuading my scientific colleagues to undertake the honorary work of advising the T.U.C., I could not but feel that I had been left, by the T.U.C.'s action, in an invidious position, and that we all had been let down rather badly. (138)

Putting social relations into practice was indeed a hazardous business!

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135. The Times, 25 May 1939, p.17 and Boswell, A narrative, p.260.

136. The trade unionists, for the record, were Bevin, J. Brown, Citrine, C. Dukes, Elvin, G. Gibson, J. Hallsworth, W. Holmes, W. Lawther and G.W. Thomson.

137. For a detailed account of this meeting see Report of proceedings at the 71st annual Trades Union Congress, Bridlington, 1939, pp. 258-260.

138. Boswell, A narrative, pp. 260-261.

Chapter VIII

1938-1939 : The Division for the Social and International Relations of Science

The British Association was never a parochial body. The fact that its annual peregrinations took it to virtually every major town in the kingdom is indicative of its desire to reach as large an audience as possible. But these Isles did not exhaust its energies. The founding fathers of the Association referred in its statutes to 'those who cultivate Science in different parts of the British Empire ... and ... foreign philosophers', and a strong interest in imperial affairs is manifest throughout the Association's history. In 1884 it held its annual meeting overseas for the first time and between then and 1929 repeated the exercise on six occasions, visiting Australia, Canada and South Africa.(1) The economic crisis of the nineteen-thirties rendered such outings impossibly expensive, but interest in building up the scientific links of the Empire continued unabated. In the winter of 1937-38 the Association organised a delegation of some sixty-five scientists to attend the twenty-fifth anniversary meeting of the Indian Science Congress Association(2) - an expedition which aroused much friendly comment. Indeed, the decision to send the delegation, formally taken at Nottingham, was hailed by The Times as 'the most important single event of the meeting'.(3) The possibility of similar visits to Jamaica,(4) Australia(5) and Southern Rhodesia(6) was also canvassed, and in a Nature leader Allan Ferguson supported Lord Rutherford's suggestion that such delegations might become a

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1. The following meetings were held overseas: 1884, Montreal; 1897, Toronto; 1905, South Africa; 1909, Winnipeg; 1914, Australia; 1924, Toronto; and 1929, South Africa.
2. B.A.R., (1938), xxvi-xxxvii ; O.J.R.Howarth, 'The British Association and the Indian Science Congress', Nature, 140, (9 October 1937), 609; A.J.V.Gale & J.L.Simonson, 'Jubilee meeting of the Indian Science Congress', Nature, 141, (1 January 1938), 1. The Indians paid a return visit in 1944 : Adv. Sci., 3, (1945), 99-105.
3. The Times, 9 September 1937, p.13.
4. See letter from Gregory to Ferguson, 22 April 1937, in the Ferguson papers; also Nature, 141, (15 January 1938), 94.
5. Nature, 141, (2 April 1938), 589.
6. Adv. Sci, 1, (1939), 131.

permanent feature of the Association's work.[7] Viscount Bledisloe, ex-governor-general of New Zealand and a member of the British Association Council from 1935, was particularly keen on this sort of activity and repeatedly urged that the Association should function as the focal point of Empire science.[8]

The object of the exercise was not, of course, simply the advancement of science: it was also the advancement of the British Empire which, it was widely believed, could be fostered by meetings between scientists of its constituent countries. As Allan Ferguson, commenting on the visit to India, argued in the leader just mentioned:

> For the British nation, the first guarantee of peace, internal or external, is a united Empire, united ... by a sympathetic understanding of each other's difficulties and problems. ... It is the creation of a friendly spirit of good will that matters most, and it is a favourable omen for the future that the Association, in the most recent of its activities, is directing its energies towards a task which will assuredly increase the spirit of good will and understanding between the constituents of our Empire.

And not just the Empire: this sort of thinking was extrapolated to embrace all countries. In a press conference at the end of the Nottingham meeting, Ferguson spoke of the Indian visit not only in terms of imperial unity but also as a 'special contribution to world peace'.[9] The concept of science as a powerful force in promoting a peace-engendering internationalist outlook has been mentioned already.[10] It was a popular theme. Edward Poulton referred to it at the close of his Nottingham address.[11] Nature frequently referred to it. For example, in a leader published in June 1937:

> Does there not rest upon men of science as a body a responsibility for the promotion of peace, and of peaceful methods of international adjustment, beyond that which already attaches to them as citizens? ... In the first place, scientific workers are better able than most men to reflect with knowledge upon the evolution of man ... and envisage great improvements still to come. ... Secondly, they have long been accustomed to international co-operation ... Furthermore, their whole professional activity contrasts strongly both in method and success with the military method

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7. Allan Ferguson, 'The British Association and imperial unity', Nature, 141, (15 January 1938), 93-94.

8. See for example his letters to Ferguson of 1 October 1936 and 23 December 1937: Ferguson papers.

9. The Times, 9 September 1937, pp. 12, 17. The article on p. 12 is actually headed 'World peace'.

10. See pp. 41, 50-51, 158 above.

11. B.A.R., (1937), 22-23.

> of settling international problems. ... They have therefore a special duty to urge the application of these methods to international problems.(12)

A year later Brightman was moved to remark that the fears expressed by A.V. Hill in his 1933 Huxley memorial lecture 'have indeed been justified, and it cannot be said that scientific workers as a whole have heeded his warning'. Scientists, he affirmed, had to 'maintain most scrupulously their intellectual honesty and independence of political pressure' and they had to remember that science and learning were important 'chiefly, for the fact that they alone seem to be truly international and capable of transcending national follies'.(13) And again :

> Among modern and social intellectual forces, science alone speaks in a tongue which meets with universal understanding. ... What is wanted today is the international spirit of science in the consideration of problems in which the interests of several nations are involved. This ... is the kind of moral rearmament to which attention should be given by all Statesmen if rationalism instead of nationalism is to be an effective power in shaping the destiny of mankind.(14)

One extension of this line of thought was the idea of world government, beloved of H.G. Wells among many others, to which Nature lent its warm support.

The British Association, as just mentioned, sought the cooperation not only of scientists throughout the British Empire but also of 'foreign philosophers'. It served as the model, and sometimes directly provided the initiative, for Associations for the Advancement of Science in a score of countries in different parts of the world(15) and tried to keep in contact with them. In 1923, for example, representatives of the American, Australasian, Italian, French, Rumanian and Spanish Associations were invited to the Liverpool meeting.(16) Relations were particularly close with the French and American Associations, with a regular mutual representation at each other's annual meetings. Sometimes it was more than simple representation : when the British Association went to Australia in 1914, members unable to make the journey were invited to the French Association at Le Havre. Similarly,

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12. Sydney Chapman, 'Science and peace', Nature, 139, (12 June 1937), 979-981.

13. Brightman, 'International science', Nature, 142, (9 July 1938), 49-51. cf. p. 75 above.

14. Brightman, 'Science in world affairs', Nature, 142, (5 November 1938), 809.

15. cf. chapter I, n. 35 above.

16. Council minutes, 2 March 1923.

members of the American Association were invited to the British Association meetings in Canada. Following H. H. Turner's visit to the American Association in 1929, proposals were made to formalise relations between the two bodies[17] but without apparent result. A. V. Hill, then a member of the Council, held 'tentative conversations' with the officers of the American Association while on a visit to the States in 1936.[18] Subsequently, the president of the latter body, E.G. Conklin, brought some colleagues to attend the 1936 Blackpool meeting, where they were 'much impressed by the frank discussion of the social relations of science'.[19] In the autumn of that year the Council, prompted by Boswell, devised a scheme 'to facilitate the attendance of members of the American Association at meetings of the British Association and _vice versa_, and also the receipt of the publications of either association by members of the other'.[20] Howarth indicated to the general officers that there was 'no apparent difficulty, if they reciprocate'[21]; but 'difficulties arose on the other side'[22] and, again, little came of it at the time. Gregory did his best to encourage proposals of this sort : in October 1936 _Nature_ carried a leader suggesting that

> the revived interest in the effect of science on society, as well as the quickened concern displayed at the British Association meetings at the use of science in the growing preparations for war, embolden the hope that a _rapprochement_ for some such purpose as this between the British Association and the American Association for the Advancement of Science may not be impossible or impracticable.(23)

A month after the Nottingham meeting these somewhat hesitant moves towards a closer connection between the two bodies were given a vigorous boost by Ritchie Calder. He published in the _Daily Herald_ an open letter to Lord Rayleigh, president-elect of the British Association, in which he argued that the preservation of democracy and personal liberty demanded the active cooperation of scientists all over the

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17. _B. A. R._, (1929), xiv-xvi.
18. Boswell, _A narrative_, p. 252.
19. Crowther, _Social relations_, p. 627.
20. _B. A. R._, (1937), xxiii. The American Association published the weekly journal _Science_.
21. Howarth, memorandum to general officers, 5 October 1936, p. 3 : copy in the Ferguson papers.
22. Boswell, _A narrative_, p. 252.
23. Brightman, 'The social mission of science', _Nature_, _138_, (24 October 1936), 699.

world and that as a preliminary step in this direction the British and American Associations should collaborate in the drafting of a 'Magna Charta, a Declaration of Independence, proclaiming that freedom of research and of exchange of knowledge is essential, that science seeks the common good of all mankind, that "national science" is a contradiction in terms'. Waldemar Kaempffert, science editor of the New York Times, who had discussed the idea with Calder at Blackpool when it was first mooted,[24] published a leader in his paper backing Calder's proposal and stressing the significance of internationalism for the maintenance of world peace :

> [Science] is primarily an attitude, perhaps the most important mental acquisition of man. Because of this attitude it is democratic. It knows no creed, no country. It achieves the only true internationality the world has ever known and thereby provides striking evidence that men can sink their differences of opinion and their passions and work for a common cause. ...
>
> Mr. Calder has not exaggerated. To save science(25) his "World Association" is needed, an organisation which shall indicate how the objective attitude of the laboratory may be applied in governing a people, in breaking down prejudices, in preventing war, in solving problems that mean progress not in one country alone but the world over. Will the American Association heed the appeal of its British counterpart? There never was a time when science had so vital a message to deliver, so high a social mission to perform.(26)

The American Association did indeed heed the 'appeal', though one should point out that the appeal came from Ritchie Calder and had nothing to do with the British Association, Kaempffert's rhetoric notwithstanding. When the American Association met in Indianapolis at the end of 1937 E.G. Conklin gave a noble and stirring address on science and ethics and on the need for scientists, in conjunction with religious leaders, to fight for the preservation of that freedom on which their work depended.[27] At the same meeting the first of a series of symposia on 'science and society' produced a resolution which for all its long-windedness is sufficiently important to deserve extended quotation :

> Whereas, Science and its applications are not only transforming the physical and mental environment of men, but are

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24. See Crowther, Social relations, pp.627-629; J.D. Bernal, The social function of science (Routledge, 1939), pp.399-400 ; Armytage, Gregory, pp.165-167.

25. On this emphasis of saving science as opposed, for example, to saving mankind, see chapter VII, n.91 above.

26. New York Times, 17 October 1937, as quoted in Science, 86, (22 October 1937), 375-376. See also ibid., 87, (7 January 1938), 16-17.

27. Science, 86, (31 December 1937), 595-603.

> adding greatly to the complexities of their social, economic and political relations among them; and
>
> Whereas, Science is wholly independent of national boundaries and races and creeds and can flourish permanently only where there is peace and intellectual freedom;(28) now, therefore, be it
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> Resolved by the council on this thirtieth day of December, 1937, that the American Association for the Advancement of Science makes as one of its objectives an examination of the profound effects of science upon society; and that the association extends to its prototype, the British Association for the Advancement of Science, and to all other scientific organisations with similar aims throughout the world, an invitation to cooperate, not only in advancing the interests of science, but also in promoting peace among nations and intellectual freedom in order that science may continue to advance and spread more abundantly its benefits to all mankind. (29)

At the same time a resolution originally adopted in 1933 was reaffirmed. This stated unequivocally : 'We regard the suppression of independent thought and of its free expression as a major crime against civilisation itself. ... We feel it our duty to denounce all such actions as intolerable forms of tyranny.'

These impressive declarations were published in full in Nature with the prefatory comment that they 'may have profound effects, not only upon the future of science, but also upon social history'.[30] The 'momentous pronouncement' at Indianapolis would, Nature felt, command much support. The journal added :

> Nor is the British Association likely to disregard the invitation to cooperate in forming the nucleus of what will be a World Association for the Advancement of Science and Society - an international 'brains trust' - since it was the success of the Blackpool meeting and its concern for social problems which inspired the recent action in the United States. (31)

Ferguson's leader[32] the previous week had expressed the 'earnest hope' that the British Association would concern itself with 'finding scientific solutions for some of the social and economic problems which

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28. This clause was quoted in illustration of the canon of 'universalism' by R. K. Merton in his famous 1942 paper, 'Science and technology in a democratic order' : see Barry Barnes, ed., Sociology of science (Penguin, 1972), p. 68n.

29. Science, 87, (7 January 1938), 10 ; also ibid., (4 February 1938), 100 and Nature, 141, (22 January 1938), 169.

30. Nature, 141, (22 January 1938), 169.

31. ibid., p. 150.

32. It was, of course, published anonymously.

deface and weaken the structure of our international relations'. There was clearly pressure on the Association to participate in laying the foundations for an internationally organised stand for the upholding of democracy and of personal and intellectual freedom.

F.R. Moulton, the permanent secretary of the American Association who had been responsible for drafting the Indianapolis resolution, followed it up with the suggestion that an international conference of representatives of scientific societies should be held in London in the summer of 1938. Such a conference, he thought, might consider :

> (1) The formulation of a set of fundamental scientific principles of an ethical nature on which unanimous agreement of the delegates can be reached.
>
> (2) The formulation of the maximum number of inviolable methods of international intercourse and co-operation among scientists on which the delegates can unanimously agree.
>
> (3) The planning of the necessary machinery for making effective and enlarging the agreements reached in (1) and (2). (33)

These matters came before the Council of the British Association on 4 March 1938. The proposed summer conference was considered 'impracticable', but members of the American Association were invited to attend the Cambridge meeting of the British Association that August and, if possible, to hold discussions with the Council beforehand.(34) The general officers wrote to Nature in reply to Moulton's above-quoted letter saying that 'the invitation from that body [i.e. the A.A.A.S.] to the British Association to co-operate in forming the nucleus of a wider organisation for this great object is engaging our earnest attention' and 'we look forward to meeting Dr. Moulton and some of his colleagues this summer, to discussing the project with them, and to having them with us at our meeting in Cambridge.'(35) A number of members of the American Association Council were, however, disappointed : Waldemar Kaempffert wrote to Gregory on 3 May that they were 'somewhat discouraged by the cool tone of a letter which they have received from Howarth. ... Possibly our American Council misunderstands the British attitude and ... there is more feeling in favor of

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33. Letter from Moulton published in Nature, 141, (19 March 1938), 517-518 ; also in Science, 87, (22 April 1938), 367-368. The conference was proposed at or very shortly after the Indianapolis meeting.

34. Council minutes, 4 March 1938.

35. Nature, 141, (26 March 1938), 557; also in Science, 87, (22 April 1938), 368.

the proposed union than mere correspondence can convey.'[36]

About one hundred members of the American Association did nevertheless turn up at Cambridge.[37] Following discussions between the respective officials, Boswell's 1936 proposal for mutual membership and receipt of publications (n.20 above) was revived and accepted,as was the suggestion that in alternate years distinguished representatives of each Association should give an address at the annual meeting of the other.[38] At the same time certain officers of the French and British Associations were admitted to honorary membership of each other's bodies.[39] Allan Ferguson wrote another leader for Nature, re-emphasising the theme that 'a closer liaison between the two [i.e. British and American] Associations would hasten the realisation of those ideals of international cooperation and good will, and would form a very considerable contribution made by men of science to the cause of world peace' and concluding :

> The Associations are to be warmly congratulated on their courage and initiative in taking these steps, steps which are obviously but the beginnings of others which will lead to greater understanding and closer co-operation, with corresponding repercussions on the friendship between two great democratic countries. (40)

While these negotiations were in progress, other initiatives were also afoot to examine and to organise the responsibilities of scientists in international affairs. As, indeed, is only logical: if scientific internationalism was to be an effective force in the maintenance of world peace, it needed a broader base than two countries could provide on their own. Some schemes were mooted by individuals : for example, by the French historian of philosophy Etienne Gilson at the Harvard tercentenary celebrations in 1936,[41] by H.G. Wells with his grandiose

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36. Armytage, Gregory, pp.166-167.
37. Armytage, Gregory, p.166; Crowther, Social relations, p.630.
38. A similar arrangement had recently been agreed between the Royal Society of London and the National Academy of Sciences of the U.S.A., with the financial help of the Pilgrim Trust. See Not. Rec. Roy. Soc., 1, (1938), 8; Nature, 140, (4 December 1937), 961, and 141, (22 January 1938), 169; and Crowther, Social relations, p.629.
39. Adv. Sci., 1, (1939), 131.
40. Allan Ferguson, 'Co-operation between the British and American Associations', Nature, 142, (3 September 1938), 409.
41. Nature, 141, (22 January 1938), 169.

plans for a so-called world encyclopaedia - 'the mental bank-balance of every intelligent man in the world', no less[42] - and by the Spanish diplomat de Madariaga in his book The World's design.[43] The most significant initiative, however, came from the International Council of Scientific Unions (abbreviated I.C.S.U.), which had been set up in 1931 as the successor to the International Research Council, itself founded in 1919.[44]

At a meeting held in London in April 1937 the Royal Dutch Academy of Sciences put before I.C.S.U. a proposal that it should appoint a committee 'which should attempt to arrive at a co-ordination of what has been proposed in respect to the social responsibilities of science and of scientific workers'. The context of this proposal was, as might be expected, a statement of belief in the internationalist theme:

> The International Council of Scientific Unions, already at a former occasion having expressed its faith in the possibility and the necessity of peace between the world's peoples, and being convinced that the 'brotherhood of scientists' can be an important factor towards the establishment of a desire for mutual understanding and helpfulness, considers it to be a part of its task to give attention to the opinions brought forward from various sides concerning the attitude which should be taken by scientists in relation to the dangers which at present menace the future of our civilisation. (45)

Following consultation with the League of Nations International Committee of Intellectual Cooperation, I.C.S.U. decided that only the more scientific aspects of the question came within its purview and that the political aspects should be handled separately, if at all.[46] It then constituted the proposed committee with F.J.M. Stratton (general secretary of I.C.S.U. and ex-general secretary of the British Association) as president, Sydney Chapman[47] (president of the International

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42. Armytage, Gregory, chap. XIII.

43. D. Casadog Jones, 'Science and a world foundation', Nature, 142, (6 August 1938), 227-229.

44. Henry Lyons, 'The International Research Council', Adv. Sci., 2 (vi), (1942), 178-181. See also F.J.M. Stratton, 'International scientific cooperation', Adv.Sci., 3 (xii), (1946), 349-350 and Hilary Rose & Steven Rose, Science and society (Pelican, 1969), pp. 183-184.

45. Brightman, 'Social responsibilities of science', Nature, 139, (24 April 1937), 689-691.

46. F.J.M. Stratton, 'International cooperation in science', Nature, 140, (28 August 1937), 337-338.

47. 1888-1970. Educated at elementary and technical schools, Manchester University and Trinity College, Cambridge. Chief assistant at the Royal Observatory, Greenwich, 1910-1914; lecturer at Trinity, 1914-1919; professor of mathematics at Manchester, 1919-1924, and at Imperial College, 1924-1946; professor of natural philosophy at Oxford, 1946-1953. F.R.S., 1919.

Meteorological Association) as vice-president and J. M. Burgers of Delft, the originator of the idea, as secretary. In the first instance the committee was to undertake the accumulation of data and the preparation of bibliographies on: scientific research; its applications; 'interpretative work on the world picture as given by science'; and 'thoughts on the social relations of science and the influences connected with its applications'.(48)

Such a project called for the cooperation of the relevant organisations in many different countries. In Britain, Chapman and Stratton approached the Royal Society. Now according to A. V. Hill, who was then one of its secretaries, the Royal Society refused to participate and Chapman and Stratton turned instead to the Council of the British Association.(49) It is certainly true that the British Association became involved, but it is not true that the Royal Society disdainfully held aloof. On the contrary, it appointed F. E. Weiss to correspond with Burgers and a committee composed of Chapman, F. G. Donnan, C. H. Lees and Miles Walker to assist him.(50) I have, however, been unable to determine whether its decision to do so was taken before or after the British Association came into the picture.

The I. C. S. U. committee represented the convergence of two ideas which had been gathering force during the previous decade: the concept of scientific internationalism as a factor in the maintenance of world peace and the realisation of the importance both to society and to organised science of making a concerted effort to understand the relations between the advance of science and the life of the community. The growth of the British Association's commitment to the latter has been the theme of this part of my thesis. Not everyone, however, was satisfied with the rate at which the Association was moving, even within the terms of reference which it had set for itself. Quite apart from its reluctance to sponsor the social sciences - i.e. the application of 'scientific method' to the study of society - it was not universally seen as adequately fulfilling the need for an objective examination of the relations between science and society. Daniel Hall, for example, had in 1936 called for the foundation of a new 'institution for the study of the social aspects of science'.(51) In 1937 The Times had wondered

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48. Nature, 140, (4 December 1937), 983; see also ibid., 142, (13 August 1938), 278-279 and Crowther, Social relations, pp. 627-628.

49. Letter from Hill to Gary Werskey : see Werskey, 'Outsider politics', pp. 77-78.

50. Not. Rec. Roy. Soc., 1 (ii), (October 1938), 53; Nature, 142, (13 August 1938), 278; Manchester Guardian, 18 August 1938, p. 12.

51. Chapter VII, p. 152 above.

whether the study of the social implications of science could best be undertaken by the British Association or by a distinct organisation, though at the same time it had confused this issue with the different one of the development of sociology.(52) In each case, as also in the case of the I.C.S.U. committee, the threat of war had given a special urgency to the question of the relations between science and society.

That old campaigner Richard Gregory now entered the fray. He was particularly impressed by the Indianapolis resolution of the American Association and by the potential of the I.C.S.U. committee. He was also impressed by the apparent lack of opportunity in this country for adequate discussion of the social relations of science, the British Association's moves in this direction notwithstanding. He therefore began to toy with the idea that a new Society for the Study of the Social Relations of Science (which he abbreviated S.R.S.) might be founded. He was unsure, though, whether this would be the best means for promoting his objective ; as he wrote to Ferguson on 7 April 1938, 'You know yourself that I am not actually committed to the formation of a new society, but I should certainly support it if there is a decided opinion among scientific workers in favour of it.'(53) To find out, he wrote a leader on the subject and before publication circulated it to a number of scientists and non-scientists ; the leader, together with comments from some forty correspondents, appeared as a special Nature supplement on 23 April 1938.(54)

In another letter to Ferguson dated 12 April Gregory set down his thoughts in greater detail :

> I have not committed myself or Nature to the idea that a new society is the only way of getting the work done. All I am keen about is that biologists, chemists and other workers in the realm of the natural sciences should by virtue of their particular knowledge and methods of investigation get closer contact with workers in the fields of social science, even though these fields have political aspects. I doubt very much whether the B.A. council would go very far in this direction, but I do believe with you that as it has already accepted the field as appropriate to its work, it is worth while suggesting that it might appropriately extend its activities in this direction by fathering a section or other organisation which could deal with papers throughout the year instead of limiting them to the annual meeting. (55)

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52. Chapter VII, pp. 167-168 above.

53. Letter, Gregory to Ferguson, 7 April 1938 : Ferguson papers.

54. Nature, 141, (23 April 1938), 723-742. The comments were edited by Sydney Chapman : see Werskey, Visible College, p.248n.

55. Letter, Gregory to Ferguson, 12 April 1938 : Ferguson papers.

In his leader Gregory put the case for a new society in terms of the need to supplement on a national basis the work of the I.C.S.U. committee, the insufficiency of the British Association's commitment and the general desirability of excluding unduly controversial matters from the usually even tempered proceedings of scientific societies : 'National scientific academies, such as the Royal Society, probably do well to limit their discussions and publications to the natural sciences.' Though realising that his S.R.S. would inevitably be faced with questions of political significance, Gregory insisted that

> its attitude ... should be scientific and objective, and it should not in general express corporate opinions, but leave readers to accept or reject the statements in its publications, according to their view of the credit of the authors. ...
>
> The S.R.S. would be a society for the advancement of knowledge, not a propagandist body for the advancement of science in the public councils and esteem (like the former British Science Guild) or for the advancement of professional scientific interests (like the Association of Scientific Workers). (56)

The correspondence which constituted the bulk of the supplement was almost unanimously agreed upon the importance of studying the social relations of science, and many commentators considered that Gregory's S.R.S. would be the most effective means of furthering this objective. Such a society, it was suggested, could promote discussion between scientists and Statesmen, between natural scientists and social scientists, between economists and sociologists; it could serve as the national analogue of the I.C.S.U. committee; it could develop ideas on science and ethics and on science and education; it could scrutinise 'the effect of totalitarian policy upon scientific output'. It could, in short, examine just about any particular aspect of the social relations of science in which individual commentators were interested.

Gregory had proposed that his S.R.S. should function like the typical learned society, with 'its council, its regular meetings, its publications, and perhaps its committees for the study of selected questions. It should receive, read, discuss, and, after consideration by suitable referees, publish papers submitted to it.' This raised a number of radical eyebrows. J.B.S. Haldane was very doubtful whether referees could be found who would succeed in being 'scientific and objective' and feared that in their absence the S.R.S. would become 'a propagandist

56. Gregory, 'Social relations of science', Nature, 141, (23 April 1938), 723-724.

body ... for the preservation, with trifling modifications, of our existing social system'. Chalmers Mitchell,[57] too, wondered whether the society would give the socialist viewpoint a fair hearing and he, Blackett, Levy and Needham all expressed anxiety that the organisation of the society should be such as to allow full ventilation of all shades of opinion on politically sensitive issues : the society's discussions should engender rather than stifle controversy. From the radical point of view, a debate on the social relations of science could not be conducted without reference to the political structure of society and, despite the precedent of I.C.S.U.'s decision to the contrary, they were determined that both this fact and their own ideas on political structure and its effect on science should be recognised in the S.R.S. It was for such reasons that Gregory had suggested that the S.R.S. should be independent of existing scientific bodies.

Not everyone agreed that a wholly new organisation was the best way of proceeding. The geneticist F.A.E. Crew (president of Section D in 1937) wrote : 'I should like to see it grow into a section of the British Association, which I sometimes think now requires a fresh purpose.' Richard Paget and Cyril Desch had similar ideas, though they also suggested, respectively, Nuffield College, Oxford (endowed the previous year) and the Institute of Sociology as possible alternatives. Boswell and Ferguson, in separate contributions, each argued strongly that the functions of the proposed S.R.S. could and should be assumed by the British Association. Ferguson had already, at the Blackpool meeting, urged that 'Our Association is peculiarly fitted to develop and discuss such knowledge'[58] and the 12 April letter just quoted indicates that he had recently repeated this view to Gregory. In his contribution to the supplement he bemoaned the addition of 'yet another to the set of letters that the unfortunate student of public affairs must memorise' and, without actually naming the British Association, observed :

> There is at least one organisation in existence which has the constitution adumbrated; which is alive to the consequences of the impact of science on a perplexed and unstable world; which is changing its alignment to meet the demands of the changing times; which has experience in the use of a mechanism capable of dealing with these problems more rapidly and more efficiently than that of a new and untried organisation; which is not lacking in enthusiasm for the forwarding of world peace, and for an equitable social order.

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57. cf. Chapter IV, n.79.
58. cf. Chapter VII, n.46.

Boswell was even more forthright. The importance of studying the social relations of science had, he wrote, been recognised already 'in the reactions of the sections of the British Association to the pressure of public opinion, and in the recent proposal of the Trades Union Congress to set up an advisory scientific committee', and he added :

> The British Association is, of course, the singularly appropriate body at the present time to undertake this task, but various difficulties would require to be surmounted, including that of publication of original papers in full, if it took over the work of such a society itself.

There was also some opposition to the whole idea. J. L. Myres, ex-general secretary of the British Association, felt that the S. R. S. could not simultaneously be a learned society as desired by Gregory and deal with questions of political significance. Insofar as bodies like the British and American Associations did undertake both functions, they kept them in separate compartments 'concurrent and distinct'.

> Clearly 'social relations' are not the business of the 'learned' societies. The less these are concerned with 'practical applications' or with practical restrictions, the better. For all these involve judgements of values - considerations political or moral, not scientific at all.

Myres challenged the advocates of the S. R. S. to 'make up their minds whether it is to be a historical, or a philanthropic society; a society for the Study of Spilt Milk, or for Promoting the Good Will among the Stronger'. A. C. G. Egerton considered that the important issue was not so much the study of social relations as that 'scientific men should be invited to take a closer and more responsible position in the affairs of State'; the British Association already provided adequate scope for the former, and the Royal Society should be encouraged to pursue the latter more actively. Frederick Soddy, in characteristically splenetic mood, attacked the 'rather naïve idea' that 'the massive intelligence of organised science should be shipped off on a quest into these uncharted seas' and laid into the proposal for 'just another debating society' : 'Are we still supposed to subscribe to the idea that "in this country at least", once a sufficient and sufficiently well-informed body of opinion exists as to what is wrong, it will all come right?'(59)

Generally, however, the opinion presented in this supplement gave Gregory strong encouragement to press ahead with some sort of organisation for the study of the social relations of science. The first problem was to decide which sort of organisation : should it be wholly new or should it be part of an existing body? If the latter, then the British

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59. Nature, 141, (30 April 1938), 784.

Assocation was, indeed, the obvious choice - provided its Council could be persuaded to agree - for only the British Association had a sufficiently wide membership and suitable constitution to undertake the job. The Association of Scientific Workers lacked the requisite means and, besides, wrote officially to Nature in support of an independent S.R.S.[(60)] The second problem was the highly sensitive one of guaranteeing the objectivity of the proposed body. Understandably enough, the radicals were particularly worried about this. But while they may have been doubtful of their chances if the British Association had taken on the S.R.S., a far larger sector of opinion would have been alienated if the society had been formed under the aegis of the Association of Scientific Workers, which was widely regarded as marxist-oriented.[(61)] As its involvement with the T.U.C. scientific advisory committee illustrated, the British Association had a reputation for political neutrality which was vital to the success of the S.R.S. It also had more than a century's experience in the organisation of conferences and research committees to commend it, as Ferguson carefully pointed out. Once the format of the new body had been settled, the third problem, that of drawing up a detailed programme of discussion and research, could be tackled.

Before launching the Nature supplement, Gregory had commissioned Ferguson to write a leader for the following issue (30 April) commenting on the various suggestions put forward, though he gently cautioned him against emphasising 'the British Association avenue so obviously as to suggest the author was officially connected with it'.[(62)] To have done so would have been bad protocol both for the journal and, in advance of its official approval, for the Association. Yet that is precisely what Ferguson proceeded to do. Just as in January he had used the anonymous editorial columns of Nature to urge the British Association to develop the practice of sending scientific delegations overseas, so now he argued that the Association, 'itself a pioneer in the attack on some parts of the problem, might be invited to undertake the task' proposed for the S.R.S. 'Is it too much', Ferguson wondered,

> to suggest that the Association might very well consider the arranging of discussions of these problems to be held in

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60. ibid., (14 May 1938), 879. All the letters in the 23 April supplement were from private individuals : neither Boswell nor Ferguson wrote as officials of the British Association.

61. Kay MacLeod, A.Sc.W., pp.383-384. The point is not whether it actually was marxist-oriented, but that it was thought to be so.

62. Letter, Gregory to Ferguson, 7 April 1938 : Ferguson papers.

> London or elsewhere at regular intervals outside the annual meeting ? ... An entirely new department of the Association might be constituted. It seems to us that this plan would be preferable to the addition of a new section, or sub-section, to deal with the social relations of science. ... The present annual report would have to be supplemented. ...
>
> It may be that the serious questions of finance and of policy involved will make it too difficult for the Association to undertake this work. But in its constitution and outlook it is at least a possible body to undertake such duties, and its long and brilliant traditions are sufficient guarantee that the work, if undertaken, will be carried out in the true spirit of science and of public service. (63)

As Gregory told Ferguson, it had been decided to hold a meeting 'at the Royal Society in May, possibly with Sir William Bragg [P.R.S.] in the Chair, for the discussion of the matter, and the proposal will then be made that a new society be founded either through the British Association or otherwise.'(64) According to Boswell this meeting was actually held on 1 June and was attended by himself, Gregory, H.G. Wells, Bragg 'and others'.(65) They managed to overcome Gregory's scepticism and agreed to give the British Association first refusal on the venture.

The Council of the British Association held its regular June meeting three days later. The general officers came equipped with reprints of the Nature supplement and the associated editorials, and with a report on the issue which they had prepared on their own initiative. They pointed out that since 'the whole subject is receiving such wide attention at the present time', some public reaction from the Council was strongly indicated. Furthermore, they intimated that 'the opinion that the Association should undertake this work, in preference to the setting up of a new organisation, is more widely held than might appear from the published views' and they reminded the Council that the forthcoming visit of members of the American Association would lead to renewed debate on the issue. Finally, they remarked that there was nothing in the Associations constitution to prevent the establishment of a department such as Ferguson had suggested in his 30 April editorial. In short, it was put to the Council that a substantial body of opinion looked to the Association for the means to undertake an organised study of the social relations of

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63. Allan Ferguson, 'Science and society', Nature, 141, (30 April 1938), 763-764.

64. Letter, Gregory to Ferguson, 7 April 1938 : Ferguson papers.

65. Boswell, A narrative, p.265.

science. Implicit in the general officers' report is the threat that failure at least to consider the matter seriously would cast doubt upon the Association's sincerity in its existing involvement in the subject and would cost it the support of a fair number of people; conversely, a positive response would redound to its advantage. The Council bowed to this pressure : it decided 'to recommend the General Committee to take action in the direction of founding a new department or organisation other than a Section, to deal with the subjects indicated' and appointed a committee to produce a memorandum for circulation to the General Committee prior to the Cambridge meeting. The members of this committee were the president and general officers (Rayleigh, Boswell, Brooks and Ferguson), Sydney Chapman, Richard Gregory, A.V. Hill and Thomas Holland.(66)

Boswell and Ferguson had each mentioned in Nature that the question of publication would have to be dealt with if the British Association were to tackle the work of the proposed S.R.S. Independently of this issue, the Association had itself begun to reconsider the format of its annual report : in November 1937 the general officers had been instructed to investigate the matter. Their report, presented at the June 1938 Council meeting, recommended that the annual Report be replaced by a quarterly publication which would, they hoped, obtain a wider audience for papers given at the annual meeting and which could more conveniently carry lectures organised by the Association at other times, such as the two British Science Guild lectures and the Radford Mather lecture. Furthermore, 'quarterly publication should go far to overcome the widespread belief that the British Association is inactive except during its annual meeting.' (!)(67) With the possibility of a social relations of science department holding meetings throughout the year and generating extra material for publication, the case for a quarterly journal was strengthened, as the general officers realised, and the Council directed that the two questions be handled concurrently by the same committee. The journal of the American Association, Science, was, incidentally, a weekly, but in Britain that rôle was already filled by Nature. Quarterly publication was probably the most frequent that the finances of the British Association would allow.

The committee charged with working out the details of the new department met on 16 June, when they were joined by H.G. Wells, who

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66. Council minutes, 4 June 1938.
67. B.A.R., (1938), xxv.

promptly 'got to cross-purposes' with Rayleigh. It was Boswell who suggested that the new body be styled the Division for the Social and International Relations of Science. The word 'Division' set it apart from the ordinary Sections, in keeping with the intention that it should organise activities at times and places other than those of the annual meeting; the word 'department' had already found occasional use as an alternative to 'sub-Section'. The administrative and financial details of the Division, also worked out by Boswell, were such as to ensure that its ultimate control was vested in the Council of the British Association.(68) The concept of a Division, with fairly carefully defined limits of independence, was a nicely balanced compromise between those who wanted a wholly autonomous body and those who wanted it to be organised and controlled by the Association.

It is no surprise that the line taken in the memorandum prepared by this committee was much the same as that taken by Gregory in his introduction to the Nature supplement. There, it will be recalled, he had argued for a society for the dispassionate study of the social relations of science which would, in parallel with the international work of the I.C.S.U. committee, fill the national need for 'thought, discussion and publication'. It would be 'a society for the advancement of knowledge' and would perform its task in as 'scientific and objective' a spirit as possible. The memorandum similarly laid down that

> The purpose of the Division would be to further the objective study of the social relations of science. The problems with which it would deal would be concerned with the effects of advances in science on the well-being of the community, and, reciprocally, the effects of social conditions upon advances in science.

The detailed activities proposed were : to furnish material for the information of the public; to coordinate relevant work both within the Association and by other bodies; to act in a consultative capacity; and to carry out its own research in the same manner as an ordinary Section of the Association. The international relations of science were included in the scope of the Division 'primarily because of the deep interest of the American Association ... in the subject'.(69) Brightman, commenting in Nature, remarked that in the defence of intellectual freedom 'something more may be called for than the scientific investigation

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68. Boswell, A narrative, pp.264-265.

69. The memorandum was published in B.A.R., (1938), xxiii-xxiv and in Nature, 142, (27 August 1938), 380-381. See also The Times, 4 August 1938, p.7 and 18 August 1938, p.10.

of social and international problems', but he conceded that

> Even if the organisation of united action in that field falls outside the scope of the Division, it may at least serve to stimulate appropriate action or assist in bringing together professional associations both within and across national frontiers in defence of the most vital condition of the integrity and advancement of science itself. (70)

At a meeting of the committee of Section F on 17 August 1938, the opening day of the Cambridge meeting, 'the dangers of the proposals were discussed but the Committee agreed not to oppose the proposal.'[71] On the same day the General Committee as a whole accepted the memorandum. Since the Council was not due to meet again until November, the General Committee appointed a so-called 'nucleus committee' of fourteen members to get things moving. This latter committee met on 20 October and (i) appointed an 'executive sub-committee' to run the Division ; (ii) prepared, for the Council's approval, a list of forty-seven nominations including representatives of each Section for the 'divisional committee' which should have overall charge of the Division ; (iii) appointed Richard Gregory as its chairman ; (iv) drew up a short list of rules governing the activities of these two committees; and (v) drafted a publicity document.[72] The new Division was launched.

Now it was possible at the time of the Aberdeen meeting of the British Association to identify three more or less distinct elements in the social relations of science debate. What can one say of the situation four years later, in view of the developments which culminated in the founding of the Division for the Social and International Relations of Science ?

The British Association's interest in the social relations of science had manifestly increased : the very fact of the Division's foundation is evidence enough of that. But it was still basically reacting to public pressure rather than trying to lead it. Whatever the general

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70. Brightman, 'Social and international relations of science', Nature, 142, (20 August 1938), 310-311.

71. Section F minutes, 17 August 1938.

72. Nucleus committee minutes, 20 October 1938. The members of the nucleus committee were: Rayleigh, Boswell, Brooks and Ferguson (ex officio) ; Chapman, H. J. Fleure, Gregory, Huxley, C. S. Myers, J. G. Smith, Henry Tizard, F. E. Weiss, H. G. Wells and J. S. Wilson.

officers' personal views on the rôle the Association might play in the debate, their arguments to the Council were couched in terms of the need to respond to public opinion. Most importantly, the emphasis was still on understanding, on objective study, on dispassionate investigation : even if the new Division did seem to expose itself to politically controversial discussion, there was no suggestion in its constitution that such discussion might lead to action. The concept of positive social relations - the systematic application of 'scientific method' to the solution of general social problems - was still essentially unacceptable. The Association's decision to subscribe, for a trial period, to the Parliamentary Science Committee and its reluctant cooperation in the establishment of the T.U.C. Scientific Advisory Committee were hardly serious challenges to this policy. Both these moves are influenced by the remnants of the British Science Guild, and it is perhaps significant that the Guild committee was absorbed into the divisional committee.

Meanwhile, the rationalists were beginning to change their tune as their advocacy of a closer involvement of science in social affairs was tempered by an appreciation of the actual position of science in totalitarian countries.(73) Though the 'spirit of science' had always formed part of Nature's vocabulary, it appeared with greater frequency as the decade progressed and to it was added a growing insistence on the pre-eminence of intellectual freedom and integrity. The corollary of this, as Brightman observed in July 1938, was that the scientist had to accept A.V. Hill's 'not meddling with morals or politics' as the price of his freedom. He reiterated the point when commenting on the new Division :

> The advancement of science demands a certain immunity and tolerance to those engaged in scientific discovery and learning, and if the present threat to those liberties is to be resisted, scientific workers in their turn must recognise the normal conditions upon which such tolerance and immunity are accorded. Above all, they must be careful to maintain most scrupulously their intellectual honesty and independence of political pressure. (74)

On this basis, internationalism was not simply the only acceptable means by which scientists, as scientists, could work to lessen the chances of war, but also the best way to make a stand for the defence of intellectual

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73. Werskey, 'Perennial dilemma', pp.531-532. The 'effect of totalitarian policy upon scientific output' was one of the subjects of study proposed for the S.R.S. in the Nature supplement: see p.186 above.

74. Brightman, 'Social and international relations of science', Nature, 142, (20 August 1938), 310-311.

freedom. This was recognised in the Indianapolis resolution of the American Association; it was recognised by the rationalists; and it was recognised by the inclusion of 'International Relations' in the title of the Division.

But the rationalists had still not sorted out the contradictions in their position : Brightman, for example, regretted the exclusion of 'united action' from the work of the Division at the same time as he was talking about 'not meddling with morals or politics'. There were also some personal factors to be accommodated if the rationalists were to be able to work alongside members of the British Association in the new Division. These factors centred round Richard Gregory. In 1933 he had objected to the British Association's decision to step up its involvement in the social relations debate partly because he thought the Association was inherently unsuited to the task, partly because it was in session but one week per year and partly out of affection for the British Science Guild. By 1938 the last of these objections was irrelevant, but the other two remained. The Association's wariness of the social sciences, for example, was in sharp contrast to his own enthusiasm for them. His friend Allan Ferguson seems to have been instrumental in overcoming his scepticism. On the one hand they shared the conviction that reason was the essential basis for social progress.[(75)] On the other, Ferguson and his colleagues were confident that, despite its resistance to the concept of positive social relations, the British Association was indeed a suitable medium for the study of the social relations of science. Its apolitical reputation was increasingly seen as an advantage in this context. The constitution of the Division, giving it a certain degree of operational autonomy and allowing for as frequent meetings as it desired, removed another of Gregory's objections. That Gregory was reconciled to the Division is evident in his accepting its chairmanship.

The resumption by Gregory of an active official part in the life of the Association was marked by his nomination, in June 1938, to his third term of membership of the Council after an absence of six years.[(76)] The process was completed in March 1939 by his election as president of the Association for 1940.[(77)] The election was, however, an haphazard

75. cf. Ferguson's Nature leader of 30 April: '.... those of us who believe that, before all and above all, reason, and conviction by an appeal to reason, are the indispensable bases for any ordered, successful and permanent social advance ....'

76. Council minutes, 4 June 1938.

77. Gregory was president from 1940 till 1946 as the annual meetings were interrupted by the war.

affair, to say the least. There were three nominees, J. Irvine, N.V. Sidgwick and F.E. Smith. The engineer J.S. Wilson, a member of the Council since 1936, mentioned to several other members his intention of proposing Gregory as well: 'Although they were all quite favourable, one or two tried to frighten me out of it.' Irvine got no support, and Sidgwick's and Smith's proposers were vague and half-hearted : the fact that Smith had been general secretary for six years was forgotten! Gregory gained twelve votes, Sidgwick six and Smith four. The proposal was entirely Wilson's idea, without Gregory's knowledge.(78)

Gary Werskey sees the Division as the locus of an alliance between radical and reformist scientists. Given the inherent unlikelihood of such an alliance,(79) particularly in the context of the softening of the latters' attitudes, this proposition obviously calls for detailed comment. Werskey takes the line that the two groups were motivated by their common concern about 'what might happen to Britain if it continued to treat its scientists as political outsiders', though at the same time he points out that the Division 'was carefully designed not to become ... a forum from which a "united front" of scientists could speak out on controversial questions'.(80) I feel, however, that at this point the concept of the 'Visible College', with its implications of an ideologically coherent group of radical scientists, ceases to be useful : it is impossible to talk about the 'Visible College's attitude' to the Division. It is more appropriate to talk instead of the attitudes of each of the radicals individually, rather than to attempt to deal in generalities.

Perhaps the only general idea that can realistically be stated concerns the radicals' long-held insistence that the relations between science and society are mutual : each influences the other. This had been accepted, to some extent at least, by the rationalists for a number of years. The British Association also seemed to be moving towards this idea. The 1933 memorandum to the sectional organising committees laid stress on how science had influenced society, but it did also mention the effects of governmental control on the development of science. The memorandum establishing the Division referred more explicitly both to

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78. Letter, Wilson to Gregory, 7 March 1939 : Gregory papers, Sussex University.

79. cf. J.G. Crowther's comment : 'The remarkable unanimity in support of the new division astonished many members [of the B.A.]. Persons with contrary political opinions were equally strongly in favour of it.' Manchester Guardian, 25 August 1938, p.13, as quoted in Werskey, Visible College, p.249.

80. Werskey, 'Outsider politics', pp.77-80; idem., Visible College, pp.248-254.

the effects of science on society and to 'the effects of social conditions upon advances in science'. While none of this amounts to an acceptance of the marxist view of science as determined by social and economic needs, it does imply a willingness to consider the mutual relations between science and society which may have disposed some of the radicals to look more favourably upon the Division. It is significant that in their contributions to the Nature supplement both Blackett and Levy went out of their way to emphasise this reciprocity of social relations.

Although Bernal, Blackett, Haldane, Levy and Needham all contributed to the Nature supplement, none of them were involved in the subsequent negotiations to establish the S. R. S. as part of the British Association and none of them were members of the ensuing nucleus committee. To judge by their activities at this time there is little reason to suppose that they particularly wished to be thus involved. In the summer of 1937 a number of radicals, including those just mentioned, feeling hampered by the attempts of the Association of Scientific Workers to project a politically neutral image, turned to the 'scientists' group' of the Left Book Club where they were free to expound on the virtues and the mutual dependence of science and socialism. This group seized the opportunity presented by the Cambridge meeting of the British Association to stage an exhibition on the old theme of 'the frustration of science'.(81) Opened by Blackett and Levy, the exhibition was intended as a demonstration of 'the frustration of science under capitalism, the perversion of science by the Nazis and the application of science to economic and industrial progress in the U. S. S. R.' Levy hoped that it would activate members of the British Association towards a sense of political responsibility: to remain non-political was, in his view, 'to connive at a scientific crime'. Bernal addressed a crowded audience on the same theme.(82) That such ideas would strike a receptive chord in the new Division did not seem likely. Gregory had made it plain in Nature that its function should be that of objective study, no more and no less, and nothing other was anticipated in the memorandum prepared for the General Committee. There was little in the origins

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81. cf. the tactics of the Association of Scientific Workers at the 1934 Aberdeen meeting - chapter V, n.42 above - and of the British Society for Social Responsibility in Science at the 1970 Durham meeting - New Scientist, 47, (1970), 461-462, 532-533.

82. Kay MacLeod, A. Sc. W., pp.384-386; John Lewis, The left book club (Gollancz, 1970), pp.83-84. See also Wood, Communism, pp.60-63.

of the Division to suggest sympathy either for socialism or for the more general proposition that organised science should speak out on political affairs.

Nevertheless, when the nucleus committee met on 20 October, it appointed Hyman Levy to the executive sub-committee (on which he was later joined by the radical journalist J.G. Crowther) and nominated, amongst others, Bernal, Blackett, Hogben and Levy for the divisional committee.(83) All these nominations were accepted by the Council of the British Association at its November meeting. Each must be considered individually.

J.G. Crowther was firmly opposed to the notion that scientists should necessarily become involved in politics, on the splendidly pragmatic grounds that 'if all the scientists with political judgement leave science for purely political work, the reactionaries within the scientists' group will have no opposition.'(84) The Division therefore gained his warm approval because its programme of study was appropriate to the politically conscious scientist : 'it could reveal the scientific evidence that would provide an indisputable basis for progressive social policies.' In founding it, the British Association 'by its courageous action strengthened the hope for a better world through the more intelligent use of science, and the solution of social problems by the application of scientific method'.(85)

Bernal, too, was very keen on the accumulation of data on social affairs by objective, 'scientific' study. At the 1936 International Peace Congress, for example, he had advocated this as a major step in the prevention of war.(86) He stressed the importance of such data-collection, the basis of a 'science of science' and a science of society,(87) in his contribution to the Nature supplement and although he said that 'no existing scientific body could undertake such a task' because none contained 'sociologists, economists and historians' as well as scientists,

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83. Nucleus committee minutes, 20 October 1938.

84. The scientific worker, (October 1936), 82; quoted in Kay MacLeod, A.Sc.W., p.381.

85. Crowther, Social relations, pp.630-632. The text of this book was completed by the end of 1939.

86. cf. Chapter VII, nn.90, 92 above.

87. Predictably, The Times also welcomed the new Division in terms of the 'science of society' : The Times, 25 August 1938, p.11. For its earlier comments on this, see chapter VI, n.27 and chapter VII, n.112 above.

yet it was fairly consistent that he should support the Division when it emerged : such hard knowledge as it might generate could always be used to further the cause of scientific socialism. His attitude to the British Association was also warming a little : in a book nearing completion about this time, he conceded that

> Of recent years, however, the Association has become more and more concerned with the economic, social and even political aspects of science. The scientists have been to a certain extent on trial, and it is at their Association meetings that they make their defence. ... It is clear that in the Association there are considerable possibilities for developing among scientists and the public a more acute and effective consciousness of the importance of science in social life. (88)

The logic of Hyman Levy's involvement in the Division is more convoluted, if not actually illogical! In a book completed about the time of the Cambridge meeting, he laid into those scientists who 'strain for a rational way out of an impending catastrophe as the tempo of class conflict rises', adding : 'The demand for a new division of the British Association to explore the social relations of science is a step in the rational process of paving the way to the new society.'(89) According to Levy, the new society could not come into being simply by a rational process. Commenting on the 1931 International Congress of the History of Science and Technology, he wrote :

> What became clear was not only the social conditioning of science and the vital need for planning, for anticipating the social effects of discovery, but the impossibility of carrying this through within the framework of a chaotic capitalism. What emerged afterwards was the necessity nevertheless for demanding that this impossible task be undertaken, in order to educate the great body of scientific men in the reasons for its impossibility. (90)

He could, then justify his involvement in the Division - and he was one of the most active members of the executive sub-committee - as a contribution to this process of negative education, though it seems an unnecessarily indirect way of furthering his cause. Another consideration was his suggestion in the <u>Nature</u> supplement that political bias in the S.R.S. would best be overcome if its governing body were made up of 'a "reasonable" group of scientifically minded people, along

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88. J.D. Bernal, op. cit. (n.24 above), p.42.
89. Hyman Levy, <u>Modern science</u> (Hamish Hamilton, 1939), pp.100-101.
90. ibid., p.97. cf. Chapter III, n.18 above. See also Werskey, <u>Visible College</u>, p.255 n and, for Levy's attack on scientific rationalism, chapter IV, pp.72-73 above.

with "right -" and "left-wing" scientific men'. This allowed him, unlike Bernal, to dispense with the need for political impartiality and to participate in the Division's activities for the specific purpose of propagating his own political views, the Division's explicitly stated objectivity notwithstanding.

P. M. S. Blackett was equally insistent that controversy - meaning political controversy - should find a place in the S. R. S. J. B. S. Haldane, who was extremely sceptical about the prospects of such controversy being allowed, took no part in the affairs of the Division up to the outbreak of war. Both Levy and Blackett were keen that there should be scope for an historical study of the social relations of science, which would, presumably, serve to focus attention on the marxist analysis of the subject.(91) Joseph Needham in the <u>Nature</u> supplement was anxious that all opinions should be freely and impartially aired, though he did not see differences of opinion simply in straight political terms. It would, he thought, be

> an excellent plan that the publications of the proposed organisation should be quite objective, providing a forum where arguments on all sides can be clearly stated. On questions such as the 'frustration' of science, the suggested moratorium of discovery and technical application, the optimum conditions for organisation of research, etc., there are various points of view.

Lancelot Hogben, despite being appointed to the divisional committee, was insufficiently interested (or perhaps too busy) to attend any of its three pre-war meetings or to take any other part in the Division's activities during its first year of existence; nor did he contribute to the <u>Nature</u> supplement.

It seems, then, something of an over-simplification to say with Gary Werskey that 'there was an ideological overlap [between 'radicals' and 'reformists'] sufficient enough for Bernal, Hogben and Levy to participate effectively in the British Association's new Division'(92) - quite apart from the fact that Hogben did not participate at all - or to speak of an 'alliance' between the two factions. As becomes clear when the radicals are considered individually instead of collectively, they did not all take part in the Division or even wished to, and those who were involved were not all inspired by the same motivation. From

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91. John Read in the <u>Nature</u> supplement also stressed the importance of the history of science, though his emphasis was on scientific humanism.

92. Werskey, <u>Visible College</u>, pp. 254-255.

the British Association's point of view, acceptance of the radicals need not be seen so much in ideological as in pragmatic terms : they could hardly exclude them if the Division was to be seen to be politically unbiassed. It would be a poor omen for the 'objective' study of the social relations of science to reject, on account of their political opinions, some of those most interested in the subject. They could only insist that the purpose of the Division was the advancement of knowledge, no more and no less. That did not imply absence of controversy ; on the contrary, Gregory tried hard to encourage it. As he wrote to Ferguson whilst endeavouring to persuade Bernal to give a paper to the Division at Dundee :

> I hope very much that he will consent, for the last thing I want is for the New Division to be regarded as academic or preservative. ... I much prefer such meetings to be provocative of thought and action than to be general and academic. (93)

The limits to which such provocative thought and action could be carried were carefully watched by the guardians of the Division during its first year of existence.

As its title foreshadows, the Division's activities up to the outbreak of war fall under two broad headings, the social and the international relations of science. For no very special reason, I propose to deal first with international relations.[(94)]

There were two organisations whose interest in internationalism had helped to focus the Division's attention on the matter : the I.S.C.U. committee and the American Association. Although the former was discussed extensively in Gregory's introduction to the Nature supplement, it was not mentioned in the memorandum circulated to the General Committee prior to the Cambridge meeting. Nor did the nucleus committee refer to it : in the statement of aims formulated at its meeting on 20 October, the only comment on internationalism was the following :

> Many of the impacts of science on society apply to mankind

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93. Letter, Gregory to Ferguson, 1 June 1939 : Ferguson papers.

94. This part of the chapter is based on the minutes of the various committees of the Division, a complete set of which for the year 1938-1939 is preserved at British Association headquarters. Apart from the nucleus, divisional and executive committees mentioned already, there were sub-committees for arranging meetings, for a national survey of research organisations, for nutrition and agriculture, for science and industry and for the international dissemination of science.
Detailed references to these minutes have been omitted : the source should be evident from the text.

> at large; the improvement of international relations is itself a social problem. It is hoped that the Division will help to maintain through its work the traditional international character of scientific advancement.

At its meeting on 1 November, however, the executive sub-committee did raise the question of how it might smooth the path of the I.C.S.U. committee's investigations and decided to consult F.E. Weiss, the Royal Society's correspondent for the purpose.(95) When the divisional committee met on 27 January 1939, proposals as to the manner of cooperation between the Division and the I.C.S.U. committee were still awaited, and the services of two Sectional recorders were volunteered. A month later the matter was stated to be 'in suspense' while O.J.R. Howarth sought out Sydney Chapman, vice-president of the I.C.S.U. committee. Finally, on 21 July, its president, F.J.M. Stratton, came forward with a request for the help of the Sectional recorders in gathering information for the report which the committee was trying to prepare. This report was due in 1940 and, six months having elapsed since definite help was first offered, Stratton's request was turned down as 'impracticable within the time-limit suggested'. So, for all that the existence of the I.C.S.U. committee on the social responsibilities of science and of scientific workers helped to prepare the ground for the foundation of the Division, the committee itself did not benefit.

The Division did, however, explore other avenues for promoting the international relations of science, to such an extent that the Royal Institute of International Affairs asked to be kept in touch with its work and, during the war, twice allowed the Division to meet on its premises. For example, the Division appointed a strong committee 'to consider means for the study of the economic requirements of nations in relation to the sources of raw materials, incidence of population, standards of living, industrial developments, etc.'. But this proved to be an empty gesture : apart from nominating one of its members, J.B. Condliffe (professor of commerce at the L.S.E.), to give the 1939 Norman Lockyer lecture, the committee does not appear to have done anything. A proposal to set up an 'International Relations sub-committee', which should establish contact with similar organisations overseas and 'examine the means by which international exchange of ideas and knowledge among scientific men has helped and can help social progress', was twice deferred (1 November, 27 January) and then abandoned in favour of another proposal. This

95. cf. n.50 above.

latter involved collaboration with the imposingly titled League of Nations International Committee of Intellectual Cooperation (abbreviated I. C. I. C.) and was first mooted to the executive sub-committee on 24 February. A month later the meetings sub-committee suggested international intellectual cooperation as a suitable topic for the Division at the 1939 Dundee meeting of the British Association; the executive sub-committee agreed and set about organising speakers.(96)

On 21 July 1939 the executive sub-committee received a memorandum from the I. C. I. C. on the international dissemination of science. The memorandum proposed the setting up of an organisation whose chief functions would be to establish a European equivalent of the American Science News Service(97) and to explore all possible media (books, films, wireless, gramphone records) for spreading information about science. The object of the exercise was to improve, qualitatively and quantitatively, the reporting of scientific developments rather than any direct propaganda for the enhancement of scientific influence in world affairs. It was suggested that the Royal Society and the British Association, through its Division, might act on behalf of the proposed organisation in this country and dispense any funds which might be forthcoming from the Rockefeller Foundation for the purpose. The executive sub-committee confirmed that it was proper to its functions to advise on the subject. The examination was then carried out by two scientists, Harold Hartley and Julian Huxley (one of the authors of the I. C. I. C. memorandum), and three journalists, Calder, Crowther and Henry Martin. The outcome of their deliberations was a series of recommendations as to how closer liaison between science and the press might be achieved and by what principles it should be governed, the most interesting of which was the insistence that 'news should be carefully watched for concealed advertisement and propaganda.'

So far as the American Association is concerned, Boswell's proposal for mutual membership and for exchange of lecturers(98) marked the limit of cooperation actually achieved, despite all the fanfare about collaboration between 'two great democratic countries' which had preceded the foundation of the Division. Although it was stated in the memorandum

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96. Those invited included representatives of the Nobel Prize Organisation and the Rockefeller Foundation, J. M. Burgers (secretary of the I. C. S. U. committee) and the ill fated Russian geneticist N. I. Vavilov.

97. cf. Chapter VI, nn.1-5 above.

98. See n.38 above.

to the General Committee that international relations were included in the Division 'primarily because of the deep interest of the American Association ... in the subject', there was in fact only one attempt at concerted action by the two Associations, and that unsuccessful. A number of American scientists under the leadership of Franz Boas produced a manifesto early in 1939 which they persuaded 1284 of their colleagues to sign. Quoting extensively from the Indianapolis resolution, the manifesto attacked the Nazi attitude to science and urged scientists 'to participate actively in the defence of democracy as the sole means of preserving intellectual freedom and insuring scientific progress'.[99] For all that Nature said of the manifesto' it has demonstrated in practical form the essential solidarity of the world of science',[100] when J. L. Myres forwarded it to the executive sub-committee for its meeting on 24 March he was told that 'it was not considered expedient to propose a similar manifesto in this country', but that Boas would be kept informed of the proceedings of the Division.

Now only Richard Gregory and Ritchie Calder were present at the meeting at which this decision was taken with, as ever, O. J. R. Howarth in attendance. Given their strong commitment to internationalism and intellectual freedom, and given the context of the foundation of the Division, it seems a little surprising that they declined to support the Boas manifesto : it may be that the reason was, indeed, practical rather than ideological. But two other comments may be made. Firstly, the manifesto is ambiguous, or at least the extracts which I have seen are ambiguous. It is not clear whether 'the defence of democracy' involves simply the advocacy of scientific internationalism or whether it also involves a willingness to participate in armed conflict. The manifesto would have little value while this ambiguity remained. Secondly, attitudes to war changed during the year after Chamberlain's visit to Munich. In the middle of October 1938 Nature carried a leader, significantly written by J. D. Bernal, which for the first time directed attention away from internationalism and peace and towards the question of how scientists could best be used in war.[101] Three months later the Association of Scientific Workers issued a statement to the effect that while it regarded war

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99. E. N. Fallaize, 'Science and democracy', Nature, 143, (25 February 1939), 309-310.

100. ibid.

101. J. D. Bernal, 'Science and national service', Nature, 142, (15 October 1938), 685-687 ; cf. Werskey, 'Perennial dilemma', p. 532.

as 'the supreme perversion of science', it was nevertheless 'prepared to assist in measures for [military] defence against anti-democratic movements'.(102) Again, the executive sub-committee of the British Association's Division, at its very first meeting, rejected two separate invitations to cooperate on peace propaganda as 'inappropriate to the work of the Division'.

At the Cambridge meeting Lord Rayleigh had devoted part of his presidential address to 'science and warfare'. Apart from a half-hearted nod in the direction of internationalism, Rayleigh did not think that scientists as such could do much to influence the advent of war:

> I believe that the whole idea that scientific men are specially responsible is a delusion born of imperfect knowledge of the real course of the process of discovery. ...
>
> I think we may say that the application of fundamental discoveries in science to purposes of war is altogether too remote for it to be possible to control such discoveries at the source. ... Can we then do nothing? Frankly I doubt whether we can do much, but there is one thing that may be attempted. ... [the Division] ... We rejoice to know that our distinguished American visitors are in sympathy with this aim, and we hope that our discussions with them will bear useful if modest fruit in promoting international amity. (103)

After Munich, the country as a whole began to prepare more seriously for war and the scientific community joined in this trend. But if the Boas manifesto was actually to be interpreted as a contribution to this process, then it is likely that it was far too strongly worded for the British Association's taste. As in 1936, the Association refrained from making any corporate statement on the issue.

So, despite a good deal of talk about the importance of internationalism, the British Association's Division did not make much headway during its first year of work in the direction of maintaining 'the traditional international character of scientific advancement'. It stimulated moves in the Australasian, French, Indian and South African Associations to set up similar Divisions, and the American Association established a 'Division of cultural relations',(104) but otherwise there was little progress towards that World Association for the Advancement of Science which Calder and others had mooted.(105) The approach of

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102. Nature, 143, (21 January 1939), 110-111.

103. B.A.R., (1938), 17-20.

104. Allan Ferguson, 'Intellectual cooperation between the nations', Nature, 143, (14 January 1939), 41-42.

105. The nearest equivalent was the marxist-led World Federation of Scientific Workers, which was founded in 1946 with (cont. over)

the Second World War was a stronger force than its projected antidote. The Division failed to cooperate effectively with the I.C.S.U. committee investigating the social relations of science on an international scale, though not through its own fault. Collaboration with the International Committee of Intellectual Cooperation was, however, slightly more fruitful and provided an opportunity to further a project with which the British Association had been intermittently concerned for the previous dozen years. Ironically, the proposed discussion at Dundee on international intellectual cooperation, which eventually was to have been based on papers from Gilbert Murray (president of I.C.I.C.), F.G. Donnan, Julian Huxley and Gunnar Dahlberg,[(106)] was one of the casualties when the outbreak of war interrupted the British Association in mid-meeting. Under the chairmanship of Richard Gregory the Division continued to beat the international drum and, in 1941, invited men from twenty-two countries to confer for three days on 'Science and World Order'. But that, as the saying goes, is another story.

If the performance of the British Association's Division in the field of the international relations of science did not, in its first year, live up to the rhetoric surrounding the Division's foundation, its performance in social relations sometimes exceeded the anticipated limits. This became apparent at the outset. The publicity document drafted by the nucleus committee on 20 October stated that the Division would seek not only 'to further the objective study of the effects of advances in science', as in the memorandum to the General Committee, but also 'to encourage the application of science to promote the well-being of society'. In other words, despite the earlier exclusive insistence on 'objective study' and the 'advancement of knowledge', an interest in the traditionally banned 'contentious field of immediate political thought' was openly declared. This would scarcely have been possible had the Division not enjoyed a certain degree of autonomy from the main body of the British Association and, even so, it caused some difficulties. Maybe Blackett and Levy's exhibition at Cambridge had some influence on the nucleus committee. In any event, the Division did offer enough scope for political controversy to encourage the participation of several individual radicals and of the Association of Scientific Workers, as well as that

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105. (cont.) F. Joliot-Curie as its first president and J.G. Crowther as its first secretary-general. For further information on the W.F.S.W., see Maurice Goldsmith, Frédéric Joliot-Curie (Lawrence & Wishart, 1976), chap. IX.

106. Nature, 144, (2 September 1939), 453 : forthcoming events.

of some of the more activist rationalists, in its affairs.

One of the major preoccupations of the Division was with nutrition and agriculture. A sub-committee was appointed to deal with this and on 28 March 1939 it organised a public meeting at Reading University on 'Milk in its nutritional and allied aspects'. As at previous British Association meetings, there were papers setting out the factual evidence for the nutritional importance of milk ; but, as might be expected from the previous paragraph and from the fact that the meeting was chaired by Richard Gregory and Daniel Hall, the political aspects of the question were given greater prominence than usual. Hall, in particular, had long been insisting on the importance of State intervention if developments in the understanding of nutrition and of the production of food were to generate improvements in the national health.[107] The Reading meeting passed a resolution calling for the compulsory pasteurisation of milk for all towns with a population in excess of twenty thousand. The idea was not original,[108] but it served to demonstrate that the Division would indeed seek 'to encourage the application of science to promote the well-being of society', political contentiousness notwithstanding. As the Nature correspondent drily remarked :

> This Division of the British Association by its very nature cannot proceed far without becoming involved, and involved very deeply, in politics and in active social planning. While this is well understood by the officers of the Division, it seemed to be somewhat of a revelation to several of those others who attended the Reading meeting. (109)

The pasteurisation resolution had to be sanctioned officially by the Council of the British Association; it could not be issued simply on the authority of the Division. In the event the executive sub-committee decided to stall, pending further inquiry by the nutrition sub-committee into the state of scientific knowledge of pasteurisation; this in turn was cut short, so far as the British Association was concerned, by the outbreak of war.[110]

The officers did indeed understand that the Division was liable to get involved in politics and they were anxious to keep the process under fairly tight control. This may be seen in the second public meeting of

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107. cf. Chapter V, n.33 and chapter VII, n.33 above.

108. It had, for example, been included in the unsuccessful Milk Industry Bill (1938).

109. Nature, 143, (8 April 1938), 590.

110. Council minutes, 3 June 1939 ; Adv. Sci., 1 (i), (October 1939), 137.

the Division, held at the Royal Institution on 25 May. It was proposed that there should be two main papers, one of which should deal with the social relations of science in general. J. D. Bernal, whose The social function of science had just appeared,(111) was suggested as the obvious man to give it. But, as Gregory wrote to Howarth at the end of February, this might adversely affect the public image of the Division :

> You will agree with me that we do not want to give the impression at this stage that the Division represents only the extreme Left-wing, & I am afraid that this would be so if we got Bernal to give the address, though he has given as much attention to the subject as anyone. (112)

The choice devolved instead upon Ernest Barker, the Cambridge professor of political science. Gregory's motive was tactical : three months later he was trying to persuade Bernal to speak at the Dundee meeting (see n.93 above). The second speaker at the Royal Institution was Daniel Hall, who took up his favourite theme of 'how the application of science to agriculture is impeded' and how State intervention was required.(113) Howarth had told him that such a paper would be acceptable only if it avoided

> entering upon the field of politics. Is that possible? I know the suggestion may sound dangerous, but I am clear from what I have heard in the Committee that our attitude I think very properly is to be that of the brothers in Princess Ida : 'Politics we barr; they are not our bent.' (114)

Nursing the Division through its infancy included, it seems, protecting it from such involvement in politics as might damage its public credibility or antagonise the British Association Council.

Another major area of the Division's work was an investigation into the organisation of research. Individual efforts had already been made in this field, notably by Julian Huxley in 1933 and J. D. Bernal in his book; the Association of Scientific Workers and a body known as P. E. P. (Political & Economic Planning)(115) were then involved in similar exercises.

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111. It was reviewed, on the whole favourably, by Rainald Brightman in Nature, 143, (18 February 1939), 262-263.

112. Letter, Gregory to Howarth, 26 February 1939 : in a box (misleadingly) labelled 'correspondence conc. the 1939 annual meeting' among the British Association papers at the Bodleian. Hereafter cited as '1939 box, Bodleian'.

113. Nature, 143, (3 June 1939), 947-948.

114. Letter, Howarth to Hall, 7 March 1939 : 1939 box, Bodleian.

115. For the background to P. E. P. see Arthur Marwick, 'Middle opinion in the thirties : planning, progress and political "agreement"', English historical review, 79, (1964), 285-298.

The prospect of mobilising the scientific resources of the country for war work gave added point to such investigations. The nucleus committee on 20 October urged that the Division cooperate with the P.E.P. project and Brightman also commended this task[116]; the executive sub-committee duly appointed another sub-committee on 1 November to deal with the matter. It held three meetings : Bernal, Egerton and Ferguson attended all three and A.V. Hill and Huxley attended two. At its first meeting Egerton, then a secretary of the Royal Society and a member of the advisory council of the D.S.I.R., presented a memorandum sketching out how public funds for research were dispensed. Apart from grants for research students, he thought that the machinery for coordinating effort was reasonably satisfactory and that a single body having overall control was unnecessary. Bernal and Huxley later produced another memorandum dealing with just such a Research Coodination Council as Egerton had dismissed; I have not come across a copy of it,[117] but from Bernal's published views it seems likely that they were in favour of much tighter central control than existed at the time.[118] At first the sub-committee suggested that the two memoranda be combined, but on 23 June the divisional committee approved an amended version of the Bernal/Huxley memorandum for public circulation and comment. Other aspects of this sub-committee's work included putting the Association of Scientific Workers and P.E.P. in touch with each other on a number of points and securing £100 from the British Association Council as three months' salary for a full-time research worker on the P.E.P. project, pending longer-term support from other sources.[119] This, apparently, was 'the first time in English history a paid research worker was set to investigate exactly how British science is organised and financed'.[120]

A long-standing element in the British Association's defence of science was reflected in the appointment of a sub-committee of the Division to deal with 'the influence of scientific and technical developments on the relative importance of different industries and on the total volume of

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116. Brightman, 'Social science problems and programme', Nature, 142, (29 October 1938), 769-771.

117. Egerton's memorandum is attached to the sub-committee's minutes: Bernal and Huxley's is not.

118. cf. Bernal, op.cit. (n.24 above), pp.35-70, 113-116.

119. In addition to the various minutes see Adv. Sci., 1 (i), (October 1939), 134-136.

120. Crowther, Social relations, p.631.

employment', matters also of concern to the nascent T.U.C. Scientific Advisory Committee. The sub-committee arranged for two papers to be given at a public meeting of the Division held jointly with the Manchester Literary and Philosophical Society on 21 June - F.C. Toy on the cotton industry and V.E. Yarsley and E.G. Couzens on the plastics industry. The T.U.C. was invited to send a representative to the meeting and chose George Woodcock, then secretary of its research and economic department, for the task.(121) Actually, neither paper considered seriously the question of technological unemployment, though Yarsley and Couzens did point out that, compared with the chemical or rubber industries, the plastics industry was relatively labour intensive; both papers dealt with the contributions of science to their respective industries and the resulting beneficial effect on the living habits of the public. Thus the advent of synthetic fabrics was described as 'a great levelling factor' - 'dainty and exquisite fabrics are nowadays within the reach of nearly every purse' - and the coming of the 'plastics age' was said to herald a world 'brighter, cleaner, and more full of colour and clarity than hitherto'.(122)

The relations between science and society were considered at a more general level by Richard Gregory in his introductory remarks to the Royal Institution and Manchester meetings, by Ernest Barker at the Royal Institution and by Hyman Levy at Manchester.(123) Gregory took the by now familiar line that 'the scientist cannot absolve himself from the responsibilities for the problems of life and labour resulting from creative scientific discovery' and he explained that 'the essential idea behind the Division is that of applying the scientific method of inquiry to social repercussions with science. The prelude to effective action is clear thinking.' Barker attacked the scientific elaborations of both fascism and socialism and, taking a more limited view than Gregory of the scope of science, argued that

> science must proceed with a single regard to the discovery of scientific truth; that it is the business of society, through

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121. Letter, Walter Citrine to O.J.R.Howarth, 15 June 1939 : 1939 box, Bodleian.

122. Mem. & proc. of the Manchester Lit. & Phil Soc., 83, (1939), 153-174; cf. Brightman, 'Science, industry and society', Nature, 144, (1 July 1939), 1-3.

123. Neither Gregory's nor Barker's papers appear to have been published, but copies may be found in the 1939 box, Bodleian. For Barker, see also Nature, 143, (3 June 1939), 947; for Gregory, ibid.; Nature, 144, (1 July 1939), 1 ; and Armytage, Gregory, pp.171-172. For Levy, see n.125 below.

> its leaders, to control the social changes which the impact of science may cause; and that the one duty of the scientist, in this respect, is to contribute the resources of his own training to the making of a proper and exact estimate of the nature of the changes and of the nature of the relevant remedies.

In view of Gregory's wariness about inviting Bernal to speak at the Royal Institution meeting, it seems a little surprising that Hyman Levy, equally a prominent member of the British communist party, should be asked to give the Pedler memorial lecture[124] at the Manchester meeting on 21 June 1939. The question of the Pedler lecturer was raised, however, at the January meeting of the executive sub-committee, at which only Gregory, Ferguson and Levy (and, of course, Howarth and his assistant D. N. Lowe) were present. It may then had been impossible tactfully to have prevented Levy from giving the lecture : Bernal at least was not privy to the discussions over a speaker for the Royal Institution meeting. Levy made the most of the opportunity for engaging in political controversy.[125] The bulk of the lecture was devoted to his concept of 'social accountancy' - an attempt to establish a quantitative basis for the study of the effects of science and technology on society by compiling a series of indexes which would relate such items as research activity, commodity production, 'social wastage', physical fitness and effective education to a 'theoretically' postulated maximum.[126] He went to some lengths to put these ideas into the context of what he called 'reciprocal causation' : just as modern physics had upset the classical notion of causation at the atomic level, so too in social affairs a simple cause-effect argument was no longer tenable. In particular, if a given scientific development had an influence on society, it was also influenced by society. This was the crucial feature of his outlook and , for all that he appeared to equate the Division with an irrelevant rationalism (cf. n. 89 above), he claimed in this lecture that its existence supported the marxist thesis on the social conditioning of science :

> For us the important thing to recognise is that we cannot

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124. This was one of the lectures organised by the erstwhile British Science Guild which had become the Division's responsibility.

125. The lecture was published in <u>Mem. & proc. of the Manchester Lit. & Phil. Soc.</u>, <u>83</u>, (1939), 129-152. cf. Brightman, 'Science, industry and society', <u>Nature</u> , <u>144</u>, (1 July 1939), 1-3.

126. cf. Hyman Levy, <u>A philosophy for modern man</u> (Gollancz, 1938) and Brightman, 'Social science problems and programme', <u>Nature</u>, <u>142</u>, (29 October 1938), 769-771.

> consistently maintain that the development of science proceeds purely in accordance with its internal logical necessity. Scientists are also social beings and their interests are focussed also by social urgency. ... We merely seek to make a public confession of the fact that the existence of the new division is a public admission of the fact that science is socially conditioned. In future the written history of every branch of science will require to take account of this fact.

If this sort of claim seemed to give the Division a more left-wing image than anyway some of its progenitors desired, what followed could only have increased their anxiety. For, as Levy hinted, the development of his 'social accountancy' would probably demonstrate that 'the application of science to promote the well-being of society' was not being carried out at all efficiently and the source of the trouble would be found to be - though he avoided the dreaded word - capitalism. Herein lay the difficulty : as Gregory had realised from the outset, a thorough study of social relations would inevitably raise political issues, yet the Division was pledged solely to the objective advancement of knowledge. In his contribution to the Nature supplement, Levy had attempted to dispense with the need to avoid politics by suggesting that all possible views should be given an airing. Here he expressed his frustration at the constraints which the Division's constitution placed on him :

> I mention these matters in order that we may begin the study of such questions with a clear and frank admission, that if we set limitations to our enquiry, it is that they will not lead us into the deeper waters of political and social controversy. We would find ourselves involved in the question of whether the present system of utilising scientific discovery in production is able to do so effectively. ... While it may be expedient not to raise issues of this nature we must recognise frankly that in doing so we are violating a long tradition of freedom in the scope of scientific enquiry. We would be automatically confining our study to the operation of science within the present form of social structure, a limitation that may make the fullest use of science impossible.

Nevertheless, the constraints were there and Levy had a little disingenuously to say : 'In raising issues of this nature we need not offer any judgement on the conclusions. ... Our concern is merely to study the facts.'

The first year of the Division's life was marked by this tension between objective study and political action. At the time of its foundation, some rationalists - Gregory, Brightman - seemed grudgingly to recognise the necessity for 'not meddling with morals or politics' as the price for intellectual freedom and some radicals - Bernal, Crowther - agreed that an organisation concentrating solely on the dispassionate accumulation of data on science and society would serve a useful purpose. And so the Division dealt with the coordination of research, gave valuable help to the P.E.P. investigation and looked at some of the social effects of industrial developments, but refrained from taking part in peace propaganda or publicising the Boas manifesto. Such decisions accorded with normal British Association policy. The Division moved one step away from tradition by also accepting the old British Science Guild theme of encouraging 'the application of science to promote the well-being of society'. This more activist rôle may be seen, for example, in the Reading resolution on pasteurisation. Neither this move nor the open admission of the proposition that science and society each influence the other were enough for men like Hall and Levy, who demanded freedom to extend their inquiries into realms of political controversy. But, as Gregory and Howarth were well aware, to have given them a free rein in this matter would have conflicted with the whole British Association ethos and would have risked gaining the Division too left-wing a reputation. So they had to be cautious in their choice of public speakers and to try to exercise a restraining influence on what they said. Radicals could and did work in the Division, but not entirely on their own terms.

The executive sub-committee and its various satellite committees between them met twenty-one times during the year. Calder and Ferguson each attended a total of thirteen of these meetings, Gregory, Huxley and Levy seven, and Boswell six. (Howarth, the secretary, attended twenty.) No one else attended more than four meetings. The running of the Division was thus in the hands of men whose political sympathies ranged from Liberal (Ferguson) through various shades of Labour (Gregory, Calder) to communist (Levy). Their attitudes to the social relations of science debate also represented a considerable span of views, from Ferguson, who combined a mild commitment to rationalism with a strong realisation of what was feasible in the British Association context, to Levy, the forthright radical. As Gary Werskey suggests, such a group was hardly likely to turn the Division into a forum from which a "united front" of scientists could speak out on controversial questions'[127]; what it could do, and what it tried to do, was to provoke study and discussion of those matters which were deemed to fall within its ambit. But, perhaps inevitably, it strayed somewhat beyond the traditional British Association line on the social relations of science.

127. Werskey, 'Outsider politics', p.78.

Although it was the Science and World Order conference staged by the British Association in September 1941 which provoked the most outspoken criticism, opposition to many of the ideas inherent in the social relations of science debate as hitherto described arose before that date, in the writings(128) of John R. Baker, A.V. Hill, Michael Polanyi(129) and A.G. Tansley.(130) Baker's scorching critique of Bernal's The social function of science in the New Statesman(131) led to his friendship with Polanyi and subsequently to the establishment, in the spring of 1940, of the Society for Freedom in Science.(132) The members of this society were especially perturbed by the concept of planning in science, whether on rationalist or on radical principles. The concept of pure science - the striving for 'organised knowledge of the objective world'(133) as an end in itself - had, they observed, been obliterated in the marxist view of all human activity as determined by social and economic considerations. In marxist theory, studies not likely to yield immediate practical benefits could only be justified as the springboard for future technological developments : pure science

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128. For references, see Wood, Communism, pp.134-136. Polanyi's 'Rights and duties of science', The Manchester school of economic and social studies, 10, (1939) was reprinted in his The contempt of freedom (Watts, 1940), pp.1-26. For Hill, see also his 1933 Huxley memorial lecture (chapter IV above) and 'Science, national and international, and the basis of cooperation', Science, 93, (20 June 1941), 579-584. See further n.135 below.

129. 1891-1976. Born in Hungary. Educated at Budapest University. Qualified in medicine but switched his attention to thermodynamics. Worked at the Kaiser Wilhelm Institute, Berlin, 1923-1933. Resigned in protest against Hitler. Professor of physical chemistry at Manchester, 1933-1948. Given a personal chair in social studies at Manchester (1948-1958) to pursue his philosophical work. Senior Research Fellow, Merton College, Oxford, from 1958. F.R.S., 1944.

130. 1871-1955. Educated at Highgate School, University College, London and Trinity College, Cambridge. Assistant lecturer at U.C.L., 1893-1907; lecturer in botany at Cambridge, 1907-1923; studied psychology with Freud, 1922-1924; professor of botany at Oxford, 1927-1937. F.R.S., 1915. President of Section K, 1923; member of Council, 1922-1926.

131. Baker's review and Bernal's reply were reprinted in C.A.Russell & D.C.Goodman, eds., Science and the rise of technology since 1800 (Open University, 1972), pp.331-334.

132. See Polanyi's obituary notice in Biog.Mem.F.R.S., 23, (1977), 413-448, esp. pp.426-430. The Society for Freedom in Science was wound up in 1961.

133. A.G.Tansley, The values of science to humanity (George Allen & Unwin, 1942), p.4. This was the 1942 Herbert Spencer lecture.

had no value - indeed, no existence - other than as a prelude to applied science. All science was essentially applied science[134] and could therefore be directed towards the area where applications were most needed. Baker and his colleagues agreed that technology could on the whole be planned according to perceived requirements, but they insisted that the disinterested pursuit of knowledge was valid as an end in itself, that it was of paramount human significance and that it could not be externally directed.[135]

They were unanimous that 'the movement against the pursuit of science for its own sake and against freedom in the practice of science' was sparked off in Britain by the Soviet delegation to the 1931 International Congress of the History of Science and Technology. They traced its subsequent development not only in the writings of the radical publicists - notably Bernal, Crowther and Hogben[136] - but also in Nature and the British Association. Nature, wrote Baker, had followed the fashion 'to confound science with technology and to overstress

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134. At the science and world order conference the Soviet ambassador, M. Maisky, proudly declared: 'We in the Soviet Union never believed in so-called "pure" science.' Adv. Sci., 2 (v), (1942), 40. cf. Hitler's statement: 'The idea of free and unfettered science ... is absurd.' Quoted in John R. Baker, Science and the planned State (George Allen & Unwin, 1945), p. 63.

135. The principal relevant works are: John R. Baker, The scientific life (George Allen & Unwin, 1942) and Science and the planned State (George Allen & Unwin, 1945); A. V. Hill, n. 128 above; Michael Polanyi, The contempt of freedom (Watts, 1940), The logic of liberty (Routledge & Kegan Paul, 1951), part I and 'The republic of science', Minerva, 1, (1962), 54-73, esp. pp. 61-62; and A. G. Tansley, n. 133 above. Secondary sources are: Michael D. King, 'Science and the professional dilemma', in Julius Gould, ed., Penguin social sciences survey, 1968 (Penguin, 1968), pp. 34-73; Werskey, Visible College, pp. 327-329; Wood, Communism, pp. 134-136; and Solly Zuckerman, Scientists and war (Hamish Hamilton, 1966), chap. VII.

136. In his Science for the citizen (George Allen & Unwin, 1938), Hogben made many absurd statements about the social conditioning of science. One - his claim that 'From a landsman's point of view, the earth remained at rest till it was discovered that pendulum clocks lose time if taken to a place nearer the equator. After the invention of Huyghens the earth's axial motion was a socially necessary foundation for the colonial export of pendulum clocks.' (p. 232) - was neatly ridiculed by Polanyi: 'May we not even abandon again, now that we all carry watches, the sophisticated idea of the earth going round the sun - as a useless meditation on the universe?' (The contempt of freedom, p. 16.) Baker commented: 'Hogben's words might have been written by an opponent who wished to satirize the opinion that science has no other function than to supply the material needs of man.' (The scientific life, p. 106.)

practical applications at the expense of basic knowledge'.[137] The theme was illustrated by the fact that Richard Gregory, who in 1916 had published 'a stimulating book on the true spirit of science',[138] should in 1941 write a favourable review of Crowther's The social relations of science.[139] Nature, for its part, refused the Society for Freedom in Science access to its pages until October 1946. The British Association, whose 1933 and 1936 meetings had been landmarks in the growth of the movement against pure science,[140] had likewise 'laid itself open to the charge of having become an Association for the Advancement of Technology'.[141] Technology was self-evidently important, but it should not be promoted in such a way as to obliterate the concept of pure science as an independent and worthwhile activity.

The campaign against planning in science was set in the context of totalitarianism, for both fascist and communist dictators had made it plain that the only function of science was to serve the interests of the movements with which they were associated. The evidence coming out of Nazi Germany and Soviet Russia demonstrated that science, as opposed to technology, could not flourish in a totalitarian culture and must ultimately wither away. Hence the two leading principles of the Society for Freedom in Science :

> (i) The increase of knowledge by scientific research of all kinds and the maintenance and spread of scientific culture have an independent and primary human value.
>
> (ii) Science can only flourish and therefore can only confer the maximum cultural and practical benefits on society when research is conducted in an atmosphere of freedom. (142)

The 'frustration of science' - the vision of what science could achieve

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137. Baker, The scientific life, p.130. Baker also pointed out that at the beginning of 1935 the journal's slogan (from Wordsworth)

    To the solid ground
    Of Nature trusts the mind that builds for aye

    was transmuted into

    To the solid ground
    Of nature trusts the Mind that builds for aye

138. i.e. Gregory, Discovery, or The spirit and service of science (Macmillan, 1916).
139. Baker, The scientific life, p.42.
140. cf. Chapter IV, n.45 and chapter VII. n.7 above.
141. Baker, The scientific life, p.88.
142. I have not seen the Occasional pamphlets produced by the Society, but the Society's objectives were published in Science, 94, (26 September 1941), 304-305 and in Baker & Tansley, 'The course of the controversy on freedom in science', Nature, 158, (26 October 1946), 574-576.

(in material terms) for society and the actuality of what it had achieved - was sympathetically appreciated by supporters of the Society, but they argued that the situation could not be improved by gearing all work to predetermined practical ends; still less could it be improved by the destruction of the liberal culture essential for the preservation of individual freedom.

The launching of the British Association's Division for the Social and International Relations of Science in a wave of enthusiasm for internationalism and the defence of individual intellectual freedom and integrity might at first sight appear to have had attractions for John Baker and his colleagues. Indeed, A.V. Hill, then a member of the Association's Council, attended the first meeting of the divisional committee.(143) But if they did manage to suspend their scepticism about the British Association, it was not for long : the general tenor of the Division's publicity document, the association of both rationalists and radicals with its foundation and, apart from Ernest Barker's Royal Institution paper, the actual performance of the Division up to the outbreak of war would all have served to arouse their opposition. Polanyi later described the Division as 'largely motivated from the start by the desire to give deliberate social guidance to the progress of science'.(144) The founders of the Society for Freedom in Science could look to no other organisation positively to make a stand for the values they held important. The need for such a stand was heavily underlined in the year after the Society's foundation by the Science and World Order conference.

143. Conversely, Joseph Needham was for a short while a member of the Society for Freedom in Science, to Baker's considerable surprise! See Werskey, Visible College, p.329.

144. Polanyi, The contempt of freedom, p.3 n.

Chapter IX

The wartime activities of the Division

Although the outbreak of the Second World War brought the Dundee meeting of the British Association to an abrupt end, it cannot be allowed to have the same effect on this part of my thesis. In particular, it would be unsatisfactory to launch the new Division and not to discuss its most important single piece of work, an event outstanding in the history both of the British Association and of the social relations of science debate. So I now pass on to the years 1939-1945 - though to keep the exercise within reasonable bounds the treatment must necessarily be briefer than hitherto.

In 1940 the British Association tried to organise a surrogate annual meeting at which, instead of the usual Sections, there would be four groups dealing with various topics under the general heading 'Science in national and international aspects'. Though not officially organised by the Division, its influence is manifest in the programme. The meeting had eventually to be cancelled for practical reasons.(1) Thereafter all the wartime activities of the British Association became effectively the responsibility of the Division, the Council retaining largely nominal control. The youngest offshoot of the Association was, for a few years, virtually synonymous with its parent.

The major event of these years was the conference on Science and World Order, held in London in September 1941. Once again the American Association provided an initial impetus. At its meeting in Philadelphia in December 1940, its Council passed the following resolution :

> Whereas, At this time of international stress the American Association for the Advancement of Science, ... realising the share of responsibility of scientific men for the general welfare of free peoples, seeks the cooperation of their English speaking colleagues;
>
> Be it resolved, That the American Association for the Advancement of Science wants the cooperation of the British Association for the Advancement of Science in attempting to formulate,upon scientific principles, an international charter of democracy. (2)

This was cabled to the Council of the British Association, which delegated the matter to the divisional committee. The latter welcomed the

1. Adv.Sci., 1 (iii), (1940), 379-380 and 1 (iv), (1940), 470.
2. Science, 93, (7 February 1941), 142.

opportunity 'to promote the advancement of knowledge and action in an international spirit' and decided, as a prelude to the scientific principles of democracy, to produce a statement on 'the democratic fellowship of science'.(3) Accordingly, Richard Gregory drew up a six-point 'Charter of Scientific Fellowship' which he circulated to members of the divisional committee on 11 February 1941.(4) When they all met ten days later they confirmed that it should be 'the function of a scientific body, as such, to put forward a statement of the democratic principles of science, rather than a charter of democracy on scientific lines' and they appointed a committee (Gregory, Calder, Ferguson, Levy and H.G. Wells(5)) to consider Gregory's charter. The product of its deliberations was circulated to the Council and to the divisional committee on 31 March.

In his original charter, and the preamble he added to it on 21 February, Gregory mounted a fierce onslaught against the attack on freedom of thought enshrined in the Nazi attitude to science. He insisted that 'freedom to teach, opportunity to learn, and desire to understand' are basic to the progress of science and 'cannot be abrogated without detriment to human development'. The advancement of science, upon which 'man depends for his maintenance and growth', had been achieved by the efforts of 'people of all races and classes of society'. These people were 'united in the fellowship of the Commonwealth of Science, with the whole world as its outlook and service to mankind its highest aim'. Although 'men of science have had neither the will nor the power to bring about, or avert, this catastrophe to civilised life', yet, 'as citizens it is their duty to defend the corporate unity of the State from external forces of disruption.' Gregory painted a glowing picture of the democracy of science which, he averred, 'is open to all

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3. Nature, 147, (12 April 1941), 448.

4. I have not been able to find the minutes of the divisional committee for this period among the British Association papers. However, Solly Zuckerman, who was a member of the committee, preserved his copies of them and eventually lent them to Gary Werskey, who in turn lent his photocopies to me : for which I am very grateful. The active members of the divisional committee in 1941 were : Gregory, Brooks and Ferguson (ex officio); Bernal, Calder, Chapman, Desch, Hogben, L.E.C. Hughes, Huxley, Caradog Jones, Levy, John Russell, Weiss, H.G. Wells, J.S. Wilson and Zuckerman; and, of course, O.J.R. Howarth.

5. 1866-1946. Educated at the Normal School of Science, South Kensington, where he met Richard Gregory. Formed a life-long friendship: 'Gregory was the only person with whom Wells never quarrelled.' (Armytage, Gregory, p.23.) Prolific and wide-ranging author. President of Section L, 1937.

who are prepared to work in it with unswerving loyalty to truth', which 'is international in its constitution and outlook' and, indeed, 'an example of world fellowship in the service of all mankind', and which is 'insulted' by the attempts of 'temporal powers to assert overlordship in cultural spheres'.[(6)]

The principles embodied in these ringing phrases were accepted by the drafting committee, though the language was toned down a little and the preamble was rewritten to bring out more clearly the urgency with which democracy had to be defended. Thus :

> [Scientists] must proclaim their special responsibility in the struggle against any slavery of the spirit which would lead to the betrayal of democratic freedom. ...
>
> It behoves men of science to declare clearly and emphatically these principles which inform their beliefs and guide their lives.

A new clause was added, to the effect that 'Any policy or power which deprives men or nations of freedom of thought and its expression convicts its supporters of an iniquity against the human race.'[(7)] The purpose of this charter was to project an image of science in the free (i.e. non-fascist) world as upholding the value systems of political democracy, guided by an unshakeable commitment to truth and seeking to serve all mankind. The revised draft concluded : 'These guiding principles of science are among the basic principles of democracy.' If democracy was threatened by Hitler, then so too was science; and science rose up to declare that it stood for democracy on an internationalist footing and was one with it in the fight against tyranny - especially fascist tyranny.

Only two years earlier, Gregory and Calder had decided against producing a manifesto on science and the defence of democracy.[(8)] Now they changed their minds and came out with a document akin to that drawn up by Franz Boas. It may be that the stronger position of the Division vis-à-vis the Council prompted them to go ahead where they had previously held back : it is unlikely that the British Association would have issued a statement of this nature in the absence of the attitudes to the social relations of science represented in the Division. Perhaps it needed eighteen months of war before the Association could be persuaded to lend its name to such a forthright document. The invitation

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6. Divisional committee minutes, 11 and 21 February 1941.
7. Divisional committee minutes, 31 March 1941.
8. See chapter VIII, pp. 204-205 above.

to give expression to the ideals of democracy and internationalism and to put some flesh on the skeleton of cooperation with the American Association[9] could hardly be ignored at a time when Britain was trying to enlist American support in the war.

Of the five men responsible for preparing the second draft of Gregory's charter, Gregory himself had long been speaking of the benign spirit of science; he, Ferguson and Wells were firm upholders of scientific internationalism; while all five, in their different ways, argued for a very close relation between scientific and social affairs. All three elements were present in this draft, though the third was to emerge more clearly later. While Gregory was no friend of socialism, fascism, and fascism alone, was seen as the enemy - though it was not named explicitly in either draft nor, for that matter, in the Philadelphia resolution. With the radical contingent on the divisional and drafting committees, it was hardly likely that socialism should have been implicated alongside fascism as destructive of freedom of thought. Even without the radicals, overt criticism of socialism would have seemed impolitic at a time when the status of Soviet Russia in the war was a matter of some delicacy.[10]

One may note that while it was the American Association which provided the immediate impetus for this charter, Gregory, Calder and Wells had all been involved during the first half of 1940 in the Sankey Commission on the Rights of Man, which had produced a formidable Declaration on the subject.[11] The American proposal thus fell on well prepared ground. Perhaps the crisis of war stimulates the formulation of resounding documents on human ideals which ultimately may have a rather muted impact. The Atlantic Charter endorsed by Churchill and Roosevelt in August 1941 seems to belong to this tradition.[12]

On 22 June 1941 Hitler invaded Russia. On 17 July the divisional

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9. The American Association offered more than resolutions: it chipped in £132, very nearly the whole of the running costs of the Division for the financial year 1941-1942. Adv. Sci., 2, (1942), 269.

10. Writing in 1945, John Baker felt obliged to justify such criticism before embarking on it: 'It might seem churlish to criticise the institutions of our ally ... [but] it cannot be right to praise the science of another country simply because that country is our ally.' John R. Baker, Science and the planned State (George Allen & Unwin, 1945), pp. 64-65.

11. Armytage, Gregory, pp. 173-181.

12. A. J. P. Taylor, English history 1914-1945 (Clarendon Press, 1965), pp. 529-530. cf. Nature, 148, (23 August 1941), 203-205.

committee decided to send, under its own name rather than that of the British Association, a message to the U.S.S.R. Academy of Sciences to the effect that the Division

> rejoices that the services of science in both countries are now being utilised to compass the defeat of the common enemy, and expresses the fervent hope that British and Russian science may in the near future be united in application to the establishment of a new and happier ordering of the affairs of mankind. (13)

The Academy's reply spoke of 'the help of scientists' ensuring 'triumph in the war for the liberation of humanity from fascist tyranny'.[14] At a time when one of the two outstanding non-combattant nations had just entered the war, it was natural that organisations should exchange greetings with their newly-allied counterparts. Similar messages went out from other scientific bodies : for example, the Royal Society - 'Our united efforts will ensure that the future of science is not endangered by the destruction of those freedoms in which has thrived the work of the great scientists of both countries. In this struggle science has already made, and will continue to make, essential contributions to victory'[15] - the Faraday Society - 'Our two countries proudly stand allied as guardians of the freedom of the world against wanton aggression.'[16] - and a distinguished group of American mathematicians.[17] The 'anti-fascist' meeting of scientists in Moscow on 12 October provided further opportunity for statements of solidarity, which poured both from numerous individuals and organisations such as the Royal Society, the British Association, the Association of Scientific Workers and the British Medical Association.[18] There was only one enemy of freedom : Hitler; and anyone who would oppose Hitler was welcomed with open arms.[19]

What was significant about the Division's message was not the fact that it was sent, but rather its reference to the application of science to

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13. Adv. Sci., 2 (v), (1942), 116-117.
14. ibid.
15. Quoted in Science, 94, (29 August 1941), 209. The message was sent on 25 July. For the Soviet reply, see ibid., p.250.
16. Nature, 148, (18 October 1941), 464.
17. Science, 94, (10 October 1941), 340.
18. Nature, 148, (25 October 1941), 490-492.
19. cf. Churchill's remark : 'If Hitler invaded Hell I would make at least a favourable reference to the Devil in the House of Commons.' Quoted A.J.P. Taylor, op. cit., p.528.

'the establishment of a new and happier ordering of the affairs of mankind'. At the same committee meeting, on 17 July, the Division passed a resolution welcoming 'any move that may be made by H.M. Government in utilising scientific knowledge and methods in social affairs and in establishing a new international order'. It also decided, on Gregory's initiative, to stage a three-day conference under the modest title 'Science and World Order' at which such applications of science could be worked out. The Association of Scientific Workers was planning a meeting on 'public problems in which science has a part' and sought the Division's cooperation; it was therefore invited to shelve its own project and join in the conference.[20] These decisions constitute something of a break with the British Association's carefully guarded tradition of avoiding involvement in controversial areas of social policy making.

Within five days a committee (Ritchie Calder, J.G. Crowther and Cyril Desch) under Julian Huxley[21] had produced a preliminary programme for the conference. Huxley had for some time been suggesting that the Division hold a meeting on 'Science in war and reconstruction' : he now had an opportunity to expound his ideas.

The Science and World Order conference was held at the Royal Institution during 26-28 September 1941, just after a major allied conference in London and during the highly emotive 'Tanks for Russia Week'.[22] If the object of the exercise was 'to give hope to anxious humanity by enabling scientists to declare themselves on the side of civilised construction instead of savage destruction'[23] - the climax to the British Association's long public defence of science - then the conference certainly provided a strong platform for such a message. Its audience, if the account is to be believed,

> ranged to the ends of the earth. Day and night, on all radio transmissions, in thirty-nine languages, the proceedings were broadcast, telling in practical terms how the free scientists, at least, desired to implement the

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20. Divisional committee minutes, 17 July 1941.

21. Huxley was brought in at Gregory's initiative. Gregory had tried, unsuccessfully, to persuade Huxley to take over chairmanship of the Division. Armytage, Gregory, pp.177-179.

22. Detailed accounts of the conference may be found in Adv. Sci., 2 (v), (January 1942), 1-116 - from which, unless otherwise stated, quotations from the conference have been taken; J.G. Crowther, O.J.R. Howarth & D.P. Riley, Science and world order (Penguin, 1942); Armytage, Gregory, pp.177-190; and Nature throughout October 1941. Crowther, Howarth & Riley's book was prepared 'with the authority of the Council of the Association, but any views or opinions which we express or place on record are not to be considered as necessarily those of the Council' - op. cit., p.3.

23. Armytage, Gregory, p.182.

> Atlantic Charter. It went out as a message of hope to the oppressed and hungry peoples of occupied countries and as a challenge to the Nazis and their bogus 'New Order'. (24)

The Nazis were as interested as anyone else.[25] The B.B.C. broadcast several discussions about the conference. The Ministry of Information made films of it.[26] No opportunity for publicity was lost, and to all who would listen it was made clear that in a free world science stood for the good of the world community, implacably opposed to the forces of belligerent nationalism.

The conference was organised into six half-day sessions, each with a different chairman, as follows :

I	Science and government	:	Richard Gregory	
II	Science and human needs	:	J.G. Winant	(American ambassador)
III	Science and world planning	:	M. Maisky	(Soviet ambassador)
IV	Science and technological advance	:	E Beneš	(President of the Czech government in exile)
V	Science and postwar relief	:	Wellington Koo	(Chinese ambassador)
VI	Science and the world mind	:	H.G. Wells	

These topics were discussed in a total of seventy-three papers, and to extract from them the main themes of the conference is a somewhat daunting task. Some idea of the prevailing atmosphere of the conference may, however, be obtained by considering the three general headings of statecraft, planning and internationalism. The one point common to all speakers was the absolute necessity of the total defeat of Hitler. The conference was about science and world order in the post-Nazi era.

The British Council, which J.G. Crowther had just joined as director of the science department, gave a lunch at the Savoy the day before the conference opened. This lunch was attended by Anthony Eden (the Foreign Secretary), six other Cabinet ministers and members of the diplomatic corps, as well as some of the scientists assembling for the conference. Eden described the conference as 'the intellectual encirclement of Germany' and urged that 'science and statecraft must work

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24. Crowther, Howarth & Riley, op. cit., p.13.
25. ibid., p.9.
26. Adv. Sci., 2 (v), (January 1942), 3.

together', both in the prosecution of the war and in the stabilising of peace. Crowther, Howarth and Riley seized upon the latter remark as 'the message of the Conference'.[27] This impression was reinforced by messages from King George VI and Winston Churchill, and by the fact that three eminent politicians - Herbert Morrison (Home Secretary), Lord Onslow (Deputy Speaker of the House of Lords) and Lord Samuel (ex-leader of the Liberal Party) - gave papers to the conference. It would seem that the pressure of war had gained for scientists a respect in government circles which their peace-time campaigns had failed to secure.

The relations between science and statecraft were discussed at the first session of the conference, chaired by Richard Gregory. Gregory himself said little on the subject, though in a trailer to the meeting he had written : 'Whether scientific knowledge is used for social betterment or to make civilisation a mockery depends upon statesmen and not upon men of science, who, however, alone understand its possibilities.'[28] Some speakers dealt with specific areas of involvement or with specific countries, while others considered more general issues. The latter fell into two camps : A. V. Hill, J. Negrin (lately head of the Spanish Republican Government) and P. P. Ewald on the one hand, and Bernal and Haldane on the other.

Hill took the view that much could be achieved by putting scientific knowledge at the disposal of government but that 'unless the independence and objectivity of science are upheld more harm than good may result.' The message of his Huxley memorial lecture had been that 'the sole object of science is to arrive at the facts, that no consideration of religion, morals or politics should be allowed to deflect it by one hair's breadth from its integrity'; and this was if anything more vital in 1941 than in 1933.[29] Negrin, a professor of physiology 'who, disliking and shunning political activities, found himself involved in them', similarly argued that while an enduring peace 'will depend fundamentally on a successful union between statesmanship and science',

> the spirit informing these considerations does not support either openly or disguisedly a régime of 'technocracy', still less of 'sophocracy'. Technology and science must

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27. op. cit., p. 15.
28. Nature, 148, (20 September 1941), 331.
29. Hill's paper was published in full in The Engineer, 172, (3 October 1941), 222-224.

> provide the essentials for rational government, but they can in no way replace it. Science and government have distinct methods and aims.

Ewald, too, agreed that 'politics depend on science for providing the data and the forecast on which to base the political decision' but that 'the method of politics is ... opposed to that of science.'

On the other hand, the closest possible relation between science and government was advocated by Bernal and Haldane. Thus Bernal : 'In the modern world only organised activity counts and ... no activity can be organised effectively unless it is done scientifically.' Planning of society called not only for scientific method but also for

> a common purpose and a new motive which will transcend all the limited motives of private profit or individual security that have dominated men in the past. That motive is already abroad. It is the accepted basis of the heroically struggling Soviet Union. ... The very existence of the present Congress is proof of its increasing vitality and consciousness.

Planning of science 'used to be a controversial question, but already controversy is fading away. ... Such a planning has been largely achieved for war purposes in most of the countries of the world, and for peace purposes as well in the Soviet Union.' Contradictorily, Bernal claimed that science could be planned 'on an essentially voluntary and co-operative basis'. He also argued that the marxist view of science must become the basis for science teaching : education 'must relate the achievements of science at every stage of development in the satisfaction of human needs'. Pausing only to dismiss pure science as 'merely science whose application to practice has a long time-lag', Haldane gave an account of the close connections between science and government in the Soviet Union and suggested that the advantages accruing from this situation were the fruit uniquely of Soviet socialism :

> I regard the relation of the Soviet State to science as beneficial to both parties, but it would not be beneficial in a non-socialist State, nor even in a socialist State unless the influence of the State were balanced by democratic organisation such as that of the Soviets.

A second major theme of the conference was planning : anticipating the needs of the world and considering how the resources of science and technology could be organised to supply them. This was handled on several levels. The most immediate was the question of post-war relief and the steps that could be taken to prevent starvation and mass epidemics in Europe after the end of hostilities. A longer view was taken in the discussion of 'science and human needs', which dealt with nutrition, energy, medicine and housing. In particular, John Boyd Orr spoke, as he often did to great effect during these years, of the need for a world food policy as the basis of international economic stability and, therefore, of world peace : 'I believe that there is no measure that would do more for the promotion of human welfare than a food policy which would bring within reach of every individual a diet completely adequate for health.' The common denominator in both these sessions was a belief in the importance of thinking ahead and a faith that international cooperation on the basis of such thought could contribute powerfully to the welfare of mankind. 'Science' was involved only insofar as the problems were technical; planning was seen in these discussions as a political issue needing scientific information rather than 'scientific method' or scientific control.

The session on 'science and world planning' was another matter altogether, for some of its participants dealt with the creation of a new world order and raised questions both about political ideology and, concurrently, about the social relations of science. The session was chaired by the Soviet ambassador, who opened the proceedings by remarking : 'There will undoubtedly come a day when the system of very comprehensive planning - economic, social, political - will embrace the whole globe. ... In this the Soviet Union has reached already a very considerable degree of perfection.' Such a project had clear implications for science : 'We in the Soviet Union never believed in so-called "pure" science. We always believed that science must help humanity in its needs.'[30] The ambassador also read out a message from the U.S.S.R. Academy of Sciences, extending its 'warmest greetings' to the conference and declaring : 'In all countries men who have devoted themselves to scientific and research work are united by one conviction - that the aim of science is to bring about the well-being of humanity.' Several speakers followed these cues. Hugh Vowles argued that large-scale power production was an essential feature of world planning; that, with some exceptions, it had been thwarted in capitalist countries ; that it was on the contrary carried out successfully in Soviet Russia; and that the moral of this was that 'we should get rid of capitalism, lock, stock, and barrel.'[31] The communist don Maurice Dobb made a firm but restrained plea for marxist economics and planning as the most effective approach to the post-war economic problems of the world. He

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30. cf. Chapter VIII, n.134 above.

31. The Engineer, 172, (10 October 1941), 238. cf. Lenin's slogan 'Electrification + Soviets = Socialism'. Note also the comment in Haldane's above-mentioned paper that 'even the Tennesse Valley Authority Scheme ... would appear as a mere incident in the gigantic programmes of socialist construction of the Five Year Plans.'

concluded : 'In achieving a new union between science and labour in social planning, I would respectfully suggest that the scientist, as much as, in some ways more than, the economist, had a very high responsibility.' In a paper on 'the world planning of scientific research', D. P. Riley of the Association of Scientific Workers suggested : 'The nature of modern science demands not only planning and team-work, but international planning and team-work' - though it is not clear from the context whether by 'planning' he meant anything more than simple coordination.(32)

While some speakers were thus anticipating great changes in the organisation of society, the organisation of science and their mutual relation, a larger number simply took it for granted that a certain degree of planning in social affairs was feasible and that science could contribute to this end, without considering the wider issues. They concentrated instead on more specific issues in planning, such as the distribution of industry and population, the growth of world population, colonisation, international transport and the preservation of wildlife. Only one speaker, E. J. Bigwood, pointed out that 'planning may have disadvantages as well as advantages' and that the application of scientific knowledge in social affairs was often a tricky and complex matter.

The third element in the conference was internationalism. This was evident in the title of the conference and in the way that the various sessions ranged over the globe. It was evident in the views, frequently expressed, that international cooperation was essential to the solution of many of the problems discussed. It was evident in the personnel of the conference, drawn from twenty-two countries.(33) Although participants were present as individuals rather than as national delegates, many made explicit references to their homelands and one, H. Bernard, described himself as the 'delegate of General de Gaulle, President of the French National Committee'. Aspects of internationalism not so far described were raised in the final session, on the typically Wellsian

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32. Riley also pointed out that at Oxford science undergraduates had to learn German, and wondered whether Russian was not becoming an equally important language for the practising scientist. After the war it was made possible for students to choose which of these two languages they wished to study. The obligation to learn either was abolished in 1970.

33. America, Australia, Austria, Belgium, Britain, Canada, China, Czechoslovakia, Denmark, France, Germany, Greece, Holland, India, Italy, New Zealand, Norway, Poland, Russia, South Africa, Spain and Yugoslavia. Crowther, Howarth & Riley, op. cit., p. 11.

subject of 'science and the world mind'. Wells himself led off with a fantastical and overlong[34] paper calling for a 'federal world language' and a 'World Institute of Thought and Knowledge'. Only 'we, the scientifically enlightened people', declared Wells, could bring forth the world mind from 'the entirely incoherent crazy thing it is at the present time'. Hogben followed by pointing out that no less than four hundred universal languages had been proposed since the beginning of the seventeenth century.[35] Crowther suggested that 'the great possibility that modern science has placed within reach of humanity is the unification of the world'. Needham discussed the rôle of science in the progress of mankind towards 'the classless state, towards which, as the profoundest analysis of social evolution shows us, we must look'. The fact that the fifth century B. C. Chinese classic, the I Ching, had described the final stage of social evolution as 'no more and no less than the communal ownership of the means of production', was for Needham striking evidence of 'the truth of human solidarity and the unity of the world mind'.[36] Haldane, on the other hand, thought that Wells' concept of the world mind was both nonsensical and irrelevant : 'Man's most urgent need is to remodel his economic order so that science can be used for construction as efficiently as it is now being used for destruction.'[37]

A complementary approach to this conference is to analyse it in terms of the various views presented on the social relations of science. The conference as a whole served to demonstrate that these relations were emphatically beneficial to society - science was vindicated on a world scale. Most speakers did not consider the wider issues of social relations : they simply assumed that technology (which they usually called science) could and should be planned for the benefit of mankind, nationally and internationally, and discussed which problems needed technical help for their solutions and how such help could be rendered. Although the rationalist obsession with the social significance of scientific method lay at the back of Wells' world mind, it was not so much in evidence at this conference as it had been during the

34. Armytage, Gregory, pp. 186-187.

35. Nature, 148, (4 October 1941), 392.

36. Needham was then at the beginning of his long and immensely fruitful investigations into Chinese civilisation.

37. Armytage, Gregory, pp. 187-188.

nineteen-thirties. The emphasis was on science as a body of knowledge, not science as a method. Two opposing views on the wider issues of social relations were debated. One, while agreeing on the social planning of applied science, argued for the autonomous importance of pure science, along the lines of the Society for Freedom in Science. The other advocated the radical concept of the social function of science.

Of those speaking up for pure science, Hill, Negrin and Ewald have been mentioned already. The other outstanding contribution came from Max Born, the Jewish theoretical physicist and an early victim of the Nazi purge of German universities. In a paper during the final session he pleaded :

> Let us insist on the dignity of science as an independent and free activity, solely devoted to the task of discovering the structure of the existing world. ... I reject the idea that truth depends on the economic situation of society or on the taste of an individual. ...
>
> The greatest enemy of science is therefore systematic untruth, carried by propaganda. [Propaganda can be counteracted] only by insisting on truth as the fundamental condition of society. Here science is an important factor in education. For reliability and truthfulness are the first things a scientist has to learn.

Science is about truth, not about the economic situation of society. As a corollary, the 'world order' is 'a question of economics and politics, guided by principles of philosophy and religion; a question outside the competence of science, even utterly unscientific'. The extremes of collectivism and individualism each seemed to embody something indispensable : like particles and waves, both had to be retained. Inspired by Bohr's Principle of Complementarity, Born suggested : 'We have to reconcile the individualist with planning, which is unavoidable, and the socialist with freedom of research, which is imperative.'

In the radical category, papers from Bernal and Haldane, from Maisky (the Soviet ambassador), Vowles and Dobb and from Needham have already been noted. In addition, the contributions of Waddington and Beneš in the fourth session should be mentioned. Speaking on technical advances in biology, Waddington paused once to advertise the development of vernalisation by Lysenko(38) and a second time to attack A. V. Hill :

> However narrowly one may wish to think of biological

38. He did add, however: 'I understand that English opinion is not yet entirely satisfied as to the validity of all these claims, and that our experimentalists have not as yet been able to obtain such striking results. But there seems little doubt that the physiological basis for vernalisation is perfectly real ...'

> technology, I do not see how one can altogether neglect the political technique by which alone biological methods can be put into practice. ... Science does, whether it wishes to or not, meddle with morals and politics.

The point was, of course, that Hill viewed the primary aim of science as 'to arrive at the facts', while Waddington held it to be putting them into practice.(39) In his closing remarks Beneš observed that the message of the session was :

> We are definitely in the age in which science is being practised, not for the sake of itself alone, but for the sake of social life, for the sake of life based upon the high principles of humanitarian belief.. In modern science there is no longer any art-for-artism.

The radical presence was, in fact, so much in evidence that one may wonder whether it was not an attempt to repeat the triumphs of the 1931 International Congress. The only radical scientist of major significance not yet mentioned is Hyman Levy. He is not recorded as having read a paper, but on the last day of the conference he handed in a resolution to the effect that 'the most urgent task of the Social Division of the British Association is to ensure the fullest and most immediate utilisation of science in the conduct of the war.'(40) He was concerned that scientists were not being used effectively in the prosecution of the war,(41) and among various specific remedies for this he urged that 'there be the fullest pooling of trade secrets and practices' and that 'this be extended as rapidly as possible to all allied countries' - measures guaranteed to raise the hackles of private industry! Bernal also complained that 'at present, the war effort is being hampered by the restrictions placed on the dissemination of technical knowledge' and E.D. Swann of the Association of Scientific Workers voiced similar criticisms. So far as one can tell from the minutes, Levy's resolution was not discussed at subsequent meetings of the divisional committee, although Gregory referred to it when winding up the conference and promised that 'what can be done usefully by this Division in that way will be done.'

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39. cf. Marx's much-quoted slogan: 'The philosophers have only interpreted the world in various ways; the point, however, is to change it.'

40. His resolution appeared among the minutes of the divisional committee, but was not mentioned in the Adv. Sci. account of the conference.

41. Other scientists were equally concerned, and had been for some time, as witness the publication in August 1940 of the Penguin special, Science in war : see Solly Zuckerman, Scientists and war (Hamish Hamilton, 1966), pp.148-149.

Richard Gregory concluded the conference by reading out his charter of scientific fellowship, which by this time was called a 'Declaration of Scientific Principles'. The Declaration consisted of an introduction and seven principles which, for the record, are as follows :

> 1. Liberty to learn, opportunity to teach and power to understand are necessary for the extension of knowledge, and we, as men of science, maintain that they cannot be sacrificed without degradation to human life.
>
> 2. Communities depend for their existence, their survival and advancement, on knowledge of themselves and of the properties of things in the world around them.
>
> 3. All nations and all classes of society have contributed to the knowledge and utilisation of natural resources, and to the understanding of the influence they exercise on human development.
>
> 4. The basic principles of science rely on independence combined with co-operation, and are influenced by the progressive needs of humanity.
>
> 5. Men of science are among the trustees of each generation's inheritance of natural knowledge. They are bound, therefore, to foster and increase that heritage by faithful guardianship and service to high ideals.
>
> 6. All groups of scientific workers are united in the fellowship of the Commonwealth of Science, which has the world for its province and the discovery of truth as its highest aim.
>
> 7. The pursuit of scientific inquiry demands complete intellectual freedom and unrestricted international exchange of knowledge ; and it can only flourish through the unfettered development of civilised life. (42)

Such, then, was the British Association's conference on Science and World Order. It excited a good deal of comment, a fair amount of it friendly. Thus The Times said : 'It has held aloft the torch of free scientific discussion between men of many nations on issues of vital importance to humanity'[43] and the Manchester Guardian described it as 'the most striking intellectual event since the beginning of the war'.[44] Gilbert Murray, in his capacity as president of the International Committee of Intellectual Cooperation, wrote to The Times to acclaim

> the unmistakeable voice of Great Britain uttering clearly

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42. Nature, 148, (4 October 1941), 393. The fourth of these principles differs from that later published in Adv. Sci., for reasons which will become apparent in a moment.

43. The Times, 29 September 1941, p.5. Two Times leaders on the conference were reprinted in Science, 94, (31 October 1941), 415-416 and (7 November 1941), 439-440.

44. Manchester Guardian, 27 September 1941, p.7.

> that profession of faith for which we worked and appealed so long.
>
> My first impulse was almost to cry Nunc Dimittis ; my second is to thank the British Association and its collaborators for the noble word, and to pray that in due time the deeds will follow. (45)

In a radio broadcast Ritchie Calder hailed the conference as 'of profound importance to every man and woman'[46] and J. B. Priestley similarly pointed out that the Declaration was 'of immense importance to us all', scientists and non-scientists alike.[47] Henry Dale in his presidential address to the Royal Society, offered his 'very sincere congratulations on the success' of the conference.[48]

Henry Dale observed that there were many at the conference, 'held at a time when Science finds itself conscript and organised as never before for the destructive purposes of war, who were clearly ready to support the view that it should be as fully organised by the governments of a world at peace'.[49] Some commentators noted this tendency with approval. The Times, for example, praised the conference because 'it has emphasised the increasingly close relationship between science and government'[50] and the Manchester Guardian, too, remarked that it had registered 'a sharp break with the bad old traditions of the relations between science and statemanship'.[51] A Nature editorial said of the Declaration :

> If it is studied aright by scientific workers and by statesmen and administrators, there should be an end to the charge that in Great Britain, ministers of State or the Civil Servants under them are insufficiently equipped in scientific knowledge or grasp of scientific method and technique. (52)

Those who argued for a closer integration of science and State were not, however, without their critics. The National Review thought it 'infinitely regrettable that a society formed for "the advancement of science" should descend to the advocacy of party politics in their crudest form'.[53] More temporately but equally firmly, the president of the

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45. The Times, 1 October 1941, p.5.
46. The Listener, 16 October 1941, p.531.
47. ibid., 9 October 1941, p.487.
48. Proc. Roy. Soc., A179, (1941-1942), 253.
49. ibid.
50. The Times, 29 September 1941, p.5.
51. Manchester Guardian, 29 September 1941, p.5.
52. Nature, 148, (4 October 1941), 380.
53. Quoted in Armytage, Gregory, p.188.

Royal Society endorsed A. V. Hill's insistence that 'freedom and opportunity, ... rather than organisation, provide the conditions for the highest types of research, and thus, in the end, for the greatest services which science can give to mankind.' Too close an association with political affairs could jeopardise these conditions :

> If science should become entangled in controversial politics, through the over-eagerness of its advocates and champions to invoke the sanction of science, or to claim its potentialities, in support of any special political doctrine, then indeed I believe that the threat to its freedom might become a real danger. ... I see danger if the name of science, or the very cause of its freedom, should become involved as a battle cry in a campaign on behalf of any political system, whether its opponents would describe it as revolutionary or reactionary.

Dale went on to speak of the traditions of the Royal Society and to suggest that the Society

> may still find it an important part of its function, to keep watch and, if necessary, to stand without compromise, for the right and the duty of science to seek the truth for its own sake, in complete freedom from any kind of extraneous influence. (54)

The Engineer, too, both published Hill's paper in full and expressed warm approval of it in a long editorial,(55) and the Manchester Guardian also gave it extensive coverage.(56)

Henry Dale's address brought forth a reply from Richard Gregory. He agreed that the attitude of the Soviet government to science as outlined by comrade Maisky

> is not acceptable to scientists who pursue knowledge for its own sake, apart from its direct service to the community or the State. Consideration of it at the conference brought science into the realm of politics.
>
> In scientific circles there are differences of opinion as to the position which science should take in the modern State, but there is no desire to transform scientific investigators into party politicians, and no need to fear such conversions. (57)

There was, however, according to Gregory, a keen desire to advance the social sciences, and 'if to indicate the relationships of such contributions to social problems and the State is to intrude into the field of politics, many men of science are prepared to-day to accept this implication.' Sociology might be disdained by the Royal Society, but it

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54. Proc. Roy. Soc., A179, (1941-1942), 253-255.
55. The Engineer, 172, (3 October 1941), 222-224 and (10 October 1941), 236, respectively.
56. Manchester Guardian, 27 September 1941, p.7.
57. Gregory, letter to The Times: The Times, 17 December 1941, p.5. cf. Armytage, Gregory, pp. 189-190.

belonged to the 'domain of reason', the 'systematic and formulated knowledge' which Gregory defined as science.

The notion of planning also attracted adverse comment. Both The Times and the Manchester Guardian pointed out the limitations of purely scientific planning in bringing about the new world order(58) - as indeed, though for different reasons, had Bernal and Haldane. The Engineer gently derided those 'enthusiasts who believe that by taking thought - and action - a new world may be instantly created upon the ruins of the old'.(59) Engineering went to town on 'the present epidemic of planners':

> Nothing but disappointment can follow, however, if it is imagined that in some way science will prove the lodestone marking the way to a happier age. The application of the knowledge which scientific progress has accumulated over the centuries will enable the best to be made of material possibilities, but it is not within the competence of science to map out a path which will lead man a little nearer to the golden age. His own self-governing capacity must remain his guide. (60)

This journal further expressed the hope that the conference 'will not create an impression that public ownership or control are necessary features in the utilisation of scientific progress for the benefit of mankind' and added: 'Scientific men have no special responsibility for world order and in so far as they attempt to assume it they are leaving the scientific sphere.'(61)

Although A. V. Hill and Max Born stood out as notable exceptions, the conference as a whole articulated the philosophy of the socialist planners and gave a platform to the radical view of science, to the extent that John Baker complained: 'There was a lot of political propaganda.'(62) Six of the seven clauses in Gregory's Declaration expressed sentiments which would appear quite acceptable to the Society for Freedom in Science, but Baker was not taken in by their rhetoric:

> It is clear that those who drafted the Charter had freedom of speech and publication, and not freedom of investigation, in mind. The people who wish to see science planned seem to have had such an unfortunate influence on those who drafted the Charter, that its preamble and seven clauses contain nothing to suggest that any scientist anywhere should

58. The Times, 29 September 1941, p.5; Manchester Guardian, 29 September 1941, p.4.
59. The Engineer, 172, (3 October 1941), 218.
60. Engineering, 152, (17 October 1941), 311-312.
61. ibid., (3 October 1941), 271-272.
62. John R. Baker, Science and the planned State (George Allen & Unwin, 1945), p.62.

> have the right to decide what he will investigate. ... True freedom is not granted by this Charter. (63)

It was, however, the fourth clause[64] which particularly upset Baker:

> In this sentence ... we have an approximation to the totalitarian idea of science. It is the very essence of true science that its basic principles are not affected by the needs of humanity. Those basic principles are the free search for demonstrable truth and the formulation of generalisations covering the discoveries made. The needs of humanity do not change them. It is only under totalitarianism that such a thing can happen. (65)
>
> The fact that [the clause] could be solemnly pronounced by the President and then published shows to what depths a body supposed to represent science may sink. (66)

A Conservative M.P. named Henry Strauss pointed out that the fourth clause was 'capable of misinterpretation' and it was accordingly altered to read: 'The service of science requires independence combined with cooperation, and its structure is influenced by the progressive needs of humanity.' 'The obnoxious idea', commented Baker, 'was thus replaced by a truism, for everyone knows that there is an interaction between science and industry.'[67] Ferguson and Howarth, announcing the alteration, insisted, however, that the spirit of the clause was unchanged: 'So far as science is concerned, the formulation of basic laws is undoubtedly profoundly influenced by the structure and state of the civilisation in which the laws are formulated.'[68] The radical view of science appeared to be in the ascendant. The Society for Freedom in Science was faced with an uphill struggle.

The Science and World Order conference generated enough ideas to keep the Division going for the duration. In addition to setting up a number of research committees, the Division organised a further seven conferences before the end of 1945.[69] The radical attitude to science was given an airing, both at these conferences and in a

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63. John R. Baker, The scientific life (George Allen & Unwin, 1942), p.49.
64. This clause was not part of the draft version approved by Gregory, Calder, Ferguson, Levy and Wells on 31 March.
65. Baker, Science and the planned State, p.63.
66. Baker, The scientific life, p.133n.
67. Baker, Science and the planned State, p.63.
68. Nature, 148, (18 October 1941), 464.
69. Details of these may be found in appendix V.

paper specially commissioned from Alexander Fersman,[70] but other views were also expressed. Particularly notable was an address by J. L. Myers to the March 1943 conference, in which he defended the concept of science as the pursuit of truth, quoted approvingly from Max Born's 1941 speech and argued against the idea that the prospect of control over nature was the sole motive for doing research.[71] I propose, however, to pass over all these conferences and to consider only the last, held in December 1945 to discuss 'scientific research and industrial planning'.[72]

The interest of this last conference lies in the fact that it presented a view of the social function of science very different from that given in 1941. While much was again said about the planning of applied science, there was almost unanimous agreement not only that pure science had an autonomous existence but also that it could not in any real sense be planned. The right men could be selected and they could be adequately endowed, but beyond that the advancement of knowledge depended on their being given a free rein. Representatives of the Society for Freedom in Science, thitherto denied a hearing,[73] were invited to address the conference : 'their remarks on behalf of pure science and freedom in science were received with almost no opposition.'[74] Not just no opposition : their remarks were positively welcomed, even by <u>Nature</u>:

> Prof. Polanyi's fine address at the opening session struck a note which was generally welcomed, and the fundamental importance of freedom of investigation and of communication was emphasised from all quarters. (75)
>
> His plea that the essence of science is the love of knowledge, and that the utility of knowledge is secondary, was dignified and sincere. (76)

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70. Fersman, 'Science in the U.S.S.R.', <u>Adv. Sci.</u>, <u>3</u> (ix), (1944), 62-77. 'In the new developments of Soviet science we scientific people have discovered the joy of a truly scientific knowledge of the world and of efficiently striving for the mastery of it.' &c. &c.

71. <u>Adv. Sci.</u>, <u>2</u> (viii), (1943), 307-309.

72. <u>Adv. Sci.</u>, <u>3</u> (xii), (1946), 286-333; <u>Nature</u>, <u>157</u>, (5 January 1946), 8-11.

73. Baker & Tansley, 'The course of the controversy on freedom in science', <u>Nature</u>, <u>158</u>, (26 October 1946), 574.

74. ibid., p.575. cf. Polanyi, <u>The logic of liberty</u> (Routledge & Kegan Paul, 1951), p.3n : 'Speakers and audience showed themselves consistently in favour of the traditional position of pure science, pursued freely for its own sake.'

75. <u>Nature</u>, <u>157</u>, (5 January 1946), 2.

76. ibid., p.8.

Richard Gregory, too, was moved to speak of 'the single motive of acquiring new knowledge ... for its own sake rather than for its practical value' as lying behind 'fundamental research'.[(77)]

Nature commented that 'one of the most striking features of the Conference was the rapprochement between the more vigorous protagonists of planning and the defenders of the freedom of science.'[(78)] The rapprochement (if that is the right word) consisted, however, in a retreat by the former : the latter did not shift their ground. If anything, they found a new eloquence in the bleakness of post-war Europe. Michael Polanyi spoke in his paper to the conference of a 'radical scepticism' which had 'destroyed popular belief in the reality of justice and reason' and had diverted 'the great social passions of our time' into the 'violent and destructive channels' of marxism and fascism.

> The doctrine which had been so effectively hammered into our heads by the leading philosophical movement during the last fifteen years had taught us precisely this: that justice is nothing but the will of one section, and that there can be nothing higher than the longing for material benefits; so that to talk about higher missions is just foolishness or deceit. No, the spiritual hunger of Europe will not be satisfied so long as we follow the leadership of those - whether on the Left or on the Right - who teach that material interests alone are real.

The rôle of the scientist in restoring faith in justice and reason lay in affirming that science was concerned with values higher than material welfare, important as material welfare was : 'We must assert that the essence of science is the love of knowledge and that the utility of knowledge does not concern us primarily.' The great spiritual need of the time was a concept of truth as independent and enduring, beyond the manipulation of sectional interests. The social function of the scientist was to embody this precept in his daily work : 'The world needs science today above all as an example of the good life.'[(79)]

In a talk broadcast in September 1948, Polanyi claimed that the movement which it was the purpose of the Society for Freedom in Science to oppose 'has petered out, leaving hardly a trace. ... To-day one can hardly remember what it was all about.'[(80)] In 1951 he described the 1945 conference as a turning point and added : 'Since then

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77. Adv. Sci., 3 (xii), (1946), 286. It was about this time that 'fundamental research' came into vogue as a synonym for 'pure science'.

78. Nature, 157, (5 January 1946), 1.

79. cf. Michael D. King, 'Science and the professional dilemma', in Julius Gould, ed., Penguin social sciences survey, 1968 (Penguin 1968), esp. pp. 59-68.

80. The talk was later published in Polanyi, op. cit., pp. 86-90; see esp. p. 86.

the movement for the planning of science has rapidly declined to insignificance in Britain.'(81) A decade later he repeated that 'the movements for guiding science towards a more direct service of the public interest, as well as for coordinating the pursuit of science more effectively from a centre, have all petered out.'(82) Why should the long debate over the social relations of science have thus resolved itself in the latter years of the nineteen-forties?

The most immediately obvious point is that the Division's 1945 conference was held under the shadow of the Hiroshima and Nagasaki bombings. Though scientists could, and frequently did, point to the potential of atomic power as a source of energy for peaceful uses,(83) the atomic bomb was bound to have a very damaging effect on the public image of science. The view of science as determined by social and economic considerations and directed solely towards material ends held little comfort for scientists or for non-scientists trying to accommodate themselves to the existence of the bomb. Science as the disinterested pursuit of truth, while also implicated, if more remotely, in the bomb, could none the less still claim to represent those spiritual values which Polanyi showed were so essential to the post-war world. In other words, the latter view of science was a far more viable proposition for the creation of a favourable public image of science than was the radical view. In the context of an increasing emphasis on the spiritual as opposed to the material aspects of science, it is interesting that when Richard Gregory was at last able to deliver his presidential address to the British Association, in July 1946, he chose to speak on 'Civilisation and the pursuit of knowledge'.(84)

A second factor weakening the radical position was that the alliance of the Soviet Union with the Western bloc gradually turned into the cold war between them. No longer was it needful to have the sort of scruples which Baker mentioned (n.10 above) about criticising the internal affairs of an ally. As more was known about the true state of Russian science and Russian society, it became apparent that the materialist definition of science and the concept of the planning of science, insofar as their advocates had linked them with the social organisation of marxist Russia, were not the wonderful things they had been cracked up to be.

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81. ibid., p.3n.
82. Michael Polanyi, 'The republic of science', Minerva, 1, (1962), 66.
83. At the end of the 1945 conference, for example, Gregory proposed a resolution calling on the Council of the British Association to urge the Government, and the scientific world, to promote the beneficial applications of atomic energy.
84. Adv. Sci., 4 (xiii), (October 1946), 7-18.

Russia seemed to provide empirical evidence against the radical view of science. The radicals paid dearly for their often uncritical admiration of Soviet communism.[85]

The final break between J.D. Bernal and the British Association came in 1949, under extraordinary circumstances. He had been elected to the Council in 1946.[86] In August 1949 he represented the World Federation of Scientific Workers at a conference in Moscow of the Soviet Partisans for Peace. His speech to the conference described the monstrous wickedness of capitalism and the saving goodness of socialism and included remarks like : 'For now in capitalist countries the direction of science is in the hands of those who hate peace, whose only aim is to destroy and torture people so that their own profits may be secured for some years longer.' Having consulted among themselves and having given Bernal the chance of reply, the Council, observing that 'it was necessary to distinguish between political statements of members of Council (which do not concern the Council), and statements on the direction and use of science in this country (on which the Council, representing the Association, might be expected to have views)', decided by a majority to sack him.[87]

It is ironic that the Division for the Social and International Relations of Science, whose foundation was to Baker and Polanyi the institutionalisation of the movement against pure science and against freedom in science, should also be the scene of the reaction against that movement. But so it was. Such collaboration as had been established between radicals and rationalists fell apart as the radicals lost credibility and as the Division moved towards the Baker and Polanyi position. Moreover, the governmental recognition of the importance of science during and immediately after the war seemed to fulfill some of the rationalists' objectives; whereupon they concluded that 'their

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85. cf. Werskey, 'Outsider politics', p.80.

86. Five ordinary members of Council (out of twenty-five) retired each year. Three new members were appointed by the Council, leaving two to be elected by the General Committee. Bernal came into the latter category - i.e. it was not on the Council's initiative that he was elected.

87. <u>Adv. Sci., 6</u>, (1949/50), 388-391. cf. Werskey, <u>Visible College</u>, <u>p.333</u>. The American Association of Scientific Workers wrote to the Council protesting against the sacking. B.A. papers, box marked 'miscellaneous correspondence, c.1912-1962', letter dated 1 February 1950.

campaigning days were over'.[88] The field was left to the defenders of pure science.

At the end of the First World War the British Association went through one of its periodic soul-searching exercises. At the end of the Second it went through another. This, too, started on the purely administrative level, with a long memorandum[89] from O. J. R. Howarth, whose postponed retirement was then approaching after thirty-seven years' service. He followed this with another memorandum on 'the future pattern' of the Association, which was circulated to the General Committee in July 1946.[90] It was discussed by the Council in December[91] and in June 1947 the Council considered also a memorandum prepared by the general officers.[92] These deliberations between them made it clear that the main worry facing the British Association was financial : inflation had wreaked its familiar havoc of raising costs and lowering investment income. In particular, Down House, the home of Charles Darwin given in trust to the British Association in 1927 with an endowment 'amply sufficient for its maintenance and preservation for all time',[93] was now running at an annual deficit likely to reach £900.[94]

It was agreed that the preferred solution to these problems was a drive towards increased membership, especially among the non-scientific public. Howarth wrote that :

> The stronger emphasis upon the broader interest of programmes will be more necessary in the immediate future, not only because of the growing public interest in science, with which the Association must keep pace if it is to flourish, but, in particular, because its annual meetings will depend even more than in the past upon the support of residents in the localities where they are held. (95)

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88. Werskey, 'Outsider politics', p.81.
89. Adv. Sci., 3 (ix), (1944), 78-85.
90. Adv. Sci., 4 (xiii), (October 1946), 68-74.
91. Council minutes, 6 December 1946.
92. Council minutes, 6 June 1947 ; Adv. Sci., 4 (xvi), (January 1948), 368-372.
93. B. A. R., (1927), xix and (1928), xlvii-liii.
94. Adv. Sci., 4 (xvi), (January 1948), 373.
95. Adv. Sci., 4 (xiii), (October 1946), 70.

The Council similarly observed :

> To obtain more general attention for the objects of science ... has been, and still is, the chief function of the Association. ... There has never been agreement whether the main object of the annual meeting was to provide a public platform or to provide scientists of different disciplines with opportunities of meeting.(96) ... The Council has recognised the important opportunity these meetings provide of acquainting the layman with the progress of science. While specialisation has not been banished, the emphasis has been laid on communications of a general nature, intelligible to the layman. Unlike many learned societies the Association has a high percentage of laymen among its subscribers and so long as the annual meeting remains the main source of recruitment of members, the Association must cater for the needs of the layman.(97)

In addition to slanting the annual meeting further towards the layman, the questions of adapting The Advancement of Science 'to the requirements of a wide reading public', of developing a regional organisation and of encouraging the participation of young people in the Association were also considered.

In the light of these remarks on the Association's public mission - an old tradition given fresh prominence out of financial necessity - it is interesting to look at Henry Dale's presidential address to the Association in 1947. The Council had decreed that 'in order to emphasise the positive contribution of science to human progress it is recommended that the general theme [of the 1947 meeting] should be "Swords into Ploughshares".'(98) Dale certainly made the most of recent developments of obvious benefit to society in a material sense; but he also spoke of the non-material values of science and of their importance to society :

> Never, in its long history, was there a more urgent call than to-day for a faithful discharge by the Association of its duties of interpreting the purposes and the true meaning of Science to a wider public, of advancing the interests of Science and of defending its freedom from extraneous pressure or adverse influence.
>
> With regard to the Association's function as interpreter, we shall find many to-day who, through genuine misunderstanding and confusion of thought, are looking askance at Science, imputing to Science itself the danger, with which a misuse of its gifts to mankind still threatens the future of the world, and imagining Science to be concerned, in any case, with material issues alone, and as playing, therefore,

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96. cf. the 1920 Nature controversy, chapter II above.
97. Adv. Sci., 4 (xvi), (January 1948), 369.
98. Council minutes, 6 December 1946 ; Adv. Sci., 4 (xiv), (June 1947), 87.

> no part, or even a negative one, in the spiritual and cultural equipment of mankind. We can hardly be surprised at such misunderstanding ... but it is the more our duty to expose and to counteract it wherever we may meet it. Science, we must let it be known, pursuing its own task, seeking such a progressive revelation of the truth concerning material nature as its methods can achieve ... thus fulfilling its mission in freedom can make its own special contribution to the cultural and moral equipment of mankind.

The Association was back to the public defence of science, to demonstrating to the non-scientific world that science, despite its involvement in war, was the bringer of both material and cultural benefits to society and was therefore an indispensable element in social stability and development.

Henry Dale also envisaged a function for the British Association similar to that which he had adumbrated for the Royal Society in 1941 (cf. n.54 above):

> And then there is our duty of defending the right of Science to pursue unhindered its own task for mankind, within its own sphere. ... We of this Association may need still to be on guard, lest some new and extraneous philosophy or political system, invoking, perhaps, the authority of Science to bolster its pretensions, may seek again to limit and to compromise, with a new orthodoxy, the freedom of Science to seek and to proclaim such truth as it can discover, not as an expedient but for its own beauty and for its beneficent promise to mankind. (99)

The lessons of the social relations of science debate were clear. The values, indeed the very existence, of science were guaranteed only by that view of science which upheld the primary importance of the pursuit of knowledge for its own sake and of its corollary, the freedom of investigation. The radical and the rationalist (and, of course, the fascist) views of science were opposed to these values. There was a need to ensure that these views did not regain the influence they had formerly enjoyed.

While the British Association thus articulated its primary commitment to the public image of science, there remained its function 'to give a stronger impulse and a more systematic direction to scientific inquiry'. O.J.R. Howarth thought that the Association could carry out the former without at the same time 'diminishing the opportunities it has always offered for scientific workers to meet each other in their own special fields of interest'.[100] It was mooted that in view of 'the vast sums now made available' by other sources, the Association might

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99. Adv. Sci., 4(xv), (September 1947), 156.
100. Adv. Sci., 4(xiii), (October 1946), 73.

cease altogether its financial subsidies to research. The idea was rejected : 'This is a fundamental matter on which the General Officers do not wish to recommend any change.'(101) It was, however, recognised that 'the time has no doubt passed when the Association can expect to play any spectacular part in the advancement of science by original research.' The parts it could still play were the study of general inter-disciplinary problems, the identification and promotion of new topics of research and the subsidising of research which might not otherwise be undertaken, particularly by individual scientists who might not be able to compete with research teams for public resources.(102) In accordance with the recently revised statutes, such subsidies should be available for a maximum of five years.(103)

Finally, what of the Division? It had attracted criticism 'mainly, it would appear, on the grounds that it has tended to lead the Association in the direction of political controversy, and to usurp the functions of certain sections'. But, as Howarth hastened to add, 'during the war its activities kept the Association alive. Without it, during the past six years, the Association must needs have passed temporarily, if not finally, to rest.' Before the war it passed on many suggestions it received to the Sections; after it, it collaborated fully with them, in accordance with its founding statutes. During the war there were effectively no Sections with which it could collaborate. As for the first criticism, Howarth did not see it as reprehensible :

> When science is so increasingly permeating human interest at large that its increasing contact with political considerations is inevitable, it would surely be worse than useless for such a body as the Association to ignore such trends : on the contrary, the fullest consideration ought to be given to them, provided that the Association rigidly excludes any appearance of party bias. (104)

The Council observed ominously : 'Meetings of the Division are not run without expense, and funds are required to organise them successfully.'(105) It agreed, however, that the Division should be continued. In the light of the foundation of U.N.E.S.C.O., though, it wondered 'whether the word "International" now has any particular significance';

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101. Council minutes, 6 December 1946.

102. Council minutes, 6 June 1947; Adv. Sci., 4 (xvi), (January 1948), 369.

103. Adv. Sci., 3 (xii), (1946), 356.

104. Adv. Sci., 4 (xiii), (October 1946), 72. cf. Armytage, Gregory, p. 200.

105. Council minutes, 6 June 1947; Adv. Sci., 4 (xvi), (January 1948), 370.

but the Division retained the fullness of its title.

Although it never regained the peak of its wartime vigour, the Division continued its multifarious activities up to the end of the nineteen-fifties, when it was wound up as a result of yet another stocktaking exercise, ironically enough conducted largely by the Division itself.(106) During the interim the character of the British Association had changed greatly, in the direction of closer contact with industry and of a concerted effort to popularise science among schoolchildren. While the value of the Division's achievements was recognised, it was felt that its constitution - particularly its dependence on the Council for funds and for authority to proceed on major issues - hampered its work in the new atmosphere of the Association and that 'nothing that the Division can do now, or could do if it were given greater powers, could not be done equally well by the Council, if it were given greater powers.' The Division was therefore disbanded and its functions were absorbed by a reshaped Council. At the same time, its value to the Association was reaffirmed :

> There is no doubt that the considerations which led to the formation of the Division are as valid today as twenty years ago, in spite of, or perhaps because of, the great development in the social and international relations of science; and whatever decision may be reached on the organisation to deal with these problems, it is desirable that the purposes of the Division ... should be restated in the new statutes in an appropriate context.(107).

To close down the Division seems, however, a curious way of demonstrating official appreciation !

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106. Adv. Sci., 13, (1956-57), 205-206, 219; 14, (1957-58), 255-262; 16, (1959-60), 260-266.

107. Adv. Sci., 16 (1959-60), 263-264.

PART II

EDUCATION AND PUBLIC ATTITUDES TO SCIENCE

Chapter X

Education and the cultural values of science

At the outset of a chapter dealing with the cultural values of science one is faced, if not with the daunting task of defining 'culture', then at least with the still formidable job of identifying what was meant by the claim, frequently made by the guardians of science during the period under review, that their subject was a major element of the cultural life of the nation. Having looked at the basis for this claim, it will then be possible to consider how it was hoped to use the education system as a means of fostering public appreciation of the cultural values of science.

On what grounds, then, was it suggested that science was an integral component of a cultural life which derived its values from the traditionally defined 'humanities'? One approach was to argue that there was a considerable overlap between the concerns of science and those of the humanities and that science had, indeed, much to offer to what Alexander Pope labelled 'the proper study of mankind'. This was especially true in regard to the relation of man to his environment. For example, astronomy introduced wholly new scales of distance and revolutionised thought about the cosmical significance of the Earth. Geology revealed unsuspected scales of time. The theory of evolution served both to link man organically with other forms of life and to demonstrate his comparatively recent emergence from them. The development of scientific knowledge of natural phenomena had eradicated the cruder forms of superstition and the fear which they engendered. In these and other ways science had profoundly influenced man's attitudes to his place in Creation and, therefore, to himself.

While the examples just mentioned were, by the 1920s, generally regarded as culturally beneficial, some more recent developments in science seemed distinctly threatening. The growth of the biochemical sciences, with their interests in a mechanistic analysis of the processes life, appeared to reduce life to a series of chemical reactions devoid of any special spiritual significance. The laws of thermodynamics postulated an irreversibly and inexorably decaying universe in which the evolution of higher forms of organised life was merely a local accident.(1)

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1. Recognition of the likely effect of this on public attitudes to science caused the American physicist Robert Millikan to devote much effort during the 1920s to attempting to refute the second and third laws of thermodynamics. See Ronald C. Tobey, The American ideology of national science, 1919-1930 (U. Pittsburgh P., 1971), chap.V.

An exaggerated emphasis on the function of genetic inheritance in determining character seemed to limit severely the scope for individual improvement. The theory of relativity made nonsense of common sense and common experience.[2] Imminent advances in atomic physics were to play havoc with traditional concepts of causality. But if all these developments had a disconcerting effect on man's self-appreciation, they did at least demonstrate that, independently of its practical applications, science had a very considerable impact on the outlook of man. It was, therefore, impossible to disregard the contributions of science to the cultural life of the nation.

A.N. Whitehead has written :

> In its essence a liberal education is an education for thought and for aesthetic appreciation. It proceeds by imparting a knowledge of the masterpieces of thought, of imaginative literature, and of art. (3)

Science could certainly claim to be a source of 'masterpieces of thought' which merited widespread appreciation both for their intrinsic qualities and for their impact on human self-awareness. A liberal education whose function was the transmission of culture was therefore incomplete without a proper attention to science. Science also contributed to aesthetic appreciation : it was frequently pointed out how the study of any part of the vast range of natural phenomena increased the student's delight in, and reverence for, his environment. It thus served to broaden his outlook and to provide him with an absorbing interest to occupy his leisure. Again, although some critics were ready to argue that the assimilation of quantities of scientific data and of the systematic scientific method cramped the imagination and stifled the inquiring intellect, scientists replied that a disciplined imagination often played a key rôle in the process of scientific discovery. On a slightly different tack, some scientists at least were eager to refute the notion that the scientific study of Creation implied or produced disrespect for the Creator : on the contrary, the great scientist was said to be characterised by humility and reverence. Furthermore, it was held that science peculiarly epitomised the values of truth and intellectual honesty, in that its conclusions were subjected to the test of impartial experiment and did not rest merely on authority. The pursuit of truth could not be deemed antagonistic to the fundamental interests of culture.

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2. See ibid., chap. IV.
3. In an essay first published in 1917 and reprinted in A.N. Whitehead, The aims of education and other essays (Williams & Norgate, 1932), chap. IV. The quotation occurs on p.70.

The suggestion that the cultural dichotomy between the sciences and the humanities was essentially superficial involved demonstrating that the basic attributes of a culture based on the humanities were equally to be found in the sciences : that science, in other words, was itself fundamentally a 'humanity'. Science complemented the culture of history, literature and art through its own unique contributions to thought and aesthetic appreciation.

Much of the growth of public support for science was elicited and received on the basis of the practical value to society of a technology derived from scientific knowledge. The utilitarian justification served, however, to generate for science an image of an activity indifferent to the 'higher', non-practical problems of human existence and aspiration which motivated the study of the humanities and which formed the core of the cultural life. The attempt to draw public attention to the cultural values of science was an attempt to dispel this image and to replace it with one in which science was seen to be involved in the traditionally sanctioned concerns of the humanities. Such a re-orientation of public attitudes was doubly necessary : not only did the utilitarian justification give science a status inferior to that of the humanities amongst people nurtured on the values of a liberal education, but it also became something of a two-edged weapon as science was implicated in the waging of the First World War, in so-called technological unemployment and in preparations for the Second World War.

These general comments on the cultural values of science may be illustrated briefly by reference to a number of addresses and papers presented to the British Association. Rainald Brightman remarked that 'there is perhaps no greater service that the British Association can render to society ... than by its attention to the human values of science',(4) and there were certainly occasions on which the Association strove to advertise such values.

For example, the notion that science should be regarded as a humanity was defended by the general treasurer of the Association, E.H. Griffiths, in a paper to Section L in 1921 : 'The distinction between "humanistic" and "natural science" studies is, after all, an artifical one, for science is pre-eminently humanistic.'(5) Gowland Hopkins concluded his 1933 presidential address in a similar vein : 'I believe that for those who cultivate it in a right and humble spirit, Science is one of the Humanities; no

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4. <u>Nature</u>, <u>128</u>, (26 September 1931), 507.
5. <u>B.A.R.</u>, (1921), 483.

less.'[6] If the humanities are concerned with the Weltanschauung of man, then the presidential addresses of J. C. Smuts in 1931 and James Jeans in 1934, each of which described how this Weltanschauung had been revolutionised by the progress of scientific thought, served to demonstrate the common ground between science and the humanities. Horace Lamb in 1925 likewise referred to the contributions made by science to man's outlook on the world :

> The provinces of art and science are often held to be alien and even antagonistic, but in the higher processes of scientific thought it is often possible to trace an affinity. ... Is it not the case, for instance, that the widespread interest excited by the latest achievements of physical science is due not to the hope of future profit, though this will doubtless come, but to the intrinsic beauty ... of the visions which they unfold? (7)

It was necessary, not merely to establish a connection between science and the cultural life of the nation, but also to demonstrate that the contributions of science to culture were positively beneficial. As mentioned earlier, the public had some cause to be sceptical about this. Science appeared to threaten the traditional values and the spiritual faith of man. The British Association was therefore anxious to reinforce Brightman's claim that 'a fearless faith in the laws of Nature consorts well with a profound faith in man's noblest ideals.'[8] The most notable effort in this direction was made by William Bragg in his 1928 presidential address. Commenting on the notion that successive advances in science contradicted previously established theories and that in a period of rapid advance this generated bewilderment and insecurity in both scientific and social spheres, Bragg observed that 'men are often needlessly alarmed by the new announcements of science and think they are subversive of that which has been proved by time.' The scientist was not, however, a thoughtless iconoclast :

> Science ... is not so foolish as to throw away that in which the slowly gathered wisdom of ages is stored. In this she is the conservative of conservatives. ...
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> The scientific worker is the last man in the world to throw away hastily an old faith or convention or to think that discovery must bring contempt on tradition. (9)

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6. B.A.R., (1933), 24.
7. B.A.R., (1925), 2. On the theme of science as a humanity, see further the third session of the Division's conference on 'Science and the citizen : the public understanding of science', held in March 1943 : Adv. Sci., 2 (viii), (1943), 307-322.
8. Nature, 128, (26 September 1931), 508.
9. B.A.R., (1928), 17, 19.

Nor did the scientist's search for mechanical causation in the understanding of natural phenomena necessarily preclude other, less cold-blooded ways of looking at the world : 'The use of a mechanistic theory in the laboratory does not imply that it represents all that the human mind can use or grasp on other occasions, in present or in future times.'(10) Bragg was emphatic in his denial of the supposed antithesis between scientific and spiritual values :

> There are even some who think that science is inhuman. They speak or write as if students of modern science would destroy reverence and faith. I do not know how that can be said of the student who stands daily in the presence of what seems to him to be infinite. ...
>
> Science ... is not setting forth to destroy the faith of the nation, but to keep body and soul together. (11)

J. C. Smuts, too, was anxious to point out the consonance of science and religion :

> Among the human values ... science ranks with art and religion. In its selfless pursuit of truth, in its vision of order and beauty, it partakes of the quality of both. More and more it is beginning to make a profound aesthetic and religious appeal to thinking people. (12)

The spiritual value of science was also mentioned by Mayhowe Heller in his presidential address to Section L in 1932 :

> We believe that natural knowledge must inspire a reverence for the Creator only to be obtained by direct contacts. (13)

Again, the function of science in rebuilding the spiritual values of postwar Europe, by embodying the precept that the pursuit of truth was a higher good than the pursuit of material ends, was the principal theme of the conference organised by the British Association's Division for the Social and International Relations of Science in December 1945 (see chapter IX above).

Other aspects of the cultural image of science were considered by Richard Gregory in his 1921 address to the Conference of Delegates :

> Science should dissociate itself entirely from those who have thus abused its favours, and not permit the public to believe it is the emblem of all that is gross and material and destructive in modern civilisation. There was a time when intelligent working men idealised science; (14) now they mostly regard it with distrust or are unmoved by its aims, believing it to be part of a soul-destroying economic system. (15)

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10. ibid., p. 20.
11. ibid., pp. 17, 20.
12. B. A. R., (1931), 13.
13. B. A. R., (1932), 210.
14. Gregory himself was a prime example of this.
15. B. A. R., (1921), 489.

Among the uplifting features of science was the scope it gave to the imagination :

> Never let it be acknowledged that science destroys imagination, for the reverse is the truth. ... The greatest advances of science are made by disciplined use of imagination. (16)

While these speakers were all concerned with science as a whole, there was also a certain amount of special pleading on behalf of the cultural values of individual sciences. The 1925 presidential address to Section C, for example, dealt with 'cultural aspects in geology', a theme which W.A. Parks developed with confidence :

> The science of geology is wide in scope and general in application; it deals with matter and with life, with time and with space; it touches the philosophical and borders on the romantic; majesty and beauty are its essentials, and imagination is necessary for its pursuit. The cultural value of such a science is not to be despised. ...
>
> The beautiful, the philosophical, and the spiritual can be found in any of the sciences, in none more than in geology. (17)

Not only were the cultural aspects of geology wide-ranging and profound : they were also supportive of an essentially religious outlook :

> To humbleness and caution I would add a conviction of theism as a result of the study of geology. I fear to venture on dangerous ground, but I must be allowed the opinion that materialism offers no adequate explanation of the wonders of geology. ... The inconceivably long gradient that has led ever upward to the mentality of man has not been traced without design. (18)

E. J. Salisbury in his 1937 presidential address to Section K put a high value on the cultural significance of botany :

> It is, I feel, the contribution that botanical knowledge can make towards general culture and spiritual contentment that is its chief claim to rank high in our educational scheme. (19)

The cultural aspects of biology were discussed at the conference on biology in education organised by the British Social Hygiene Council in December 1932[(20)] and at the 1934 Conference of Educational Associations. At the former, for example, it was argued that biology made fundamental contributions to the understanding of man's place in the universe and therefore of the nature of his existence. It was also pointed out that a

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16. ibid., p.493; cf. E.H. Griffiths, ibid., p.482.
17. B.A.R., (1925), 55, 74.
18. ibid., p.72.
19. B.A.R., (1937), 236.
20. See further chapter XIII below.

knowledge of biology greatly enhanced man's appreciation of beauty. At the latter, Julian Huxley remarked that the biological theory of evolution provided evidence of 'a process running counter to the second law of thermodynamics' and thus served to offset 'the rigorous determinism of physico-chemical science, with its stress on the universe as something which is running down'. Arnold Wilson discussed the cultural implications of biology in terms of the controversy between the vitalistic and mechanistic approaches to life and its affect on man's understanding of himself.[21]

It was clear, then, that science generally and individual sciences in particular impinged to a very considerable extent on the cultural life of the nation, and scientists were mostly ready to argue that this interaction served to enhance the cultural life. It was, however, insufficient for the British Association or any other organisation simply to reassure the public that the professional practitioners of pure science had the best cultural interests of society at heart. The only way to avoid the schizophrenic situation of claiming that science was, indeed, a cultural activity - in order to put it on a par with the humanities in its concern for the highest values of society - while simultaneously using utilitarian arguments to canvas public support, was to make the cultural contributions of science a central part of the received image of science. But if the public was to change its attitude to science, then it was necessary to demonstrate that the cultural aspects of science were accessible to more than simply a small élite of highly trained and highly privileged individuals. As George Daniels has observed, 'how can one ask the public to provide support, much less facilities, for the intellectual gratification of one select group ?'[22] The solution lay in education : the teaching of science had to be such that those who were not destined to become professional scientists could still assimilate to themselves the cultural components of science.

Such a programme implied a fresh analysis of the rationale and practice of science teaching. Where science had been taught for the preservation and advancement of academic discipline, or for the economic importance of science-based technology, curricula had evolved without appreciable reference to the cultural values of science. In the remainder of this chapter I wish to examine three attempts to introduce these

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21. Report of the 22nd annual Conference of Educational Associations (1934), pp. 257-267.

22. George H. Daniels, 'The pure-science ideal and democratic culture', Science, 156, (1967), 1699-1705; p.1705.

values into the teaching of science. Two of these attempts involved specific curriculum developments in secondary grammar schools : the use of the history of science to provide an extra dimension to existing courses and the movement for the teaching of 'general science', which aimed to give pupils a broad acquaintance with a wide range of sciences. The third was the effort to reach older sectors of the population through the adult education movement by structuring courses around the students' experience of how science affected their cultural and material environment.

The history of science, or what might sometimes better be called the hagiography of science, provides a rich source of material from which to illustrate claims that science has brought great cultural and spiritual, as well as practical, enlightenment to mankind, that scientists are men who have deep respect for, and understanding of, the most important human values, that the cultivation of scientific knowledge tends to ennoble the mind and elevate the spirit. The incorporation of such material into the teaching of science, it was thought, would help pupils to appreciate the essentially human nature of scientific work and thus serve to influence public attitudes to science.

One of the most famous and influential attempts to portray science in this light was Richard Gregory's Discovery, or The spirit and service of science, published in 1916. In that same year Gregory was appointed chairman of a Section L research committee on 'the method and substance of science teaching in secondary schools, with particular reference to the essential place of science in general education'. The committee's report appeared in 1917. It acknowledged that the development of Henry Armstrong's heuristic methods[23] from 1889 onwards - in which the British Association had played a key rôle - had achieved substantial improvements in the teaching of science, especially of physical science, but remarked that it had certain disadvantages which could no longer be ignored :

> Unfortunately, in concentrating attention upon training in experimental method, the complementary teaching of science as a body of inspiring principles and a truly humanising influence has been neglected; and it is to this aspect of the subject that particular importance is attached in the present report. (24)

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23. On Armstrong and heurism see W.H. Brock, H.E. Armstrong and the teaching of science, 1880-1930 (C.U.P., 1973) and E.W. Jenkins, 'H.E. Armstrong, heurism and the common sense of science', Durham research review, 8, (1976), 21-26.

24. B.A.R., (1917), 127. This despite the fact that Armstrong was a member of Gregory's committee!

The committee therefore set itself the task of considering schemes of work 'in which humanistic aspects of science occupy a prominent place'.(25)

The bulk of the report consisted in specimen schemes produced by individual members of the committee. Two of these, by Archer Vassall (science master at Harrow) and F.W. Sanderson (headmaster of Oundle), which were to prove seminal for the development of the general science movement, made special reference to the importance of projecting the cultural and historical aspects of science. Vassall suggested that an 'acquaintance with the foremost men in the history of scientific knowledge should be included in each [science] subject'. Sanderson confirmed that an historical approach would draw out the cultural features of science : 'No one can study the life and works of a great discoverer without finding himself within a realm of art.' He went on to speak of the 'romance of science', 'which contains within itself the great inspiration', and to argue that 'the first duty of the teacher is to inspire boys with an awakening love of the natural world and bring them to the verge of knowledge where lies the mystery.' The preliminary pages of the report had a section headed 'Human aspects of science' in which the educative value of the history of science was emphasised :

> There should be more of the spirit, and less of the valley of dry bones, if science is to be of living interest, either during school life or afterwards. ... One way of doing this is by lessons on the history of science, biographies of discoverers, with studies of their successes and failures, and outlines of the main road along which natural knowledge has advanced. It would be far better, from the point of view of general education, to introduce courses of this kind, intended to direct attention and stimulate interest in scientific greatness and its relation to modern life, than to limit the teaching to dehumanised material of physics and chemistry which leaves but little impression upon the minds of boys if seen only 'in disconnection, dull and spiritless'. (26)

It is clear that the sort of history of science envisaged throughout this report was biographical/hagiographical and that its functions were to project a more human image of science along the lines of Gregory's <u>Discovery</u> and to show that the traditional distinction between science and the humanities was essentially unfounded :

> History and biography enable a comprehensive view of science to be constructed which cannot be obtained by laboratory work. They supply a solvent of that artificial barrier between literary studies and science which a school time-table usually sets up. (27)

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25. ibid.
26. ibid., p.140
27. ibid., p.141.

At the end of his term of office the 1924 president of Section L, Ernest Barker, proposed to the sectional committee that the place of the history of science in education would be a suitable topic for discussion at the 1926 Oxford meeting of the British Association.(28) The subject was duly considered, both in a special discussion and in the presidential address to the Section, delivered on that occasion by Thomas Holland. Holland complained that 'under the tyranny of terminology our classical friends have usurped the "humanities"' and pointed out that the Renaissance had been the source of revolutionary advances not only in the spheres of literature, theology and art but also in science. He pointed out that specialisation had gradually reduced the once revitalised classical studies to a narrow field 'stricken with a formalism and even pedantry' and feared that a similar process was at work in the study and the teaching of science. To rectify this he suggested that the teaching of science be imbued with the spirit of biographical history :

> Nothing appeals to a man like humanity; if we inspire the student's curiosity regarding the life-histories of our leaders, he will find out for himself the facts and principles of their science and technology. ...
>
> It is the biographical history of science itself that contains the essential vitamins of the student's food.

Such a course would greatly enlarge the common ground between science students and their non-scientific colleagues, to the obvious benefit of society :

> To be appreciated [science students] must understand and be understood by others : they want the humanities, and the humanities are not the monopoly of the classical scholar.(29)

The eminent historian of science Charles Singer opened the discussion on the place of the history of science in education by pointing out that

> Social, political, religious, and psychological environment have all had their share in shaping the growth of scientific knowledge. Our Science is thus as much a product of tradition as our Law, and can only adequately be grasped by those who receive the tradition.

He suggested that general education - as opposed to the education of the scientific specialist - might be based on the study of the history of civilisation, in which the history of science would clearly be included. Although this would be a natural way of introducing the non-scientist

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28. Section L minutes, 27 August 1925.
29. B.A.R., (1926), 251-253.

to scientific ideas, he recognised that 'the re-casting of humane studies is, however, too ambitious a programme.' If this scheme was not feasible, Singer still argued that it was necessary to present a broad survey of science and that this could most readily be achieved by a study of its history. While the historical approach did not provide for training in scientific method through individual practical work, it did fulfill the important function of helping the student to understand his cultural environment and thus to lead a richer life.[30]

As Singer observed, the historical and the heuristic approaches to the teaching of science had different objectives, the one emphasising the cultural values of science and the other concentrating on scientific method. D. P. Berridge, senior science master at Malvern and secretary of Section L, testified that the former was more successful in engaging the interest of his pupils, and Richard Gregory remarked that it provided welcome scope for considering 'how science has affected human life'. Other speakers argued for a mixture of the two approaches.[31]

A paper by Cyril Desch, professor of metallurgy at Sheffield, treated of the history of science as a means of providing a link between the sciences and the humanities. For the student of pure science, he felt that the history of his subject should be taught integrally with its technical aspects and that this would enable him to understand its contribution to the development of human culture : 'By relating each important discovery as it is dealt with to the state of thought at the time, the importance of science in human history may be made clear.' The historical approach to applied science offered further scope for making its cultural significance accessible to scientist and non-scientist alike :

> In the teaching of applied science, the connection between great discoveries and inventions and social and economic conditions affords many themes for an enthusiastic teacher, and furnishes a means of directing the attention of the student to social studies, which are so apt to be neglected by the scientific specialist. On the other hand, the student of history and literature may be brought into contact with the facts and conceptions of science by a similar approach.

Desch added that the linking function of the history of science could only be made complete by the 'recognition of sociology as a science'.[32]

As one would expect from the presence of Charles Singer and Cyril Desch, this discussion on the whole took a reasonably sophisticated

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30. B.A.R., (1926), 420-421.
31. J. of Ed., 58, (1926), 620.
32. B.A.R., (1926), 422.

view of the history of science. The subject was not treated simply as a source of material for hagiographical lessons on the heroes of science : it was used to relate the development of science to other intellectual and cultural movements and to social conditions, and thus to demonstrate how science formed an integral part of the total cultural heritage of the nation. It was suggested that the history of science, considered in this way, would enable the scientist to obtain a deeper appreciation of his subject and the non-scientist to gain some insight into the real nature of science.

Another Section L committee under Richard Gregory was appointed in 1927 to investigate the position of science in School Certificate examinations and to assess the suitability of available syllabuses 'as essential subjects of instruction in a rightly balanced scheme of education designed to create an intelligent interest in the realm of nature and in scientific aspects of everyday life'. The committee's report was surprisingly reticent on the cultural values of science and the function of the history of science in promoting them : indeed, the only explicit reference to the history of science came in the passage on 'human aspects of science' which the committee reproduced from the 1917 report. There was, however, some mention of relating the teaching of science wherever possible to the literary side of the school curriculum 'in order to identify its cultural possibilities with the highest the school can give'. This would both humanise the image of science and enrich the outlook of non-scientists :

> The study and training in science associated with literary work should lead the growing boy, or girl, to a fuller appreciation of the verities of life, to something larger, loftier in their outlook than anything that can be offered by a literary training alone. (33)

It was often vaguely suggested that science should be linked with literary studies. Sometimes this meant no more than that scientists should be taught to write good English. Sometimes it implied a reference to the influence of science on literature, a theme of which Gregory himself was particularly fond. If the phrase 'the literary side of the school curriculum' was used to indicate everything except the scientific side, then it could be taken to include historical work and links between science and the 'literary side' could be forged by giving due attention to the history of science. Generally, however, as in the present report, the precise nature of these links was not specified.

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33. <u>B.A.R.</u>, (1928), 458.

Speaking in Oxford in 1933, Frederick Gowland Hopkins argued strongly for the teaching of the history of science. It would, he felt, broaden the education of scientists and help non-scientists towards a deeper appreciation of science :

> The history of science - the history of the gradual development of the fundamental ideas and conceptions, perhaps its effect upon civilisation - might form the subject of school teaching and take the place of the purely technical teaching of science which the schools at present give. That would turn out not only men who are going to take up science as a career, but the right sort of teaching would give that sympathy with and understanding of science which we would fain have in our public men and in our citizens generally.

Commenting in Nature, Richard Gregory remarked that there were two types of history of science : intellectual history and social history. Reacting to the social relations of science debate, and in some contrast with his statements of 1916 and 1917, he put in a plea for the latter :

> For the education of most young citizens ... we suggest that what is wanted is not the history of science as such but of its social and industrial influences. ... We have often been reminded in recent years of these social and economic contacts; and it is upon them that the chief emphasis should be placed when attention to the history of science is being advocated for students in schools or universities.

It is interesting that at this stage Gregory discussed the social history of science in terms of the influence of science on society and not in terms of a reciprocal influence between science and society.(34)

A discussion on 'The failure of modern science teaching to develop an adequate cultural background to life' at the 1934 Conference of Educational Associations provided another opportunity for assessing the educational function of the history of science. Arnold Wilson, son of the famous pioneer of science education, J.M. Wilson, and then chairman of the British Science Guild, suggested that 'the true cultural background [generated by science] is humility arising from a reverence for the Unseen', and argued that study of the history of science would be conducive to such humility by impressing on pupils the incompleteness of scientific knowledge and the ancientness of its pursuit :

> Let children realise that the search for scientific truth is no new thing, but as old as humanity, concurrent with, and a concomitant of, religious truth. (35)

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34. Richard Gregory, 'History in science', Nature, 131, (3 June 1933), 777-779.

35. Report of the 22nd annual Conference of Educational Associations (1934), p.266.

From a rather different point of view, Julian Huxley indicated two ways in which the science student could profit by studying the history of his subject. Firstly, it could give him a better perspective on its present state of development :

> The student of science is too often deluged by facts and has the dreadful feeling that nothing remains for him to discover; that all he has to do is to master all these facts. The history of science shows him that we are much in the same relative position as the people of a couple of hundred years ago.

Secondly, it could illustrate the relation between science and social affairs which had been the theme of Huxley's recent talks for the B. B. C. :

> The history of science will help the student towards something which I regard as of real importance - an appreciation of the meaning of science in regard to the state of society at a given time. ... Science is an integral part of social life, and its direction is guided quite definitely by the general social and economic structure of the time. (36)

The history of science might thus help to make the cultural aspects of science more widely accessible and to clarify the relation of science to the other major components of intellectual and social life, so generating more realistic attitudes to science.

The discussion on the cultural and social values of science staged by Section L at the 1936 meeting of the British Association - which has already been mentioned in chapter VII - was opened by Richard Gregory with a paper in which he described the impact on the Weltanschauung of man made by scientific thinkers from Hippocrates to Darwin. It was left to Lancelot Hogben to draw out the educational implications of this impact, which he did by reference to his own peculiar mixture of marxism and scientific humanism.(37) The science syllabus, he argued, 'must be permeated with the historical outlook and taught in the closest association with historical studies'. This was a very different proposition from the biographical / hagiographical approach to the history of science, which Hogben condemned in no uncertain terms :

> It was called the historical approach because the tedium of the lecture room was from time to time relieved by lantern slides of bearded and very much superannuated scientists or of their birth-places. Many of us can still recall how serial obituary notices of great uncles who have gone before helped us to return to the matter in hand with redoubled zest. ... As it affected our general outlook, it left the impression that science has progressed by a succession of miraculous divinations of exceptionally gifted individuals who might

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36. ibid., pp. 261-262.

37. See chapter VII, n.57 above.

> have contrived to be born at any convenient time with much the same results. Needless to say, biographical anecdotage of this sort throws no light on the relation of science to the changing fabric of social life and their dependence on one another. (38)

He therefore called for a complete break with the 'biographical and obituary school of writers who are responsible for so much justifiable prejudice against the history of science' and advocated a fresh approach to the subject in which a new attitude to the cultural and social values of science would emerge from an analysis of the relation between the growth of scientific knowledge and the social conditions under which that growth occurred. Such an analysis would help prepare the ground for the development of scientific humanism, to which Hogben looked for the future well-being of mankind. His own Science for the citizen, published in 1938, was to be the best known effort in this direction.

The history of science, then, was regarded as a field of considerable educational potential. Whether it was taught to science specialists or to others, whether it was taught as a distinct subject or merged into lessons on science or on history, it was clearly a useful means of generating appreciation of the cultural values of science. This was true irrespective of how one defined these values. The actual approach used, however, would obviously vary with the definition : even this very brief sketch indicates a connection between attitude to the cultural and social relations of science and support for the teaching of that type of history of science which would best embody these values. Although, so far as I know, the matter has not been investigated in detail, it would seem reasonable to postulate a similar connection in respect of the professional study of the history of science and it would be an absorbing exercise to examine the histories of science published during this period with a view to elucidating their functions in the social relations of science debate.(39)

The most important and sustained attempt to enlist secondary school science teaching directly in the campaign to project the cultural values of science was the 'general science' movement, which, interestingly,

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38. John Boyd Orr et al., What science stands for (George Allen & Unwin, 1937), pp.124-125.

39. This point was raised by Paul Wood during a seminar I gave to the History and philosophy of science department at Leeds University.

occupied a time-span similar to that of this thesis. General science differed from, and conflicted with, existing science courses in its emphasis on a broad acquaintance with a wide range of sciences as opposed to a more detailed knowledge of only one or two; in the relatively small rôle it assigned to individual practical work, thitherto the dominant feature of school science; in its reassessment of the comparative educational significance of scientific knowledge and scientific method; and in its promotion of subjects outside the traditional trio of physics, chemistry and botany. The general science movement served a number of purposes. It provided a basic course of 'science for all' in secondary schools. It allowed the introduction of sciences which fell outside the established range. It supplied an antidote to the excessive demands of university entrance requirements, with their effects in encouraging premature specialisation and an unacceptably academic approach even below School Certificate level. And it 'humanised' the teaching of science by laying stress on its cultural function. In the following pages I shall concentrate on the last of these and consider the other functions of general science only where they overlapped with the cultural function. Although the principal organisation behind the general science movement was the Science Masters' Association, my main emphasis is necessarily on the rôle played by the British Association.[40]

The general science movement has its origins in two pamphlets published by the Association of Public School Science Masters[41] in 1916. The British Association quickly became involved through Gregory's committee on science teaching in secondary schools, whose report, as mentioned already, appeared in 1917. The scheme of work prepared for this report by Archer Vassall described a course of science whose content ranged from cosmology to the gramophone and which was designed to be taught compulsorily to all boys in a public school up to the age of about 17 years, irrespective of their intended specialisation. A similar course prepared by F. W. Sanderson aimed at broadening the traditional syllabus by concentrating in the earlier years on applied

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40. For the history of the general science movement, see E.W. Jenkins, From Armstrong to Nuffield : studies in twentieth century science education (John Murray, forthcoming), chap. III. I am most grateful to Mr. Jenkins for allowing me to read his book in typescript.

41. The Association of Public School Science Masters was founded in 1901. In 1919 it opened its doors to other boys' secondary schools and became the Science Masters' Association. The Association of Women Science Teachers was founded in 1911. In 1963 it merged with the S.M.A. to form the Association for Science Education.

rather than pure science. He defended this approach enthusiastically :

> This form of science teaching is stimulating and arresting, and gives the boy plenty to do and much to think about. It arouses interest, develops intelligence, and promotes catholicity of taste. Teachers will find that the application of science, and all that may be called the romance of science, are alive with possibilities for the education of the young in everything connoted under the words Culture, the Humanities, and Art. (42)

Percy Nunn contributed a syllabus of science for an urban boys' secondary school which attached a much greater importance to biology than was then usual and which, besides traditional physics and chemistry, included studies of astronomy, geology and what he called 'general physics' or mechanics.

These schemes had in common the aim of familiarising all children with a much broader spectrum of scientific knowledge than existing courses provided. Since most children were not intending to become professional scientists, a common syllabus based on highly academic considerations was quite inappropriate; it was further argued that such a syllabus was inappropriate below School Certificate level even for the intending professional. In assessing the function of any given discipline in education, Nunn maintained that its cultural value was the principal consideration :

> A subject justly claims a place in the school only in so far as it represents a movement of primary importance in the evolution of the human spirit. ... Equally with literature and art, science is one of the grand historic expressions of the human spirit. ...
>
> The prime contribution of the heroes of science to the world's cultural wealth is not the scientific method but the scientific life. (43)

But if science teaching was to take its full place as an indispensable constituent of a liberal education on account of this cultural value, then a break with existing practice was required :

> The proper aim of a general course in science is to give, not an exhaustive knowledge of detail nor a mastery of laboratory technique, but what we have called a realisation of the scientific life and an appreciation of its more important contributions to the world of ideas and the welfare of man. (44)

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42. B.A.R., (1917), 155.
43. T. Percy Nunn, 'Science', in John Adams, ed., The new teaching (Hodder & Stoughton, 1918), pp.159-160. cf. Nunn's presidential address to Section L in 1923 : B.A.R., (1923), 261-272.
44. ibid., p.192.

Richard Gregory told Section L in 1919 that 'the weak points of the [existing] instruction are insufficient attention to the broader aspects of natural knowledge and to scientific discovery and invention as human achievements.'(45) The general science movement offered an opportunity to remedy this situation by teaching a wider course of science and by teaching it in such a way that the cultural and human aspects of science would be made apparent.

One of the most striking features of the general science movement is the way in which advocates of particular sciences which had thitherto been neglected in the school curriculum took advantage of the movement to press their own individual claims. These claims were advanced in terms consonant with the cultural objectives of general science but, despite arguments to the contrary, they did serve to underline one of the central problems facing the movement : namely, that of demonstrating the feasibility of constructing a single coherent school subject called 'general science' which would be other than a disjointed collection of separate sciences. The three sciences most notable in this respect were geography, biology and geology.

The low status of geography in secondary education will be discussed in chapter XII below, which will deal with the political arguments designed to amend the situation. Here I wish to look at the cultural arguments for geography teaching. The advocates of geography frequently spoke of its cultural value. For examples, James Fairgrieve, lecturer in education with special reference to geography at what later became the London Institute of Education, wrote in 1918 that 'the objects of teaching geography are mainly cultural in the best sense.'(46) Halford Mackinder, reader in geography at London University, stated : 'Geography is essentially a mode of thought which has its scientific, artistic, and philosophical aspects.'(47) A joint committee of Sections E and L under Percy Nunn, in its first report on geography teaching presented at the 1923 meeting of the British Association, argued in a passage clearly reflecting Nunn's influence :

> The claim of a subject to a place in the school curriculum must ultimately be measured by the value of its contribution to the history of the human spirit, the development of culture and civilisation, and what may be called the educated mind of the age. ... The criterion ... justifies the admission of ... natural science and geography, which have

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45. B.A.R., (1919), 354.
46. James Fairgrieve, 'Geography', in John Adams, op.cit., p.232.
47. Halford Mackinder, 'Geography as a pivotal subject in education', Geog.J., 57, (1921), 376-384 ; p.382.

> only in modern times attained to the distinctness of aim, the individuality of method, and the coherence of content which have made them important elements in the life of civilised peoples. (48)

The cultural values of geography derived from two considerations. The one was that since the turn of the century professional geographers had increasingly devoted themselves to the study of the geographical factors influencing the distribution of peoples over the surface of the earth and their consequent life and work : that is, geography had become a man-centred discipline as opposed to one concerned principally with the inanimate features of the landscape. The other was that geography claimed to rank both as a humanity and as an independent science. This gave it a unique position in an educational system which differentiated sharply between the humanities and the sciences, a point which its advocates eagerly seized. Thus James Fairgrieve : 'Geography is at once a science and a humane study. It requires at once the accuracy of scientific work and the sympathy which comes from the humanities.'(49) Nunn's committee made the same point : 'Geography is a scientific as well as a humanistic study.'(50) The Board of Education recognised the special position of geography by putting it into an individual category in its classification of 'courses of advanced instruction'.(51)

It was, in fact, often suggested that geography could serve as a bridge between the sciences and the humanities and so present students with a more unified view of knowledge. Halford Mackinder made this point in his above-quoted article :

> If our aim is to give unity to the outlook of our pupils, and to stop that pigeon-holing of subjects in their minds which has prevailed in the past, then Geography is admirably fitted as a correlating medium. It may very easily be made the pivot on which the other subjects may hang, and hang together. (52)

Nunn's committee similarly pointed out that 'the natural and biological sciences, applied science, and history, as well as literature, art, and the social sciences, often demand or reflect a geographical setting.'(53)

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48. B.A.R., (1923), 324.
49. James Fairgrieve in John Adams, op. cit., p.262.
50. B.A.R., (1923), 330.
51. See chapter XII, n.19 below.
52. Halford Mackinder, art. cit., p.382.
53. B.A.R., (1923), 329.

John McFarlane, head of the geography department at Aberdeen and originally a successful history student, likewise observed : 'Educationally Geography occupies a special position linking up as no other subject does the scientific and humanistic aspect of intellectual activity.'[54]

Under these circumstances the general science movement was an obvious target for the attention of geography teachers. Richard Gregory, himself the author of geography text-books and president of the Geographical Association in 1924, used his presidential address to Section L in 1922 to suggest that geography might be made the basis of a general science course :

> General science should be more than an amorphous collection of topics from physics and chemistry, with a little natural history thrown in as a sop to biologists. It should provide for good reading (55) as well as for educational observation and experiment; should be humanistic as well as scientific. The subject which above all others has this double aspect is geography. ... Practically all the subjects of a broad course of general science are of geographical significance, inasmuch as they are concerned with the earth as man's dwelling-place, and the scene of his activities. (56)

In 1923, during a discussion on the first report of Nunn's committee, Gregory again argued that geography, 'as the science concerned with the earth as the home of man and the scene of his activities', offered a sound basis on which to construct a general science course. Such a course would 'give human interest to science teaching and be closely connected with scientific needs of geography'. Although he gained some support for this idea, there was doubt as to whether a course based on geography would give adequate coverage to other sciences : the guardians of physics and chemistry, for example, would not be likely to accept a scheme in which only those aspects of their subjects which were necessary for an understanding of geographical principles would be included.[57]

There is a paradox underlying the assumptions behind the cultural claims of geography which seems to have escaped attention during the period under review but which should, nevertheless, be mentioned. The

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54. B.A.R., (1928), 642.
55. Much of Gregory's address was concerned with pointing out that heuristic practical work was not the only means of acquiring scientific knowledge.
56. B.A.R., (1922), 209.
57. The discussion was not published in B.A.R., but see J. of Ed., 55, (1923), 716.

cultural values of science as a whole were said to be such that science should be regarded as a humanity : that there was no fundamental opposition between the two branches of learning. On the other hand, geography was said to be unique as a bridge between the sciences and the humanities, which implies the existence of an opposition in need of bridging. The history of science, too, was sometimes described as having a bridging function. Too much talk of bridging, however, would create the impression that science actually was not a humanity. It could be argued that such was, indeed, the case, but that the values derived from science were nonetheless consonant with those derived from the humanities. This was, however, a far more difficult line to maintain than the argument that science, which had such a profound influence on the Weltanschauung of man, was essentially a humanity and that cultural consonance was thereby guaranteed. So it would appear that injudicious advocacy of the cultural values of geography, especially as an educational medium, was prejudicial to the general cause of reassuring the public about the cultural values of science as a whole. If nothing else, the paradox illustrates the complexity of trying to influence public attitudes in so intricate yet nebulous an area as culture.

Biology - as distinct from zoology or botany - provides a second example of a science whose educational status at the end of the First World War was abysmally low : it was not even recognised for School Certificate purposes until 1923. In chapter XIII I shall describe this situation in greater detail and discuss arguments based on the function of biology in training for citizenship which were used to advance the status of biology. Here I wish to look at the opportunities offered by the general science movement for advertising the cultural values of biology.

At the end of the First World War, science in boys' secondary schools consisted essentially in physics and chemistry. The challenge presented by the general science movement to broaden this basic curriculum implied that time would obviously have to be found for the inclusion of the biological sciences. The syllabuses prepared by Vassall, Sanderson and Nunn for the 1917 report of Gregory's Section L committee on science in secondary schools all gave serious consideration to biology. Nunn's syllabus, for example, allotted 50% of the time in the first year to biology, decreasing to 20% in the fourth year. Sanderson expressed its value in the following terms :

> The importance of biology in a scheme of general education cannot be overstated. It is the science which very closely

> touches the life of the nation, and its economic value is found in all directions. Every branch of knowledge in the years to come will be influenced by the study of biology, and the humane studies in history, economics, sociology will be re-written under the same.
>
> Biology should be an integral part of school studies, and take its place by the side of languages and mathematics. In the early years it should be taught to all.(58)

The general science movement clearly provided a vehicle for improving the position of biology in the school science curriculum.

The Science Masters' Association was very much alive to the cultural claims of biology as a serious school subject. For example, an article in the School Science Review at the end of 1928 argued :

> Biology has educational value both as discipline and as information. ... Its information is characterised by the humanistic element, which brings it into direct contact with the intellectual, aesthetic, moral and industrial life of the community.(59)

The chemist J. C. Philip, in his presidential address to the Association in 1930, described the poverty of an education based only on the physical sciences :

> No one who has been trained exclusively in the physical sciences can appreciate to the full the infinite beauty and variety of nature : he walks abroad, but in his lack of knowledge he misses the keen enjoyment of the naturalist : his outlook is restricted. ... It is regrettable that so many of our boys grow up without any knowledge whatsoever of the life sciences. ... Such a state of affairs is unfortunate on general and cultural grounds. (60)

Henry Cawthorne likewise suggested that only a science syllabus which gave adequate scope to biology could 'be made to reveal the wonders of nature and its essential unity, from which a greater reverence for life and living things may develop'.(61)

Similar statements about the cultural value of biology were made at the 1932 conference on 'Biology in education' organised by the British Social Hygiene Council(62):

> Surely a citizen is impoverished, just as a blind man

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58. B.A.R., (1917), 158.
59. E.W. Shann, 'Biology in secondary schools', S.S.R., 10, (December 1928), 126-133; p.126.
60. J.C. Philip, 'School science: its purpose and scope', S.S.R., 11, (March 1930), 169-180 ; pp.173-174.
61. Henry Cawthorne, 'Biology and the science syllabus', S.S.R., 12, (October 1930), 55-61 ; pp.56-57.
62. cf. n.20 above.

> is impoverished, if he understands nothing of the things about him and sees nothing of the beauty of living form. ... There can be no true appreciation of beauty which is quite divorced from the laws of life on which it depends or knowledge of its mode of development and its relation to the rest of the world. (63)
>
> The present tendency is towards more leisure for workers. Biology, in its widest sense, would be a great new source of joy and might help to fill that leisure in such a way that life could reveal its deeper meaning to many to whom it is now a mystery. (64)

Other aspects of culture were also discussed. Biology as a source of 'masterpieces of thought' was the inspiration for William Hardy's paper on 'The idea of progress', in which he attributed the concept of progress to the development of 'natural science and especially, perhaps, of biological thought mainly Darwinian'. He went on to speak of the 'great responsibility' for ensuring that natural science was sufficiently widely and well appreciated that such fruits might not be lost,' a responsibility which can be discharged only just so far as the average mind of the average man not only knows of the existence of natural knowledge, but also knows something of its powers and, above all, something of its limitations'.(65) The argument that biology should be taught on account of what it revealed about man's relation to the rest of Creation was put most forcefully by J. G. Crowther :

> The first reason for studying biology is cultural. Man cannot understand what he is, and how he came to be as he is, without appreciating himself as a biological entity. Without this fundamental knowledge, which is biological, he cannot be the conscious master of the civilised society he has made. It is the datum upon which civilised society is constructed. The possession of this pure biological knowledge is the mark of culture. (66)

There were, then, two concurrent processes : an attempt to argue the educational claims of biology on the basis of the cultural significance of the subject, and the movement for general science which offered a curriculum incorporating a great deal more biology than existing practice allowed. In 1929 Section L appointed a committee under the chairmanship

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63. J.G. Crowther, ed., Biology in education (Heinemann, 1933), pp.130-131 : paper by Walter Morley Fletcher.
64. ibid., p.35 : paper by G.W.Olive. On the 'problem of leisure', see further Brightman, 'Education and leisure in progressive life', Nature, 136, (30 November 1935), 847-849 and chapter III, p.57, chapter IV p.78 and chapter VII, p.166 above.
65. J.G.Crowther, op.cit., p.18.
66. ibid., p.4.

of, successively, Percy Nunn and Lilian J. Clarke[67] to investigate 'the teaching of General Science in schools, with special reference to the teaching of Biology'. Its report was presented at the 1933 meeting of the British Association.[68] It began with a comprehensive review of 'the growth of opinion in favour of Biology as a part of the general science work of a school' and then discussed the current status of the subject 'general science', defined as 'at least a study of living things, both plant and animal, together with physics and chemistry'. The data obtained on the position both of general science and of biology as an individual subject were only moderately encouraging, but the committee discerned what it called

> a general feeling of growing intensity that the traditional chemistry and physics or botany of the secondary school is insufficient educationally, and that instruction in biology should claim a portion of the time available for science. (69)

The committee strongly supported this feeling, emphasising the cultural value of a broadly conceived course of general science and the importance of its dissemination amongst all pupils :

> General Science should be taught in all secondary schools and on all 'sides' of such schools, inasmuch as a knowledge of General Science forms an essential part of a liberal education. It should be regarded as an essential element in a school curriculum, and after the elapse of an agreed number of years no School Certificate should be granted unless the school is certified as efficient in this respect.
>
> A course should not be called General Science unless it provides a coordinated survey of physics, chemistry and biology, using these words in a wide sense. (70)

The general science movement led to an increase in the amount of biology taught in secondary schools. The objective of this movement was to provide all pupils below the age of sixteen, and non-science specialists in the sixteen-eighteen age range, with a basic familiarity

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67. 1866-1934. Educated at University College, London. Head of science at James Allen's Girls' School, Dulwich, 1896-1926. Pioneered new methods of teaching botany through experimental work and described these methods at every opportunity. One of the first women to be elected F.L.S. and to join the General Committee of the British Association. Secretary of Section L, 1921-1926. Member of ten Section L research committees. See further J. of botany, 72, (1934), 112-113 and Nature, 133, (1934), 439-440.

68. B.A.R., (1933), 312-330. cf. Nature, 132, (7 October 1933), 531.

69. ibid., p.328.

70. ibid., p.329.

with the culture of science. This conflicted, however, with the traditional subject maintenance objective, the idea that the function of science education was primarily to train future professional scientists. The Nunn / Clarke committee noticed this difficulty and remarked that it was exacerbated by the attitudes of universities : 'General Science including biology is not accepted for matriculation in most universities, whereas physics and chemistry are.'(71) The introduction of biology teaching as an integral part of a unified course of general science was not an acceptable alternative to the specialised teaching of biology as an individual subject, despite strong arguments that, at least below sixteen, the demands of all-round education should be given precedence over pre-professional training. During the late 1930s and early 1940s, and more particularly after the publication of the Percy (1945) and Barlow (1946) reports dealing with scientific manpower, the latter objective came to be the dominant one. The exaltation of the subject maintenance function of biology teaching over the cultural function was a factor in the postwar decline of the general science movement.(72)

The third discipline which made use of the general science movement to advance its claims as a medium of cultural education was geology. The subject was included, for example, in Percy Nunn's 1917 syllabus in a subordinate capacity.(73) W. A. Parks' account of the cultural values of geology in his 1925 presidential address to Section C has already been mentioned.(74) P. G. H. Boswell embarked on the same theme in 1932 : 'The value of geology as a cultural subject has frequently been emphasised. For the breadth of view it engenders and the enthusiasm it inspires, it should find a place in the curriculum of every university student.' He went on to show how geology influenced the study of such sciences as astronomy, geophysics, biology, geography and civil engineering.(75) Within the British Association the question of the educational value of geology was, however, considered chiefly in the years after 1935.

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71. ibid., p.321.
72. See E. W. Jenkins, op. cit. (n.40 above), chap III.
73. B.A.R., (1917), 160-172; cf. John Adams, op. cit., (n.43 above), pp.190-191.
74. See nn. 17-18 above.
75. Boswell, presidential address to Section C, B.A.R., (1932), 57-88, esp. pp.59-63.

As early as 1903 W. W. Watts had devoted a presidential address to Section C to the rôle of geology in education. It was therefore appropriate that in 1935, the year of his presidency of the British Association, Section C should hold a detailed discussion on geology in schools.[76] Subsequently a committee under Watts was established to investigate the matter further. It presented reports in 1936[77] and 1937.[78] The first report attracted the attention of some members of Section L, who asked for more detailed syllabuses to be constructed; this was done in the second report though, like the first, it was prepared solely by professional geologists. A joint meeting of the two Sections discussed the second report in 1937.[79] For convenience I shall deal with all these events together.

The whole exercise was conducted at the initiative of the geologists, and it is clear that they were worried primarily at the outlook for their profession :

> There are scarcely twenty secondary schools in England and Wales where geology is taught, even to small numbers of pupils, as a full science subject. ...
>
> There is now real danger that, apart from those preparing for careers as miners or engineers, there may be very few students in geology at most Universities within the next generation. The reaction of this upon the progress of the science in this country, upon thought, research, and teaching must be disastrous.[80]

The geologists therefore passed a resolution calling the attention of the British Association Council to the 1936 report of Watts' committee and adding :

> Enquiries have shown that the subject is practically excluded from all but a few schools. This is already producing a dearth of able students at the universities, with a consequent narrowing of the basis of recruitment for professional geologists, and it is likely to produce a decline in the standard of research in this country.[81]

The Council reacted favourably : it circulated the committee's reports to appropriate educational authorities, expressing the hope that 'careful consideration would be given to the question of introducing geology into

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76. B.A.R., (1935), 378-381; cf. Nature, 136, (2 November 1935), 708-709.

77. B.A.R., (1936), 291-295.

78. B.A.R., (1937), 281-290; cf. T.L.Green, The teaching and learning of biology in secondary schools (Allman, 1949), pp.148-149.

79. ibid., pp.359-361.

80. B.A.R., (1936), 291-292.

81. ibid., p. lxi.

the school curriculum, either by inclusion in a course of general elementary science or as a separate subject'.(82)

It was widely agreed that it would be inappropriate to press for the introduction of geology as a separate subject in secondary schools. The general science movement, however, offered more promising openings. The Watts committee gave its strong support to 'the view that instruction in General Science should form an essential part of a liberal education' and suggested that geology should occupy one-sixth of the general science course.(83) But in order to argue that geology should form part of the course at all, it was necessary to couch its claims in cultural rather than in subject maintenance terms. So Section C placed its greatest emphasis on the cultural values of geology; indeed, it was stated that 'the introduction of Geology into schools is advocated by the [Watts] Committee chiefly on cultural grounds.'(84)

It was already becoming evident that the difficulties of constructing a unified syllabus out of physics, chemistry and biology were very considerable. The geologists suggested that their own subject might be used as the common basis to which the other sciences could cohere : that its inclusion would resolve rather than exacerbate the problems of general science. Building perhaps on Boswell's 1932 address, the Watts committee - of which Boswell was a member - argued :

> Geology has contacts with every other science, and its study may be advantageously linked with courses in chemistry, biology and geography. It might well be used as a starting-point in the study of science generally. ...
>
> The inclusion of some geology in [general science] syllabuses would be of much service, as it would be very helpful in building up a synthesis of the other sciences.(85)

A. E. Trueman, secretary of the Watts committee and professor of geology at Bristol, pointed out how geology gave ready access to other branches of science :

> It affords opportunities to develop a scientific outlook even in those who do not carry their study of science to a higher stage. ... A pupil knowing nothing of other sciences may make a beginning with geology, yet this subject has so many

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82. B.A.R., (1937), xix; B.A.R., (1938), xx.
83. B.A.R., (1937), 284.
84. ibid., p.282.
85. B.A.R., (1936), 292, 294.

> contacts with every science that it forms a natural part of any scheme of general science.(86)

In sympathy with the objective of general science that it should broaden the pupils' outlook, it was frequently suggested that geology was peculiarly effective in this respect. This element of the cultural value of geology related both to the importance of an enhanced appreciation of natural beauty and to the 'problem of leisure',[87] each of which were also involved in the educational claims of biology. In the 1935 discussion Trueman argued that geology was 'likely to afford a more lasting interest to many than corresponding periods spent in chemistry and physics'. M. E. Tomlinson, a geography mistress, spoke on the same theme :

> The study of Geology should be available for school pupils, particularly those who do not proceed to a university, since it creates an interest in phenomena out of doors, which may well develop into a lasting life interest. It ... will undoubtedly contribute to the happiness of the individual by helping him to a satisfying means of enjoying his leisure, now too often spent indoors with cinema and jazz.(88)

The first report of the Watts committee endorsed this claim :

> Geology has an appeal to which many students, even quite young ones, readily respond, and an interest then roused and stimulated almost invariably outlasts school-days. It gives a definite practical outlet, takes them out of doors, and provides a pursuit which can be followed in school journeys, in the leisure time of holidays, and through the opportunities afforded by travel.(89)

A third cultural claim of geology relates to its impact on the Weltanschauung of man, which W. A. Parks had described in 1925. This was included amongst the justifications for geology teaching advanced by the Watts committee :

> For any educated person some acquaintance with the outlines of geology is essential, for some of the most profound changes in thought have resulted from the growth of geological knowledge.(90)

A. E. Truman made the same point in the 1937 discussion between the geology and education Sections :

> It is claimed that some knowledge of the outlines of geology is an essential part of a liberal education, for some of the most profound changes in thought have resulted from the growth of the science.(91)

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86. B.A.R., (1937), 360.
87. See n.64 above.
88. B.A.R., (1935), 380.
89. B.A.R., (1936), 292.
90. ibid.
91. B.A.R., (1937), 360.

This argument was, however, less frequently used than the other two previously mentioned.

Although they were primarily interested in subject maintenance, the British Association geologists were able to make out a fairly strong case, based on cultural considerations, for the inclusion of their subject in schemes of general science designed to give all pupils up to School Certificate level an acquaintance with the broad culture of science. The first report of the Watts committee was presented in September 1936, but it did not actually appear in print until the publication of the British Association Annual Report in the early months of 1937. During the intervening December the sub-committee of the Science Masters' Association investigating the teaching of general science published its interim report.(92) It gave little encouragement to the geologists :

> Despite their obvious claims to inclusion, we decided to omit specific mention of Geology and Astronomy from the syllabus we now present, the shortness of the available time being one of the chief reasons. (93)

This moved Trueman to write a letter to Nature pointing out that the sub-committee's own definition of general science - 'a course of scientific study and investigation which has its roots in the common experience of children and does not exclude any of the fundamental special sciences'(94) - was incompatible with its disregard of geology.(95) Some compensation was thereupon provided in the sub-committee's final report, which introduced geology as one of ten schemes of 'optional work'.(96) The general science movement, then, did provide for a slight improvement in the status of geology in secondary education.

Reverting to general science as a whole, it was becoming evident after a decade of effort that the subject had made neither the quantitative nor the qualitative progress which its advocates had hoped. Gregory's committee on science in School Certificate examinations found that in

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92. Science Masters' Association, The teaching of general science : part I (John Murray, 1936), Hereafter cited as T.G.S.I. cf. Nature, 138, (19 December 1936), 1030-1031.
93. ibid., p.34.
94. ibid., pp. 16, 30.
95. Nature, 139, (6 February 1937), 251.
96. Science Masters' Association, The teaching of general science : part II (John Murray, 1938), pp.40-43, 78-79. Hereafter cited as T.G.S. II.

1926 only 2.5% of School Certificate candidates offered general science, as compared with 25% for each of botany and physics and 40% for chemistry.[97] Moreover, as the Nunn / Clarke committee discovered,

> General Science is usually taken as an introduction for pupils of ages 11-13, and further, it is clear ... that in many schools 'General Science' is taken to mean chemistry and physics only. (98)

This conflicted with the original intention that the subject should be taken right up to School Certificate level (i.e. to the age of 16) and that it should comprise a good deal more than traditional chemistry and physics.

By 1933 the Science Masters' Association recognised that the position of general science was in need of review, and it appointed a sub-committee which recommended that the subject be made compulsory for all pupils taking the general schools examination.[99] In 1935 a more substantial sub-committee under the chairmanship of C. L. Bryant, assistant science master at Harrow, was established 'to consider the problems presented to teachers in Secondary Schools by the introduction of courses in General Science as a constituent of general education'.[100] In its interim report published in December 1936, this sub-committee went to some lengths to consider the aims of science teaching. The strict subject maintenance aim it rejected as wholly inappropriate to the work of a secondary school, though it pointed out that a broad course of general science would be more likely than existing narrow courses to arouse the interests of children, particularly in sciences other than physics and chemistry, and that this would help to secure an adequate supply of students for such sciences at university level. The 'disciplinarian' or mind-training aim it regarded as too dubious a proposition to constitute a viable function of science teaching. This, too, was turned to account in staking the claims of general science :

> It is no longer possible to defend a narrow curriculum by urging the claim that it "trains boys to think and to appreciate scientific method". ... The psychological findings, on which the above remarks are based, remove one of the last arguments against the wider acceptance of courses in General Science. (101)

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97. B.A.R., (1928), 525.
98. B.A.R., (1933), 319.
99. See E.W. Jenkins, op. cit. (n.40 above), chap. III.
100. T.G.S. I, p.3.
101. ibid., p.14. On the psychological theory of transfer of training, see chapter XIII, pp. 341-343 below.

That left only the cultural aim of science teaching and it was here, according to the Bryant sub-committee, that general science really came into its own :

> No one can now be considered truly cultured, no one can be considered as having felt the European spirit at its best, if he has never had his imagination stirred by that great adventure of ideas on which we are engaged : the scientific exploration of natural phenomena. Of all the claims made for the inclusion of Science in a school curriculum, the strongest undoubtedly is that which stresses the cultural value which the subject possesses. (102)

'These are noble sentiments', commented Nature, 'finely expressed; they represent the true spirit in which science should be taught.'(103) The Association of Women Science Teachers, too, gave its 'ready assent' to the notion that the principal aim of science teaching should be the cultural one and that this could be achieved most effectively through general science.(104)

Both the Spens (1938) and the Norwood (1943) Reports ostensibly gave warm support to the general science movement. The former nevertheless 'seriously underestimated the potential of the subject as a vehicle of liberal education'(105) : it looked to the literary parts of the curriculum to provide the bulk of the cultural education, and it allocated less time to general science than to the more formal science courses. One of the essential conditions governing the effectiveness of general science as a medium of cultural education was that it should be taught as a single coherent whole, preferably by a single teacher. Yet in evidence to the Norwood Committee the Science Masters' Association stated :

> It would be true to say that a school is teaching General Science even if its pupils study Physics, Chemistry and Biology separately with separate teachers, do some Geology as part of their Geography course, and take separate subjects in S.C., not the subject General Science.(106)

The contrast between this statement and the basic principles of the Association's earlier publications illustrates its failure to solve the central problems of general science. Although the subject made very

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102. ibid., pp.14-15.
103. Nature, 138, (19 December 1936), 1031.
104. T.G.S. II, p.18.
105. See E.W. Jenkins, n.40 above.
106. S.S.R., 24, (1942), 97.

considerable progress under the peculiar circumstances of wartime, after 1945, especially in the grammar schools, it came increasingly to be used simply as a brief introduction to the specialised study of individual sciences. Eventually, by the mid-1970s, it had virtually disappeared as an O-level subject.(107) The cultural function of science education was unable to displace the subject maintenance function, even for children below the age of sixteen.

Finally, I wish to look briefly at how the British Association sought to make use of adult education to promote awareness of the cultural values of science. At the 1932 York meeting Richard Gregory suggested to the organising committee of Section L that it cooperate with the Workers' Educational Association, which was then investigating the place of science in its activities.(108) The Section recognised that this could contribute to the wider question of influencing public attitudes to science and appointed a research committee under J. L. Myres 'to consider the position of science teaching in adult educational classes, and to suggest possible means of promoting through them closer contact between scientific achievement and social development'. The committee presented a report the following year.(109)

It is clear from this report that the committee was motivated primarily by the need to overcome public apathy and antipathy towards science. Thus it remarked that despite fairly extensive opportunities for learning about science,

> the number is probably still large who, by reason of geographical circumstances, of mental aptitude, of temperament, and of upbringing, regard science and its works with casualness, suspicion, and hostility - even with contempt. ...
>
> What can be done for those whose early training left them uninterested in science, or critical of it ?(110)

The report observed that 'since 1921 there has been very little active propaganda on behalf of science'(111) and Nature similarly suggested :

> It would perhaps be well if scientific workers made in the near future an unprecedented attempt to organise the

107. See E.W.Jenkins, n.40 above.
108. Section L minutes, 2 September 1932; B.A.R., (1933), 332.
109. B.A.R., (1933), 330-357.
110. ibid., p.331. cf. The Listener, 13 September 1933, p.376.
111. ibid., p.348.

> propagandist and interpretative side of science, and to see their problem of publicity as a whole in which the adult educational class has its essential place.(112)

The Myres committee found that many fewer courses were conducted in science than, for example, in literature, history, economics, sociology or philosophy and psychology, and reported 'a general impression that scientific subjects have not recently held the place in adult education that might have been expected in view of the large (and ever-growing) influence of scientific achievements on the general course of events, and especially on social development'.(113) Apart from practical reasons for this, the committee pointed out that courses which were too formal and academic, too closely modelled on university teaching, were liable to lose their audiences, whereas

> in all cases when the approach is made along popular lines - when the courses deal, frankly and simply, with the real issues of life, and touch the everyday experience of the students - classes are well attended and high enthusiasm is engendered.(114)

There appeared, then, to be a market for science in adult education, provided that the courses could be made to relate fairly explicitly to the experience and interests of the students. One way of doing this was to begin with the technology of local industry or with scientific hobbies, from wireless to the breeding of pets, and proceed to the underlying scientific principles. Another, as Charles Singer suggested, was to concentrate on the history of science so as to show that the most important feature of the history of civilisation in the previous three centuries was the rise of science. The historical approach, which could be based on the study of the lives of certain outstanding scientists and might include demonstration of their key experiments, would show 'the differences science has made, (a) in our way of thinking, and (b) in our way of living' and would 'give a human interest to science'.(115)

In considering the aims and purpose of science teaching in adult education, the Myres committee found a preponderant emphasis on its cultural aspects.(116) This was expressed in a number of ways. The theme of the influence of science on man's Weltanschauung was mentioned several times, both in terms of showing the historical influence on man-

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112. L.A.Fenn, 'Science for citizenship', Nature, 132, (14 October 1933), 581-583; p.583. cf. chapter IV, n.65 above.

113. B.A.R., (1933), 331.

114. ibid., p.338.

115. ibid., p.347.

116. ibid., pp.344-347.

kind as a whole and in terms of furnishing 'experience which each individual may correlate with his whole experience to form his philosophy of life'. The impact of science on society, 'the part which science and scientific achievement and method have played and may play in moulding human society of to-day', recurred frequently and suggested that adult education was an important forum in which to pursue the social relations of science debate. A third popular theme was education for leisure, the use of science teaching to bring a deeper and more fulfilling dimension to leisure activites. These themes all illustrated the cultural significance of science, insofar as they showed how science contributed to the intellectual and social environment and how it could lead to a fuller appreciation of the richness of life. A symposium in Section L on 'the cultural value of science in adult education' at the 1933 meeting reiterated these arguments.(117)

The Myres committee intended to produce a second report containing specimen syllabuses showing how the aims it had elaborated could be worked out in practice. The senior secretary of Section L, George Dunkerley, insisted that this report be ready in time for the 1934 meeting of the British Association, but in the event the members of the committee were too busy to carry out this task and the committee was suspended.(118) In 1936, however, the president of Section L, Richard Livingstone, used his address to direct attention again to the tremendous cultural importance of adult education.(119) Subsequently the committee was reconvened, now with the philosopher A. W. Pickard-Cambridge, president of Section L in 1935, as chairman and a fresh set of members : only Richard Gregory remained from the original Myres committee. A report was presented in 1937.

The bulk of the report consisted in the specimen syllabuses, prefaced by some detailed statistics showing 'the very modest position' of science in adult education. The committee also produced a seven-point statement on the aims of science teaching in adult education. Two of the points were concerned with mental training and four others could be classified under the broad heading of culture. The <u>Weltanschauung</u>

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117. ibid., pp. 568-569.

118. See the J. L. Myres papers at the Bodleian Library, box marked 'B. A. - Science in adult education'.

119. <u>B. A. R.</u>, (1936), 228-232; cf. J. Wickham Murray, 'The future in education', <u>Nature</u>, <u>138</u>, (10 October 1936), 601-602.

aspect of culture was said to be one of the aims of science teaching : 'It is a cultural activity that broadens the student's outlook and encourages him to seek an understanding of the fundamental facts of life. He is thus led to co-ordinate and synthesise his knowledge.' The impact of science on the social environment was another theme :

> A student will be led to recognise the part played by science and scientific achievement in moulding the society of to-day, and he will thus acquire a fuller understanding of human activity and of the manifold aspects of social development.
>
> By apprehending the impact of science on the life of the community, a student will appreciate many of the forces that are continually re-shaping the fabric of our social life.

The value of science for a more fulfilling leisure was also mentioned :

> The teaching of science provides knowledge likely to be of interest throughout life, by giving a wider meaning to personal experience and to the observation of natural phenomena, and a keener apprehension of the general principles underlying the structure of our material environment. In this sense a wise use of leisure is fostered.(120)

The British Association, then, made use of adult education, as it made use of secondary education, both to impress upon the public that science made major contributions to the cultural life of the nation and to render these contributions accessible to the non-scientist. By laying stress on the cultural values of science it showed that the influence of science on society was not confined to the effects - good and bad - of its applications but extended to matters touching the deepest issues of human existence and aspiration. In Part I I have shown how the British Association was motivated in its attempts to influence public attitudes to science by the need to generate an atmosphere hospitable to the further advancement of science. It seems to me that its efforts to disseminate the cultural values of science by means of the educational system may best be interpreted as an aspect of this wider undertaking.

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120. B.A.R., (1937), 309. cf. chapter XIII, pp.354-355 below.

Chapter XI

Education for citizenship

In order to provide a context for subsequent discussion of the argument that one of the functions of the educational system, and of science in the educational system, was to promote responsible citizenship, I want in more general terms to look at the concept of 'education for citizenship', and in particular to examine the notion that citizenship could be taught explicitly. This was thoroughly investigated by Section L at the beginning of the nineteen-twenties and, though rejected by the bulk of educational opinion at the time, was resurrected in the mid-thirties. It is necessary first to give a brief account of the political atmosphere which seemed to make the issue one of some urgency.

Perhaps the most striking feature of the immediate postwar years was the speed with which the idealism of war-time collapsed into disillusion and cynicism.[1] Both in international relations and in the internal affairs of this country, the new order conspicuously failed to emerge : the old, with a minimum of alteration, reasserted itself in an environment no longer suited to its ways. Inter-allied harmony had been disrupted even before the end of the war, with the Russian revolution of 1917 ; in 1918 and 1919 British, French and American troops were sent to several parts of Russia in generally futile attempts at anti-Bolshevist intervention, and in 1920 they were almost drawn into the Polish-Russian war. Idealism was further undermined at the Paris peace conference : the veneer of international altruism provided by the League of Nations was not proof against the anti-German vindictiveness which characterised the proceedings. Under such circumstances the inevitable outcome was 'the peace to end peace'. Cooperation

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1. The sources used for the next seven paragraphs are :
   - (i) Encyclopaedia Britannica, fourteenth edition (1929) (1938 impression) - articles on 'Strikes and lock-outs', 'Trades Union Congress' and 'Trade Unions' ;
   - (ii) Robert Graves & Alan Hodge, The long weekend : a social history of Great Britain, 1918-1939 (Faber, 1940) ;
   - (iii) Arthur Marwick, The deluge. British society and the First World War (Bodley Head, 1965 ; Macmillan, 1973) ;
   - (iv) Mowat, Britain ; and
   - (v) A. J. P. Taylor, English history, 1914-1945 (Clarendon Press, 1965).

even between the allies was minimal in some important areas; Lloyd George and Woodrow Wilson, for example, tried to take a moderate line on the divisive issue of German reparations, while Clemenceau set out to cripple France's traditional enemy as a safeguard against future aggression. The American Senate failed to ratify the treaty, thus emphasising allied dis-unity. Moreover, no general agreement was reached on the very complex question of inter-allied war debts, which continued to haunt international relations for many years.

The coherence of the Empire was little stronger than that of the allies. In India, where the civil disobedience campaign of Mahatma Gandhi reached its zenith in 1921, the British presence was becoming increasingly fraught. Countries which had already attained Dominion status were beginning to assert their independence : Canada, for example, refused to support the British line over the Chanak crisis, and at the Washington naval conference of 1921-22 Australia and New Zealand successfully opposed British policy towards Japan. Nearer home the Irish, recovered from the bloody uprising of Easter 1916, were again flexing their muscles and the British army was soon involved in an ugly civil war that ended only in December 1921, with the Irish Free State formally coming into existence a year later.

The ending of the war was a long drawn out affair. Carefully laid plans for demobilisation provoked mutiny and were hurriedly abandoned; Winston Churchill devised a much simpler plan by which four million men were released in a year, but in February 1920 there were still 125,000 men awaiting demobilisation. Military activity in the Middle East dragged on till the Chanak crisis of 1922. Food rationing continued till November 1920. The delay in the legal termination of the war had serious consequences for the implementation of one of the principal clauses of the 1918 Education Act - the raising of the school leaving age to fourteen without exemption.(2)

The industrial front seemed distinctly threatening. The 'triple alliance' of miners, railwaymen and dockers, which had been making aggressive noises in the summer of 1914, was revived, though in the event the separate components acted independently. The miners were temporarily bought off by the Sankey Commission, whose divided second report (June 1919) allowed Lloyd George to shelve the great issue of nationalisation. The railwaymen struck in September 1919; they were

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2. Brian Simon, The politics of educational reform 1920-1940 (Lawrence & Wishart, 1974), pp.32-33.

charged by the government with an 'anarchist conspiracy', patriotic citizens were enrolled as volunteer guards, newspapers treated the affair as the threatened revolution; but the railwaymen organised their own highly effective publicity and attained their objective, which was nothing more drastic than maintenance of existing wage rates. Even the police came out, in protest against non-recognition of their union, in August 1919; the establishment press, using the inflammatory language of 'mutiny' and 'desertion', managed to suppress the fact that there was wide-spread sympathy for the police, and the strike fizzled out with little result other than dismissal of the strikers. 34,970,000 working days were lost in 1919 through industrial action: with the exception of 1912, much the worst annual tally for decades. Trade union membership reached a new record of eight and a third million in 1920, of whom six and a half million were affiliated to the T.U.C.

The economic boom collapsed during the winter of 1920-21. Unemployment doubled between December and March and passed the two million mark in June. The government's reaction was to accelerate its policy of decontrol. The mines reverted to their former owners on 31 March 1921 ; they immediately cut wages and restored district differentials. The miners, predictably, objected and, equally predictably, were locked out. In an atmosphere threatening civil war a general strike was called, postponed for three days (until 16 April) and cancelled at the last moment, wrecking the triple alliance in the process. The miners carried on for three bitter months but, 'to the general rejoicing of the educated, prosperous classes', were forced to accept terms 'which now seem to us, less than half a century afterwards, as remote and barbaric as serfdom'.(3) Thereafter no group of workers was successful in resisting wage reductions. But not for lack of trying: in 1921 85,870,000 working days were lost through industrial action, the second worst total in the history of the country. This figure fell below twenty million in 1922 and below eleven million in 1923. It is interesting that trade union membership fell by 20% in 1921 and by a further 15% in 1922. A.J.P. Taylor describes 1922 as 'the first orderly year which Great Britain had known since the outbreak of war.'.(4)

There was bitterness, too, on the political front. The establishment tried to tar the Labour party with the brush of bolshevism, Lloyd

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3. A.J.P. Taylor, op. cit., p.146.

4. ibid., p.163.

George castigating it as 'run by the extreme pacifist, Bolshevist group'[5] during the 'coupon' election of 1918. The smear did the party little harm : it campaigned with the growing support of a war-weary population against anti-bolshevist intervention[6] while at the same time emphatically rejecting the advances of the British communist party (founded in July 1920), and it steadily increased its representation in the Commons, from 42 in December 1910 to 59 in 1918, 142 in 1922 and a minority government with 191 members in December 1923. There were, nevertheless, a few incidents during the immediate postwar years which served to inflate the bolshevist bogey to apparently alarming proportions. Particularly ominous was the Clydeside general strike of January 1919, during which the red flag was run up the municipal flagpole and troops with tanks were moved in to suppress the rioters. Another affair demonstrating political use of the strike weapon occurred in May 1920, when dockers, suspecting that her cargo of munitions was destined for use by the Poles against the Russians, prevented the Jolly George from sailing. The only remotely socialist newspaper, the Daily Herald, resumed daily publication in 1919 and quickly reached a circulation of 330,000 ; but it was alternately ignored and attacked as extremist, it was boycotted by advertisers and it was in constant financial trouble till its association with Odhams in 1929.

The parliament elected in December 1918 was overwhelmingly conservative, in both senses of the word. This goes some way towards explaining both its heavy-handed approach to strikes and its failure to set in motion any whole-hearted programme of reconstruction such as had been mooted during the war. The era before 1914 beckoned across the intervening years of devastation with a fascination greatly more alluring than any vision of a new society. During the war the

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5. Arthur Marwick, op. cit., p.263, points out the contradiction between pacifism and bolshevism, the latter being personified in the popular imagination by a 'bloodthirsty bearded cossack', and remarks that the contradiction went unnoticed. Both adjectives were terms of abuse : pacifism was seen as the opposite of patriotism (by the Representation of the People Act, 1918, all conscientious objectors were disenfranchised for five years, the Lords having amended a clause originally stipulating indefinite disenfranchisement), and bolshevism was equated with anarchy.

6. Working class solidarity was not the chief motive in this. More than other parties, Labour extended active sympathy to pacifists - at considerable electoral cost - and espoused the cause of internationalism, for example in giving valuable support to the League of Nations and in attacking, with considerable courage, the vindictiveness of the treaty of Versailles long before it was fashionable to do so.

State acquired a vast array of powers over the community and the individual; afterwards, instead of permanently establishing some measure of collectivism, it returned to the good old days of private enterprise. What took the edge off any movement for reform was the postwar economic boom, with its accompanying inflation : between 1914 and 1920 the cost of living rose by 75% - mostly in 1919-20 - but the average income of all working class families rose by 100%. The boom also served to absorb the bulk of demobilised servicemen, so that massive unemployment - always a powerful catalyst of change - was at least temporarily avoided. What stifled any remaining drive towards reform, notably in the educational world, was the subsequent slump and panic economy measures. Yet to the credit of this government stand two seminal, albeit unwitting, pieces of social legislation : the Housing and Town Planning Act of 1919, which introduced State responsibility for house-building, and the Unemployment Insurance Act of 1920, which extended the principles of the 1911 Act to virtually the entire working class.

It was thus under somewhat fraught circumstances that, in September 1919, the British Association gathered at Bournemouth for its first annual meeting in three years. The shadow of war naturally hung over the proceedings : nearly all the sectional addresses included an analysis of the contributions made by their respective disciplines to the conduct of the war and of the accompanying upheavals in their social standing. Napier Shaw,(7) addressing Section L, was particularly concerned about the sudden demise of public spirit at the cessation of hostilities : 'The stimulating drama of the war in which good strove with evil gave place to the new conflicts which have the characteristics of real tragedy. ... after a foretaste of a league of nations we found ourselves in a welter of jealousies, animosities, and struggles at home and abroad.'(8)

7. 1854-1945. Educated at King Edward's School, Birmingham and Emmanuel College, Cambridge. Lecturer in experimental physics at the Cavendish, 1877-1899. Secretary of the Meteorological Council, 1899-1905; director of the Meteorological Office, 1905-1920; professor of meteorology at Imperial College, 1920-1923. F.R.S. President of Section A, 1908, and of Section L, 1919. Member of the Council of the British Association, 1895-1900, 1904-1907.

8. B.A.R., (1919), 349.

He looked to the teaching profession to revive the moral fibre of the nation : 'The educational corporations ought to show us the ideals of the principles and practice of a new code of conduct.'[9]

With this in mind a discussion on 'training in citizenship' was held which attracted over two hundred listeners - the largest audience of the day.[10] Only two of the speeches were published, those by Bishop J. E. C. Welldon[11] and Robert Baden-Powell.[12] Welldon started boldly with the assertion that a united teaching profession could achieve any pre-agreed social object : it could create a nation of Huns or of heroes. The task he prescribed for education was to heal the many divisions within the community, a task for which it was especially suited now that the system was increasingly facilitating social mobility. Unity, or at least mutual understanding and tolerance, had to be attained between those of differing political or religious views. Unity was urgently required on the industrial front : 'Something must be done ... to create a fellow-feeling between capital and labour.' A common love for the country had to be engendered : 'The schools - and above all the elementary schools - must teach an enlightened patriotism.' Loyalty on a larger scale was also to be fostered : 'The children must be made to understand the dignity, as well as the history, of the Empire.' Baden-Powell, on the other hand, was more interested in out-of-school activities and used the platform to expound the virtues of his scouting system as a means of producing 'efficient and human citizens'.[13]

These objectives, and the differing means proposed for their realisation, were examined in great detail by the committee which was set up at the end of the meeting under Welldon's chairmanship with the general brief

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9. ibid., p.350

10. The Times, 13 September 1919, p.14.

11. 1854-1937. Educated at Eton and King's College, Cambridge, where he enjoyed a dazzling career as a classical scholar. Lecturer and tutor at King's, 1878-1883. Headmaster of Dulwich, 1883-1885, and of Harrow, 1885-1898. 'At Harrow he established his fame as a great schoolmaster.' (D.N.B.) Bishop of Calcutta, 1898-1902; Canon of Westminster, 1902-1906; Dean of Manchester, 1906-1918; Bishop of Durham, 1918-1933. Deputy chairman of the Manchester Education Committee. President of Section L, 1911.

12. 1857-1941. Educated at Charterhouse. Joined the army, 1876; retired a lieutenant-colonel in 1910. Defender of Mafeking, 1899-1900. Wrote Scouting for boys (1906). Founded the boy scout movement in 1908 and the girl guides in 1910. Raised to the peerage, 1929; O.M., 1937.

13. B.A.R., (1919), 360-361.

of 'training in citizenship'. Besides Welldon and Baden-Powell, the committee was made up of three practising schoolmasters, two university lecturers, four prominent educational administrators[14] and the newly appointed editor of Nature, Richard Gregory. Of the twelve members, at least nine were connected with public schools and/or Oxbridge, which fact may have had some influence on the tone of the reports they produced.

In the committee's first report, presented to Section L in 1920, both direct and indirect methods of training were discussed. Pride of place, however, went to the former, in the shape of a detailed 'syllabus of instruction in civics'.[15] The syllabus had two aims : to provide straightforward instruction in such matters as the history of civilisation, the mechanics of government and the administration of justice, and to teach those personal qualities which they felt to be essential to the good citizen. Welldon claimed that information he had received from schools indicated the 'pressing need' for a syllabus of civics, though one may wonder whether such explicit character-training as his syllabus provided was what his correspondents had intended.

It is not clear for which sector of the educational spectrum the committee's remarks were intended : different parts of the syllabus seem suited to different types of school, but no attempt was made in the arrangement of the syllabus to take this into account. When introducing the 1920 report, Welldon seemed to identify the lower classes as those most in need of the training he was proposing. Three quotations illustrate the drift of his thought :

> [Welldon] honoured the manual labourers who fought in the war, but if here and there the spontaneity of response of the Labour Party to the demands of the nation in the hour of need had been less evident than in other classes, he put it down in some measure to the want of the public school spirit in elementary schools.(16).

The argument that good citizenship involved willingness to do military service will be discussed in a moment. The urgent need for basic

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14. Respectively Cuthbert Blakiston, George Dunkerley and W.D. Eggar; Charles Fay and Lady Shaw; Maxwell Garnett, Spurley Hey, Miss E.P. Hughes and Theodore Morison.

15. The report was published in B.A.R., (1920), 281-320; the syllabus occupies pp.285-297. The syllabus was drawn up by Welldon and, after criticism by the committee, was expanded by Dunkerley.

16. The Times, 25 August 1920, p.14; also in T.E.S., 26 August 1920, p.468. cf. n.34 below.

loyalty to the country was reiterated, again with the implication that it was a quality in which the lower classes were deficient :

> So important is it, however, that children of both sexes in all schools, and not least in elementary schools, should be systematically taught to recognise their duty to the Nation and the Empire that the Committee feel the time is opportune for issuing an official handbook upon Civic Duty.(17)

Not merely 'civics' : 'Civic Duty' was the order of the day. A handbook of this nature would be valuable on the home front since, by 'inculcating the unselfish patriotic spirit', it would

> go far towards preventing, or at least mitigating, the industrial controversies now threatening to undermine the basis of society.(18)

There were three aspects of ensuring that the educational system functioned to maintain the stability of the country : keeping the teachers favourably disposed towards the existing order, preventing children from acquiring the wrong ideas and trying to equip them with the right ones. The first of these was the most effective weapon available to H.A.L. Fisher when, as president of the Board of Education, he had to defend his plans against the ravages of the Geddes committee.[19] Although the National Union of Teachers, the bulk of whose members were employed in elementary schools, declined to ally itself with the Labour party,[20] the formation of the Teachers' Labour League served to ensure that the threat of teacher militancy remained a factor in the thinking of, at least, Conservative politicians. One may note, however, that Welldon was uninhibited by such considerations and launched an extraordinary attack on the moral standards of the N.U.T. in a paper to Section L in 1923.[21]

That there was a danger of children being taught anti-social ideas may be illustrated by two episodes. One was a debate in the London Education Committee in November 1921, when a Mr. Watts, who 'disclaimed purely propagandist reasons for his remarkable resolution',

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17. B.A.R., (1920), 281.
18. ibid., p.282.
19. Brian Simon, (n.2), pp. 31, 32, 46-47.
20. Asher Tropp, The school teachers (Heinemann, 1957), pp.215-216.
21. Welldon, 'How far the value of education in elementary schools has corresponded with the increase of expenditure upon it', B.A.R., (1923), 499; see also T.E.S., 22 September 1923, pp. 419, 423 and 29 September 1923, p. 434.

proposed 'That as it is of the first importance that the youth of London should have a sound knowledge of that wonderful historical occurence, the Russian revolution and the period following to the present date, the Education Committee recommend the Council to issue a short history of the same, preferably written by Communists, or at least compiled mainly from Communist sources.' The motion was indignantly rejected by thirty-two votes to two, but led to a discussion of the problems of bias in the teaching of history. The T.E.S. warned sombrely: 'Mr Watts' action, however, is not without significance, and those whose work is concerned with the young adolescent would do well to be alert and watchful.'(22)

A second illustration is the rise of 'socialist' and 'proletarian' Sunday schools, some of which were communist-oriented and the source of much controversy. Questions were asked in Parliament respecting their legality, and in February 1922 John Butcher (a Conservative Unionist M.P., later Lord Danesfort and president of the British Empire Union) introduced his Seditious Teachings Bill, designed to 'prevent the perversion of the minds of children under the age of 16 by means of seditious teaching and revolutionary propaganda'. The Bill did not reach the statute book, but similar Bills were presented almost annually for the rest of the decade. The general tone is evident from Butcher's definition of sedition as the desire

> (a) to bring into hatred or contempt or to incite dissatisfaction against the King and Constitution of the United Kingdom or the administration of justice; or
>
> (b) to incite the King's subjects to attempt, otherwise than by lawful means, the alteration of the form of government as by law established; or
>
> (c) to promote feelings of ill-will and hostility between different classes of his Majesty's subjects.(23)

It is interesting that one of the arguments used against direct teaching of citizenship was the danger that the task might devolve upon a teacher 'unsuited' for it or that a local education authority might use

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22. T.E.S., 19 November 1921, p.515.

23. T.E.S., 25 March 1922, p.138; The Times, 11 February 1922, p.14; 22 April 1922, p.9; 1 August 1922, p.17; 4 July 1924, p.8; &c. See also Brian Simon, (n.2), pp. 71-74. It is interesting, and not without significance, that - according to the O.E.D. - the perjorative term 'bolshy', meaning 'left-wing; uncooperative, recalcitrant' came into use about this time. Its first such application occurs in D.H. Lawrence in 1918.

it for its own political ends.(24)

A highly eminent public school headmaster testified in 1929 that :

> Elementary education ... has, I think, been the main influence which has prevented Bolshevism, Communism, and theories of revolt and destruction from obtaining any real hold upon the people of this country.(25)

The objective of the Welldon committee was to render this influence more effective by making it more explicit and more direct : it was an attempt to supply the third of the three aspects just mentioned. It was to this end that the syllabus of instruction in civics was drawn up.

The key to the philosophy behind the syllabus is the concept of 'enlightened patriotism'. Patriotism is a difficult and somehow unfamiliar concept for the generation growing to adulthood in the nineteen-seventies, but at the end of the First World War it was a more self evident virtue. To the members of Welldon's committee it was, quite simply, 'the sentiment natural to civilised humanity' [15];(26) it was the 'spirit of service, sacrifice and sympathy' [15] ; it put country before self and humanity before country; it upheld the integrity of all nations equally. When the committee wrote that 'the British Empire is the greatest human institution under Heaven, the greatest secular organisation for good' [13], it was expressing not the creed of the narrow zealot but the considered, genuine and (at least in Britain'.) widely-held belief that the export of British judicial and constitutional integrity was of real value to many countries on their way to national maturity. It admitted the historical failures of imperialism and its contemporary difficulties : but these merely reinforced the need to uphold the dignity of the Empire and to ensure that it remained true to the highest standards.

A sense of enlightened patriotism was the prerequisite for national unity, that antidote to the apparent disintegration of British society

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24. See, for example, a speech by Lord Eustace Percy, then president of the Board of Education, to the North of England Education Conference : The Times, 7 January 1927, p.17. Also Guy Whitmarsh, Society and the school curriculum : the Association for Education in Citizenship, 1934-1957 (M.Ed. thesis, Birmingham, 1972), pp.19 ff.

25. Cyril Norwood, The English tradition of education (John Murray, 1929), p.171. Norwood was successively headmaster of Bristol G.S., 1906-1916, of Marlborough, 1916-1925, and of Harrow, 1926-1934 and was chairman of the Secondary Schools Examination Council, 1921-1946.

26. Numbers in parentheses will be used to locate quotations within the indicated sections of the syllabus. The syllabus itself may be found in B.A.R., (1920), 285-297.

for which Napier Shaw and Welldon had pleaded at the Bournemouth meeting. The sense of unity which had been experienced during the war had to be carried over into peacetime : it should be 'taught in schools and advocated from pulpits'. [14] The committee recognised that talk of national unity is fatuous in the presence of insurmountable class divisions : 'No hindrance to unity [is] greater than social or political privilege which cannot be overcome; caste [is] a bar to all progress.'[14] It therefore rejoiced that the 'glory of Great Britain [is] that the humblest citizen may rise to the highest places.'[14] Nevertheless, much still remained to be achieved, and the committee remarked on the 'duty of [the] community to sympathise with every effort of the workers to improve their conditions and develop their intelligence'.[16]

As Welldon made clear, the committee was worried about 'the industrial controversies now threatening to undermine the basis of society' and, in addition to the general cure sought in the promotion of good citizenship, the syllabus provided a detailed analysis of industry and commerce which stressed above all the necessity for 'restoring a friendly feeling and confidence among all persons engaged in the same industry'.[16] The basic idea was that both employer and employee should set aside personal ambitions and work together for the good of the nation - i.e., practise enlightened patriotism. Thus the issue of nationalisation, then particularly sensitive in the coal industry, was, the committee felt, 'not a question of right or wrong, but of expediency ... to be considered from [the] point of view of national, not sectional, interests'.[16](27)

While decontrol was the order of the day in the business world, the government was taking upon itself responsibilities for individual welfare of a magnitude far greater than it realised at the time.(28) Pausing only to wag its finger at those who tended to 'look upon the State as a dispenser of charities', the Welldon committee enthusiastically welcomed these developments. It regarded public health as very much the responsibility of the State and gave details of many areas in which public authorities had or ought to have had secured improvements. Welldon's concern here seems to have been motivated by the loss to the war

27. The failure of the Sankey Commission, whose second report of 20 June 1920 contained four unreconciled points of view, illustrates the difficulties.

28. C. L. Mowat, (n. 1), pp. 43-46; A. J. P. Taylor, (n. 1), pp. 146-149.

effort due to ill-health(29) and by the continuing importance of national efficiency : 'A healthy and skilful body of workers, upright in character and self-reliant - a source of strength to the country.' [9] With perhaps greater altruism the syllabus discoursed on the necessity for a proper scheme of national pensions which would remove the poor man's dread of old age and free him from the stigma of charity. This, too, was a national responsibility : 'It is the duty of the Government to take at the public expense such measures as will give every citizen a chance of working while his strength lasts, and of living in peace when work is no longer possible.' [10] A third area of social welfare which the committee regarded as the responsibility of the State was housing. Bad housing bred immorality, ill-health and crime; good homes were 'the sources and centres of virtue' [19], the cradle of citizenship. The 1919 Act had given local authorities requisite powers to attack the housing problem, which of course was particularly severe after the war(30): it was now the 'duty of voters to see that these powers are exercised'. [19] The point was re-iterated : 'The whole strength of a municipality [is] to be employed under Parliamentary sanction in improving the houses of the poor.' [19]

The committee clearly placed the State very high in its scheme of things. What relation was envisaged between the State and the individual? It was an intimate relation on both sides.

> The State can do for individual citizens something which they cannot do for themselves. It can afford them means of knowledge and culture. It can encourage education, temperance, and civic and patriotic devotion. It can offer opportunities for development and elevation. [1]

All this and the physical necessities of life too! In return, the citizen had to accept that

> Man is essentially and before all else a member of the State and must live up to that membership. ... So great [is] the debt of the citizen to the State that he may justly be expected to make large sacrifices for the good of the State. [3]

Such an uncompromising statement would have gained little support before the war. But the experience of living under the Defence of the Realm Acts, which gave the government virtually unlimited powers over the private citizen, wreaked a fundamental change : for all that the government tried to pull out after the war, for all that many sectors of

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29. The syllabus quoted Lloyd George as saying that 'a million more men would have been available for military service had the conditions of physical welfare been observed.' [9]

30. It was estimated that at least 800,000 new houses were needed.

society strove to restore the pre-war order, the change proved irreversible. A simple illustration of this is the rapid passage into law of the Emergency Powers Act, 1920, a panic reaction against the militancy of miners and railwaymen by which Lloyd George 'made permanent the dictatorial powers' legitimised for wartime only by DORA - 'as big a blow against the traditional constitution as any ever levelled'.(31)

From this view of the State and the individual, it followed that compulsory military service was entirely reasonable : 'So great is the debt of every citizen to the State that every citizen may be justly called on in time of need to defend the State.' [12] During the war some 16,000 conscientious objectors had been able to opt out of active military service,(32) though, as noted already, official retribution was exacted when they were disenfranchised.(33) It is interesting that the Welldon committee should go out of its way to justify conscription, apparently without exemption, as a corollary of its ideal of citizenship. The committee seemed to equate conscientious objection with lack of that patriotism which marked the product of the public school : 'The Public School spirit which has so signally vindicated itself in the War [is] to be encouraged in all secondary and elementary schools.' [15] To its absence from elementary schools Welldon attributed, in some measure, the support of the Labour party for conscientious objectors.(34)

In addition to the general 'spirit of service, sacrifice and sympathy', the syllabus prescribed the detailed personal qualities of the good citizen. He was expected to take a lively interest in local history and local affairs, and to be sufficiently knowledgeable about national politics to exercise his vote responsibly. His leisure time was 'not to be wasted in idleness' but to be profitably occupied in necessary rest, home duties, civic duties, amusements and self-development'. [21] He was to be wary of the 'perils attaching to misuse of cinematograph shows'.[8](35) He was to shun such 'common prejudices' as

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31. A.J.P. Taylor, (n.1), p.144.
32. Arthur Marwick, (n.1), pp.76-85, 313-314.
33. See n.5 above.
34. See n.16 above.
35. For a contemporary view of the social effects of the cinema, see Graves & Hodge, (n.1), pp.133-142. One should add that Section L, and Richard Gregory in particular, were early exponents of the educational value of the cinema.

religious bigotry and 'depreciation of members of other nations and races'. [3] He was to avoid 'the evil of gambling' [21] and the lack of self-control manifested in the habit of smoking. [3] Perhaps above all, he was to be free of the demon drink. Welldon's committee had what amounts to an obsession about temperance, which had a section of the syllabus all to itself and cropped up repeatedly in other sections. Drink was 'the greatest national evil' and 'the source of three-fourths of the crime and misery in the nation'. [20](36) It wreaked havoc on health and greatly increased infantile mortality [9, 19]. Temperance was vital not only to individual happiness but also to national efficiency : 'In the present rivalries of the nations, Great Britain must become sober, or it will lose its pride of place.' [20] Two pro-temperance influences were identified : education in elementary schools and, interestingly, women's votes.

Such, then, was the Welldon syllabus. Although from time to time concern for the individual came to the fore, the main emphasis was on the much-needed strengthening of Britain and the British Empire. This was made the chief motivating principle and guide to conduct (enlightened patriotism) ; to this end national unity, especially in industry, was essential. The old Fabian theme of national efficiency featured at several points : the health and sobriety of the individual were the responsibility of the State because they affected the contribution he was able to make to its well-being. Even the importance attached to individual social mobility was couched in terms of the 'loss of much splendid talent' and the weakening of national unity which would otherwise occur. Welldon considered that the qualities he desired were on the whole to be found in the public schools and through the syllabus hoped to disseminate an undefined quantity called 'the public school spirit' among the lower reaches of the education system.

The syllabus was only part of the committee's 1920 report. There were, besides, a contribution from Baden-Powell analysing schematically the scouting approach to training in citizenship, several other more formal

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36. In defence of the maligned drinker, it should be noted that under the combined onslaught of DORA regulations, the Liquor Control Board and taxation, convictions for drunkenness in England and Wales plunged from 189,000 in 1914 to 29,000 in 1918. By 1920 this figure was back to 95,000, before settling down at an average of 77,000 for the years 1921-1925. (Data from Encyclopaedia Britannica, art. 'Temperance'.) Welldon argued for nationalisation of the drink trade, but the Liquor Control Board was abolished by the Licensing Act of August 1921.

courses used in different parts of the country, a selection of school constitutions ranging from the minutely organised - 'Order is Heaven's First Law'(!) - to the reasonably flexible, illustrating the possibilities of indirect training in citizenship through exercise of responsibility, and, finally, some suggestions for awakening children's interest in local affairs.

The second report(37) was given over to comments from various public schools. The general attitude was a marked distrust of formal instruction in citizenship, combined with warm approval of indirect methods such as the appropriate teaching of relevant subjects, the prefect system and the basic atmosphere of the school. The prevailing mood was typified by the headmaster of Wellington, F.B. Malim :

> I myself should deplore any rigid scheme of Citizenship teaching. It is liable to become political propaganda, and is very often premature. It should be taught in connection with the History, Geography and English lessons of the School, and depends in no small measure on the religious teaching given.

F.W. Sanderson, the famous headmaster of Oundle, provided the most original comment :

> I confess to a distrust of instruction in Citizenship. As far as I have seen, it means instruction in ideas of things as they are, not as I think they might be for new needs. I also have doubts about 'Boy' government. ... my own judgment is that even here boys carry out a 'dominant' code, and really I think the system prevents the growth of the newer ideals.

The committee, for its part, was critical of the public school missions as suitable media for citizenship training. These missions, it pointed out,

> require very careful handling if they are not to inculcate a conscious philanthropy that is destructive of democratic citizenship. The free mingling in games and other competitions of boys and girls from neighbouring schools of all grades and classes should afford more effective training.

Scouting, on the other hand, was described as 'the most effective practical training on the social side' - which, with Baden-Powell on the committee, is not altogether surprising!

There can be little doubt that, whilst it recognised the value of certain types of indirect training, the Welldon committee began its work with a firm belief that direct training in citizenship through the teaching

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37. B.A.R., (1921), 361-375.

of a broadly conceived course of civics was both feasible and desirable. Though the syllabus was not so much a graduated course as a collection of 'things that a citizen should know',[38] it was definitely intended to form the basis of such a course. This was made clear in, for example, Welldon's 1919 paper, the introduction to the 1920 report and a letter published by Welldon appealing for funds in which he wrote : 'There can be little doubt, as contemporary events have shown, that systematic instruction in the offices and opportunities of citizenship is needed by all classes of the community.'[39]

The committee's investigations did not substantiate its belief. The public school headmasters were distinctly sceptical, and the committee noted the frequency with which history, geography and English literature were advocated as suitable media for incidental instruction in citizenship. It therefore urged that the teaching of these subjects 'should be extended by continual reference to contemporary events'.[40] This was also the official attitude. Henry Hadow, vice-chancellor of Sheffield University and chairman of the Consultative Committee of the Board of Education, in a series of lectures delivered in 1922, accepted the Welldon syllabus as a quarry 'from which a considerable amount of good material may be hewn', but was distrustful of any attempt to use such material directly, preferring that it should be disseminated through the ordinary history, geography and literature lessons.[41] A Board of Education pamphlet published in the summer of 1923 made the same point :

> But while we in England have taken readily to the social idea in teaching history, we have not adopted to the same extent as some other nations the idea of teaching 'Civics' as a definite subject. Most of our teachers, unlike those of the United States, prefer to allow the lessons which Civics would impart to flow naturally from the ordinary Historical Course; and if this is done deliberately and

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38. ibid., p.362.

39. T.E.S., 6 August 1921, p.364; also in J. of Ed., 53, (September 1921), 586, 588. cf. n.51 below.

40. B.A.R., (1921), 361. The syllabus did not mention geography explicitly, but it did stress the 'need of acquaintance with English History and Literature and the possessions and resources of the British Empire' [11] - a theme reiterated at the 1923 Imperial Education Conference (T.E.S., 21 June 1923, p.343) - and also recommended that children should 'learn at school patriotic poetry, eg. Shakespeare and Scott'. [15]

41. W.H. Hadow, Citizenship (Clarendon press, 1923), pp.194-200.

> with due consciousness of the end to be attained, it may prove to be the better way.(42)

The Hadow Report spoke in a similar vein :

> The need for instruction in civics or citizenship has long been recognised, and sporadic attempts are made from time to time to introduce specific courses on the subject somewhere in the schemes of instructions for older children. Opinion is divided, however, as to the necessity for this, if the syllabuses in history are well thought out and the work is carried on by specially qualified teachers.(43)

The Welldon committee was thus obliged to soft-pedal its original enthusiasm for direct training. Its third report admitted that 'a knowledge of civics ... is only a part of the training in citizenship'(44) and in the fourth and final report it was stated that

> The Committee desire to emphasise the opinion that training in citizenship depends as much upon environment and example as upon positive teaching.(45)

Acknowledging the importance of the general school atmosphere, this report drew attention to 'the necessity for greater care in the appointment of educational authorities and the choice of persons to serve in the schools'. As if to underline the change in its position, the committee concluded that school was not even the most important element; 'Home life is the bedrock of civilisation', and, reverting to an earlier theme, 'with adequate housing home life should reach a standard at present unattainable.'(46)

Did Welldon's committee exert any influence on educational thought and practice? Civics, in the restricted sense of the mechanics of government, enjoyed a certain vogue during the years after the war. As a leader in the Times Educational Supplement pointed out, in a comment on the summer school organised by the Civic Education League,

> Civics, as it is called, is becoming a subject of the general curriculum in elementary and even in secondary schools. It is a subject of the greatest importance in an age when

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42. Board of Education, Educational pamphlet no. 37 : the teaching of history (H.M.S.O., 1923), p.23. The pamphlet was the work of a small committee appointed in February 1921.

43. Board of Education, Report of the Consultative Committee : the education of the adolescent (the Hadow Report) (H.M.S.O., 1927) p.196.

44 B.A.R., (1922), 337. The bulk of this report was a bibliography of some three hundred publications on citizenship, one third of them American.

45. B.A.R., (1923), 422.

46. ibid., p.423.

> half-educated agitators are endeavouring to undermine the hereditary belief of the masses of the people in orderly government and the maintenance of the existing balance of society. To teach the elements of constitutional government as a branch of or in connection with the teaching of English history is a necessity for our time ... (47)

Welldon's committee observed in 1922 that 'a remarkable and active interest has been evinced in the subject'[48] and reaffirmed a year later that 'a considerable interest has been aroused throughout the country.'[49] For this it could probably claim some of the credit.

But the interest was in a narrower conception of civics than that originally entertained by Welldon, and it was civics as an aspect of other subjects - notably history - rather than as a subject in its own right. Welldon's approach might have been acceptable in the United States, but it made little headway amongst his own countrymen. Not for lack of trying : the committee worked very hard to publicise the syllabus. The Civic Education League hailed the 1920 report (which included the syllabus) as 'a definite and remarkable advance in civic education'[50] and volunteered its clerical services to distribute the report throughout the country. Welldon thereupon launched an appeal for the funds to print 20,000 copies 'with a view to its free distribution among teachers in schools of all grades'.[51] In the event something over 5,000 copies were circulated, recipients including all L.E.A.s and all H.M.I.s : but with little apparent impact on central policy other than the desultory comment in the Hadow Report quoted above. The educational press paid it scant attention; only Nature gave it any sort of welcome, saying that it 'should prove valuable to all who are interested in the welfare and future of their country'.[52]

The Council of the British Association was somewhat ambivalent

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47. T.E.S., 2 September 1920, p.479. It is significant that a leader under the heading 'civic education', appearing in the week after the first report of Welldon's committee was presented to the British Association, should fail to mention that report at all.

48. B.A.R., (1922), 337.

49. B.A.R., (1923), 422.

50. B.A.R., (1921), 361.

51. T.E.S., 6 August 1921, p.364; also in J. of Ed., 53, (September 1921), 586, 588. cf. n.39 above.

52. Nature, 106, (30 December 1920), 579. One may recall that the editor of Nature was a member of the Welldon committee.

in its attitude to the committee. Welldon was keen to publish a book based on the syllabus which should be issued under the auspices of the Association. This the Council declared itself officially 'unable to approve'[53] and, for all that the 1921 report gave the impression that publication was going ahead,[54] no such book as far as I know ever appeared. By way of compensation, as it were, Cuthbert Blakiston, a member of the committee and a classics master at Eton, who was already engaged in writing a book on civics, adapted it to the Welldon syllabus; indeed, the similarity of subject-matter and even phraseology is so great that one may wonder how the projected volume would have differed from Blakiston's. The latter was even graced by a foreword from Welldon in which, reiterating some of the main themes of the syllabus, he expressed the hope that the book would 'tend to elevate and consecrate the Imperial destiny of Great Britain'.[55] On the other hand the Council did give its blessing - though little of its money - to the mass circulation of the 1920 report, which remained on sale at British Association headquarters throughout the interwar years.

The history of the Welldon committee invites comparison with that of two other bodies : the Moral Instruction League and the Association for Education in Citizenship. The Moral Instruction League was founded by the Ethical Union in 1897.[56] Thitherto the medium of citizenship training had been the Bible lesson in elementary schools and, at the other end of the social scale, the corporate life of public boarding schools. To this the League issued a challenge, declaring its ambition 'to substitute systematic non-theological moral instruction for the present religious teaching in all State schools, and to make character the the chief aim of school life'. The League soon discovered, however, that a direct attack on Bible teaching - despite the manifest shortcomings of what passed under that heading - was counter-productive;

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53. B.A.R., (1921), xvi.
54. ibid., p.362.
55. C.H. Blakiston, Elementary civics (Edward Arnold, 1920), p.vi. This book was described in Welldon's bibliography (n.44 above) as 'suitable for the upper classes in the Public Schools'.
56. F.H. Hilliard, 'The Moral Instruction League, 1897-1919', Durham Research Review, 3, (1961), 53-63. See also Susan Budd, Varieties of unbelief (Heinemann, 1977), esp. pp.245-246.

so in about 1901 it started to promote its ideals as a complement to religious instruction rather as an alternative to it.

This less antagonistic approach quickly bore fruit, even in official circles : the League's principles gained implicit approval in the Board's Regulations for 1904 and, more emphatically, for 1906, where it was stated that

> Moral instruction should form an important part of every elementary school curriculum. Such instruction may either (i) be incidental, occasional and given as fitting opportunity arises in the ordinary routine of lessons, or (ii) be given systematically and as a course of graduated instruction.(57)

The League prepared and circulated a syllabus of moral instruction, and by the end of the decade nearly one third of all Local Education Authorities had responded favourably, though of these less than half had actually set aside time for moral instruction. Apart from its origins in the ethical movement, the syllabus can hardly be described as radical : the virtues it sought to propagate ranged from cleanliness, tidiness and good manners in the infant classes to patriotism, love of Empire and exercise of civic responsibility in the upper Standards.(58) In fact, it was not dissimilar to the Welldon syllabus. The chief differences were that the League's syllabus was aimed at the entire elementary school population, from infants to Standard VII (ages 13-14), and was concerned chiefly with individual behaviour; Welldon's syllabus was aimed at the 11+ age range - ostensibly at those in the upper reaches of the elementary system, though it seemed more suited to public schools - and was concerned with uniting the people in a common love for the country. A further difference, of course, was that,at any rate initially,the League hoped to displace religious teaching altogether; Bishop Welldon, on the other hand, insisted that :

> A supreme condition of good citizenship was that children should not be educated so much dogmatically as in the fear of God and the imitation of Christ. Faith united and dogmas separated.(59)

Both, however, believed that their aims could be achieved by direct

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57. Quoted Hilliard, art. cit., p.58.

58. Hilliard's article gives the general idea. A 'scheme of training in citizenship' almost certainly prepared by the League was adopted by the West Riding Education Committee on 29 December 1904 and may be seen among the minutes of the W.R.E.C. at the Leeds University School of Education. A very similar scheme,used in Devon, was published in B.A.R., (1920), 300-303. See further W.H.Hadow, (n.41), p.196, where the League's syllabus is described as 'bad because intrusive and premature'.

59. The Times, 25 August 1920, p.14; also in T.E.S., 26 August 1920, p.468.

systematic teaching.

From about 1909 the League's fortunes began to wane. Firstly, its enthusiastic secretary Harrold Johnson came round to the view that purely secular moral instruction was not really feasible and that a sound religious basis was essential;[60] he eventually resigned in 1913. Secondly, after its initial success, the idea of direct systematic instruction came unstuck. On the one hand school spirit, example, dedicated staff, 'the right moment for words in season wisely said', and on the other the study of history, literature and contemporary life : these were the preferred media for the acquisition of moral values. That the League was alive to these views may be inferred from its title, which changed to the Moral Education League in 1909, the Civic and Moral Education League in 1916 and the Civic Education League by 1919. By the nineteen-twenties, then, it had abandoned 'morals' for 'civics' and 'instruction' for the more nebulous 'education'; it had also turned its attention from the elementary syllabus to a series of summer schools in civics for teachers and others.[61] 'Civics' was hoped to provide a medium in which good citizenship might be fairly contagious; but it was a far cry from the original aspirations of the League.

This explains why the League was so enthusiastic about the first report of the Welldon committee.[62] What it does not explain - indeed, what it makes puzzling - is why Welldon should try to resurrect the idea of direct training so soon after it had been thoroughly explored and generally dismissed. I have no simple answer to this. It may be that Welldon was misled by the initial support he gained from a few schools into thinking that there was a much wider demand for direct training than he subsequently found. Perhaps he attributed the League's failure to its aggressive secularism and thought that with his own more orthodox ambitions the direct approach might succeed. One might recall Welldon's conviction, expressed in his 1919 paper to Section L, that a united teaching profession could determine the character of society. Given the postwar crisis, it may have seemed to him

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60. Hilliard speaks of the 'real tragedy' of the League's greatest failure, its failure to encourage 'a broader approach to moral teaching which incorporated the best of the religious <u>and</u> secular teaching material', and remarks that Johnson was <u>the</u> only one of its leaders to see this.

61. Hilliard is a little premature in suggesting that the League had already ground to a halt by 1919.

62. see n.50 above.

that a frontal assault on the task was necessary. Like the Moral Instruction League, he discovered that, irrespective of its necessity, or even its theoretical feasibility, it was culturally unacceptable.

The Moral Instruction League was founded in an attempt to introduce a secular approach to ethical teaching. Welldon's committee was a response to the crisis of the immediate postwar years which appeared to threaten the existing order of society. By the time that the Association for Education in Citizenship[63] was set up in May 1934 a much deeper sense of crisis was abroad: with the economic disasters of 1929-31 and the rise of totalitarianism, it seemed that democracy itself was at stake. It was evident that education played a key rôle in promoting and sustaining dictatorship of both Left and Right: how could it be used to save and strengthen democracy?

In a special supplement to The new statesman and nation the founders of the Association, a group of Liberal and Fabian intellectuals led by the Manchester politician Ernest Simon, argued:

> The right method is not to impart a subject called 'civics', but so to teach such subjects as history, geography and economics ... that the child will leave school with the equipment to understand the world in which he lives. [The aim is] the creation ... of citizens with a working map of the social and political world in their heads, a map which will save them from being the proper geese for the propaganda (64) of millionaire press lords or aspiring dictators.(65)

In his personal contribution to the supplement Simon repeated that 'it is not necessary to introduce a special subject called "civics"'; but in the same breath he insisted on 'the importance of the direct and conscious teaching of citizenship'.[66]

This apparent contradiction was worked out more fully in a book published by the Association the following year.[67] On the one hand 'civics' had already been tried and found wanting, or at least found too alien a plant to flourish in the culture of the British educational system. On the other, direct teaching of some sort appeared highly

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63. Guy Whitmarsh, op. cit. (n.24 above); also Mary Stocks, Ernest Simon of Manchester (Manchester U.P., 1963), chap. VIII.

64. This appalling pun was not typical of the tone of the supplement!

65. 'Education and citizenship', The new statesman and nation, 14 July 1934, pp.61-73; p.61.

66. ibid., p.72.

67. Association for Education in Citizenship, Education for citizenship in secondary schools (O.U.P., 1935).

successful under totalitarian regimes. There was a second reason why Simon wanted to try it. As faculty psychology and its associated doctrine of transfer of training fell into disrepute, it seemed logical to suggest that citizenship should be taught through subjects which impinged directly upon it.

> Nobody thinks of training doctors through Hebrew or engineers through theology. Surely it should be recognised that it is equally important to train citizens not through some 'disciplinary' subject like Latin but through subjects which are directly useful to the citizen in later life. (68)

Citizenship, it was argued, could be promoted partly by teaching traditional subjects in such a way as explicitly to bring out their social significance and partly, or mainly, by introducing the social sciences - economics and politics - into the curriculum.(69) By 'direct and conscious teaching of citizenship' Simon meant arousing the pupil's interest in social affairs, building up his knowledge of them and developing his powers to think about them logically and without prejudice. Such qualities would enable him to withstand the persuasions of 'millionaire press lords or aspiring dictators' and to play a responsible part in upholding democracy. The educational system had conciously to be directed towards this end. The prescription was less crude, if no less emphatic, than the Welldon syllabus of civics.

The study of secondary education undertaken by the Consultative Committee between 1933 and 1938 provided the Association for Education in Citizenship with an opportunity to seek official backing for its views. Despite strenuous efforts,(70) and despite the fact that Lady Shena Simon, Ernest Simon's wife, was a member of the Committee, official backing was on the whole not forthcoming. The Spens Report agreed that 'it is scarcely possible to exaggerate' the importance of education for citizenship - the 'whole future of democracy' might depend upon it(71) - but it categorically rejected the idea that the

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68. ibid., p.20.

69. One may note that this was the time when attempts were being made to gain formal recognition for the social sciences within the umbrella of the British Association. See chap. VI above.

70. Guy Whitmarsh, (n.24), chap. III.

71. Board of Education, Report of the Consultative Committee : Secondary education with special reference to grammar schools and technical high schools (the Spens Report) (H.M.S.O., 1938), p.xxxvii. cf. Brightman, 'Education in a democracy', Nature, 143, (15 April 1939), 615-617.

study of economics[72] and of national and international politics[73] could be undertaken before the age of sixteen. All that could be done, it suggested, was to teach recent history in such a way as to bring out 'the serious character of the social and other problems which have to be faced' and to teach other subjects in a manner which would optimise such transfer of training in logical thought as psychologists then thought possible.[74] The case against transfer of training was not taken as an incontrovertible case for direct training in citizenship. Similarly the fact that direct training seemed successful under totalitarianism was not accepted as an argument that it should be tried in democratic Britain.

Spens supported his rejection of direct training with a theory about rhythmical patterns of learning. According to this theory, a child's interest in a subject was focussed firstly on the subject's 'appeal to the sense of wonder or romance', next on its practical utility and lastly on the way it lent itself to the logical construction of general ideas.[75] It was suggested that the third phase had been over-emphasised at the expense of the second, and that a redressing of the balance would do much for citizenship :

> If the utility phase were adequately developed in all the subjects of the secondary school curriculum, everything which those concerned about 'education for citizenship' rightly demand would probably be granted. Pupils would leave school with a better equipment for practical affairs of many kinds and with some understanding of the way in which those affairs depend upon exact knowledge. (76)

Insofar as citizenship could be taught at all, it was to be taught through the traditional curriculum subjects: and for this end the content of each subject was at least as important as its general intellectual outlook.

In the next two chapters I shall consider how the advocates of geography and biology, respectively, used the education for citizenship argument to claim for their subjects a larger share of the curriculum and, with it, greater public esteem.

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72. ibid., p.179.
73. ibid., p.xxxvii.
74. ibid., p.xxxviii.
75. ibid., pp.162-163. This theory was first spelt out by T. Percy Nunn in his famous book <u>Education : its data and first principles</u> (Edward Arnold, 1920).
76. ibid., p.163.

Chapter XII

Geography for citizenship

By the end of the First World War geography had attained a rather curious position in the educational system of this country. It was reasonably well entrenched in the elementary schools, and the universities were increasingly admitting geographers to their ranks : but the subject was very poorly represented in the secondary schools. There were several reasons for this, of which the most important were the reluctance to concede that geography was an independent discipline in its own right, the difficulty of fitting into a curriculum which tended to drive a wedge between 'humanistic' and 'scientific' studies a subject that could not be assigned neatly to either slot, and the effect of certain Board of Education decrees, most notably Circular 826.[1]

The repercussions of this situation on the development of the discipline attracted the criticism of geographers and, to a lesser extent, of educationists. This was reflected institutionally. The Royal Geographical Society (founded in 1830), which together with the British Association had been instrumental in establishing geography at the ancient universities,[2] set up the Geographical Association in 1893 to represent secondary school geography teachers. The Association's membership, having reached the thousand mark at the outbreak of war, then shot up to four thousand by 1921 and maintained that level until the late nineteen-thirties.[3] The depth of feeling which this indicated allowed the Association to function fairly effectively as a pressure group for secondary school geography.

The chairman of the Manchester branch of the Geographical Association, T.W.F. Parkinson,[4] was elected secretary of the vigorous

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1. Board of Education, Circular 826 : memorandum on teaching and organisation in secondary schools (H.M.S.O., 1913), p.31: 'It is not necessary that separate instruction in both History and Geography should be given in all forms.' cf. B.A.R., (1925), xxxi and (1926), xiv.

2. B.A.R., (1887), 158-160; H.J.Mackinder's centenary address to Section E, B.A.R., (1931), 96-109 and H.R.Mill's paper, ibid., pp.405-407; and Halford Mackinder, 'Geography as a pivotal subject in education', Geog.J., 57, (1921), 376-384.

3. H.J.Fleure, 'Sixty years of geography and education. A retrospect of the Geographical Association', Geography, 38, (1953), 231-266.

4. d.1926. B.Sc., Manchester, 1885. Manchester pupil teacher centre, 1896-1910; principal geography master, Manchester Boys' Central High School, 1910-1926. Inspector of schools with special reference to geography for the Manchester Education Committee. See J.M.G.S., 43, (1928), 97.

Manchester Geographical Society in 1918.[5] An enthusiastic propagandist for secondary school geography he soon persuaded the Manchester Geographical Society to put its weight behind his campaign for reform. His next step was to enlist the support of the British Association, through its Conference of Delegates of Corresponding Societies to which the Manchester Geographical Society was affiliated. He secured an invitation to address the Conference in 1919 on 'geography in the curriculum of higher education' and attracted some of the leading British Association geographers to his audience.[6] His paper underlined the weaknesses of the provision for geography teaching and, in staking the subject's claim for a larger share of the curriculum, Parkinson emphasised particularly its imperial significance :

> Probably there never was a time in the history of man when geography was so necessary as at present. ... We have the largest empire the world has ever seen. ... Unless we know more of this empire, and this is geography, we are unworthy of the trust which is imposed upon us.
>
> How can we expect the respect of Canadians, Australians, South Africans, and Hindus when we know so little of them and their countries and make such small efforts to know more? ...
>
> Surely it is necessary to study geography if a right conception of our obligations is to be obtained. ...
>
> The mightiness of our Empire must inevitably depend upon our power to recognise that geographical factors have controlled the rise and fall of great empires even before our day.

This was an able statement of what may be called the 'geography for empireship' line of thought, couched here chiefly in moral terms but with a warning of the possible political consequences should it continue to be ignored.

A similar argument had been used by H. B. Gray[7] in 1909 when, addressing Section L on 'The educational factors of imperialism', he had urged that schools should give 'a prominent place to the scientific teaching of geography, and particularly to historical geography'.[8] In 1923 Gray became chairman of a committee appointed by Section L

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5. T. Nigel L. Brown, The history of the Manchester Geographical Society, 1884-1950 (Manchester U.P., 1971), pp.65-68.
6. B.A.R., (1919), 444-448; J.M.G.S., 35, (1919), 62-66.
7. 1851-1929. Educated at Winchester and Queen's College, Oxford. (classics) Headmaster of Bradfield College, 1880-1914, which he 'saved from extinction'. (D.N.B.) President of Section L, 1909.
8. B.A.R., (1909), 717.

'to consider the educational training of boys and girls in secondary schools for overseas life'. The committee was motivated by the observation that many secondary school leavers, and especially public school leavers, were struggling to enter congested professions in England while healthier and more agreeable occupations in the Dominions went begging. This situation was bad both for the Dominions and for the home country. It was therefore necessary to stimulate in adolescents the desire to live and work overseas and to ensure that detailed information as to career opportunities was made available at the appropriate time.

The principal method of achieving the first of these aims, the committee decided, was to encourage schools to develop agricultural studies as part of the ordinary curriculum. Agriculture would foster a love for the healthy outdoor life, thus possibly turning the eyes of children towards the vast uncultivated expanses of the empire, and it would generate the type of practical outlook that would serve emigrants in good stead. To the argument that 'Empire considerations demand it' was added the claim that agriculture was 'educational in a very wide sense' : it deserved some place in the curriculum in its own right, quite apart from the ulterior, imperial motive. It is interesting that during the life-time of the committee (1923-1931), this pedagogic justification grew in importance relative to the imperial justification.[9]

In the committee's second report it was suggested that the teaching of geography could play a very important rôle in stimulating emigration - especially in schools where agricultural studies were not feasible - and that lack of geographical knowledge was in part responsible for the low emigration rates. School geography might consciously be used to alter this :

> A detailed study of the resources, occupations, produce, markets, social and economic condition of the British Empire would materially assist in awakening an interest in the subject, and not improbably lead to a desire to go abroad. (10)

In his presidential address to the British Association the following year, the Prince of Wales, a keen supporter of the Gray committee,[11] spoke of the rôle of geography and history in familiarising children with the Empire.[12] The committee itself repeated its argument that, failing

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9. cf. B.A.R., (1924), 345-346 and (1929), 270-271. This may be related to the fact that in 1926-7 chairmanship of the committee passed from Gray to the famous agriculturist John Russell, director of the Rothampstead experimental station, Harpenden.

10. B.A.R., (1925), 275.

11. B.A.R., (1924), xviii-xix

12. B.A.R., (1926), 12.

agricultural studies, 'geography has strong claims to be considered as a useful substitute, as affording a valuable means of opening the minds of boys and girls alike to the possibilities of a career abroad within the Empire.'(13)

This attitude to the function of geography in schools as bound up with education for empireship - helping children to awareness of the moral obligations devolving from possession of the empire and encouraging them to live and work in under-developed parts of it - was unacceptable to many of the geographical fraternity. This became apparent during the discussion following Parkinson's 1919 paper.(14) Although one speaker other than Parkinson did refer to the value of geography 'for the widening of the outlook of our people ... that they might be better fitted for the use of the great trust of the Empire that had been placed in their hands', it was firmly pointed out by C. B. Fawcett(15) that the fundamental unit of geography was the world and not the British Empire. Fawcett warned against exaggerating the historical significance of geography 'as if geographical factors were the sole factors affecting human development', but at the same time remarked that 'the citizen who knows nothing of the countries of the world cannot give a sensible vote(16) on any question.' Other speakers dwelt on the need for greater geographical expertise in various government departments.

On one matter all were agreed: the educational provision for geography was seriously inadequate. The meeting unanimously passed a resolution proposed by H.J. Fleure(17) calling on the Council of the British

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13. ibid., p.333.
14. B.A.R., (1919), 446-448.
15. 1883-1952. Educated at University College, Nottingham and the Oxford School of Geography (Diploma, 1912). Lecturer in geography at University College, Southampton, 1914-1919, and at Leeds University, 1919-1920; reader in geography at Leeds, 1920-1928. Professor of economic and regional geography at London, 1928-1949. Secretary of Section E, 1919-1920; vice-president, 1927, 1931-1932, 1934-1938; president, 1937.
16. Sensible voting was a topical issue: the Representation of the People Act, 1918, had almost tripled the number of voters. See A.J.P. Taylor, English history, 1914-1945 (Clarendon Press, 1965), pp.115-116.
17. 1877-1969. Educated at Aberystwyth University College. Professor of geography and anthropology at Aberystwyth, 1904-1930, and of geography at Manchester, 1930-1944. F.R.S. Secretary of the Geographical Association, 1917-1947; president, 1948. Vice-president, Section E, 1919, 1923; president, 1932. President, Section H, 1926.

Association 'to suggest that the Board of Education should hold an inquiry on the teaching of Geography similar to those which have been held on other subjects'.[18] With its usual incisiveness the Council deferred the resolution to the geography Section. Section E responded in 1920 with a resolution that the Board of Education should allow geography to be taken on a par with other subjects in advanced courses.[19] This was endorsed and duly forwarded by the Council.[20] In 1921 a joint resolution from Sections E and L urged the Council to take a number of specific steps in regard to the status of geography teaching and this time the General Committee, 'in view of the urgency' of the situation, instructed the general secretaries to take immediate action without waiting for the Council's prior official approval.[21] It was this action that led to revision of the position of geography in advanced courses.[22] At the same meeting (1921), and at the initiative of the geographers, a joint committee of the two Sections under the chairmanship of the educationist T. Percy Nunn[23] was appointed to consider in detail the whole question of geography teaching and to keep an eye on the Board of Education. The following year, after the successful

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18. Inquiries had been, or were being, held on modern languages, natural science, history, classics and English.

19. Beginning in 1917, the Board of Education offered a grant of £400 for 'courses of advanced instruction' in the 16-18 age range. The courses were arranged in four groups : A: science and mathematics; B: classics; C: modern studies; and D: the civilisation of (i) Greece or Rome and (ii) England. In 1922 the Board, under pressure from the British and the Geographical Associations, recognised a fifth group, E, for geography. B.A.R., (1922), xiv-xv ; Geog. T., 11, (1921-1922), 268-270; T.E.S., 17 December 1921, p.568 and 31 December 1921, p.587-588. For an assessment of the value of advanced courses in the development of sixth form science, see B.A.R., (1933), 314-315.

20. B.A.R., (1921), v.

21. ibid., p.xxxviii.

22. See references in n.19 above.

23. 1870-1944. Educated at University College, Bristol. Varied teaching experience (physics), 1891-1905. Vice-principal of the London Day Training College, 1905-1922; director, 1922-1936. Transformed it into the London University Institute of Education, 1932. Professor of education, 1913-1936. Author of many papers on education, mathematics, philosophy and psychology. President of Section L, 1923. cf. J.W. Tibble, 'Sir Percy Nunn : 1870-1944', B.J. Ed. Stud., 10, (1961), 58-75.

outcome of negotiations on advanced courses, membership of the committee was augmented so that, in addition to Nunn, it was made up of seven geographers and seven educationists.[24]

Apart from the intrinsic interest of the subject and its utilitarian value, Nunn's committee advanced two justifications for the teaching of geography : its unique potential as a bridge between 'humanistic' and 'scientific' studies, and its rôle in education for citizenship. The first of these has been considered in chapter X ; the second will be discussed here.

The committee's first and most substantial report was presented in 1923 and was written chiefly by Nunn, W.H. Barker,[25] Richard Gregory and Halford J. Mackinder.[26, 27] They insisted that the focus of secondary school geography should be man, as opposed to the surface of the earth, and that the study of the various geographical distributions should be strictly tailored to this end.

> The main aim of the teaching should be to enable pupils, by study of the regions of the world, to realise how the peoples of the world live and work, and how their life and their work are related. This aim coincides with the nature of the contribution which geography can make to the training of future citizens, estimated in relation to the fundamental needs of our time. ... For school purposes, at least below the stage of the advanced course, the emphasis should be on man. (28)

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24. Respectively W.H. Barker, L. Brooks, H.J. Fleure, O.J.R. Howarth, H.J. Mackinder, J.L. Myres and J.F. Unstead; G.H.J. Adlam, D. Berridge, C.E. Browne, Richard Gregory, E. Sharwood Smith, E.R. Thomas and Miss O. Wright.

25. 1882-1929. Educated in Derby and at London University. Pioneered the teaching of geography at Leytonstone, 1910-1919. Head of the geography department at Southampton, 1919-1922; reader in geography at Manchester, 1922-1929. Important exponent of school geography. Author of _Geography in education and citizenship_ (U. London P., 1927). Secretary of Section E, 1921-1928. - _Geog. J._, _74_, (1929), 195-196.

26. 1861-1947. Educated at Epsom College and Christ Church, Oxford. A man of many parts: called to the Inner Temple, 1886; first reader in geography to be appointed at Oxford, 1887-1905; reader in geography at London, 1900-1923, and professor, 1923-1925; with Michael Sadler a leading light in the Oxford Extension Movement, 1885-1893; principal of Reading University College, 1892-1903; director of the L.S.E., 1903-1908; Unionist M.P., 1910-1922; P.C., 1926. Chairman of the Council of the Geographical Association, 1913-1946. President of Section E, 1895 and 1931. See E.W. Gilbert, _British pioneers in geography_ (David & Charles, 1972), pp. 139-179 and L.M. Cantor, _Halford Mackinder : his contribution to geography and education_ (M.A. thesis, London, 1960).

27. _Geog. T._, _12_, (1923-24), 162.

28. _B.A.R._, (1923), 324.

The fundamental needs of our time : Bishop Welldon, H.B. Gray and T.W.F. Parkinson, in their different ways, saw these as the strengthening of nation and empire, the building up of a sense of enlightened patriotism and of moral responsibility towards one's fellow citizens in the home country and in her possessions overseas. Despite the presence in its ranks of James Maxwell Garnett, secretary of the League of Nations Union,(29) the Welldon committee rejected the concept of world citizenship, though 'doubtless the ideal of every serious reformer, whether he be a missionary of Religion, of the League of Nations, of Imperialism, or of Communism', as too ambitious a project for school purposes.(30) Nunn's committee, on the other hand, implicitly accepted Fawcett's advocacy of the necessity for a world-view rather than an empire-view. On this larger canvas the fundamental need was international understanding and to its achievement the teaching of geography as the study of 'how the peoples of the world live and work' had much to contribute. Building up an attitude of world citizenship took the place of direct training in British citizenship : the problems exercising Welldon's committee were absorbed into a wider perspective and transformed in the process.

That the most pressing need of the time was international understanding and that geography had a vital rôle to play in its development was the firm opinion of the general geographical community.(31) H.J. Fleure, presenting the annual report of the Geographical Association at the end of the war, issued an enthusiastic challenge :

> We wish to call all geography teachers to rise to the great occasion that has opened out. We have a special chance of a new start. ... We can follow paths now open to the improvement of citizenship and civic betterment generally. We are called upon to take our share in the criticism and the radical alteration of the old industrial system which has been such a strain on XIXth century Europe. And most of all we should endeavour so to promote sympathetic appreciation of the life and work of all peoples of the earth that real intelligent world citizenship may become a possibility. In this direction our responsibility is of the greatest. No other teachers can do much here. (32)

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29. An organisation inspired by Gilbert Murray and Lord Robert Cecil to organise and educate public opinion in favour of the League of Nations.

30. B.A.R., (1921), 362. Hugh Richardson, secretary of Section L 1906-1915, wrote to the Section L organising committee to suggest that the subject of world citizenship be discussed at the 1927 meeting. His suggestion did not bear fruit. See Section L minutes, 28 April 1926.

31. On science and internationalism at this time, see chapter III,n.5 above.

32. Geog.T, 10, (1919-20), 36.

J. F. Unstead[33] took up the torch in January 1921 with a speech to the annual meeting of the Geographical Association on 'the study and teaching of international relations' : the achievement of international harmony depended on the development of 'educated democracies and their realisation of world citizenship', and in this vital work 'there is both a great opportunity and a great responsibility entrusted to the teachers of Geography.' Their mission revolved around reinforcing the postwar consciousness of the mutual interdependence of all nations.[34] Thus identified with this creed, the Geographical Association - intimately associated with Nunn's committee - gave the latter every possible encouragement, urging geography teachers to cooperate with its investigations, praising its 1923 report and exhorting readers to buy it, and generally acknowledging the good work of its ally in the cause.[35] Since the Association was in the hands of Fleure, Mackinder and P.M. Roxby[36] - the first two members of Nunn's committee and all three convinced internationalists - such support is not altogether surprising.

There was, indeed, a strong groundswell of feeling that the time had come for a re-evaluation of geography teaching. The Times Educational Supplement, observing with muted enthusiasm that 'this modern world of ours is so dependent one part an another that we are all perforce our brothers' keepers', declared :

> In order, then, to take a share in the general citizenship of the world thus forced upon humanity it is essential that a knowledge of the factors underlying life and its problems the wide world over should form a part, and an important part, of a sound education.(37)

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33. 1876-1965. Studied politics and economics at Cambridge, followed by postgraduate work under Mackinder. Lecturer in geography at Goldsmith's College, 1905-1919, and at Birkbeck College, 1908-1922; professor at Birkbeck, 1922-1930. Assistant editor of Geog. T., 1906-1914. Retired early to devote himself to writing. - Geog. J., 132, (1966), 334-335.

34. Geog. T., 11, (1921-22), 136-140. cf. Unstead's paper to the League of Nations Union thirteen years later: Report of the 22nd annual Conference of Educational Associations, (1934), 47-61.

35. Geog. T., 11, (1921-22), 135, 202, 268-270 and 12, (1923-24), 5,162,242.

36. 1880-1947. Educated at Bromsgrove and Christ Church, Oxford. Lecturer in regional geography at Liverpool, 1904-1917; the first professor of geography at Liverpool, 1917-1944. Co-editor of Geography, 1915-1933. President of the Geographical Association, 1933. Devoted much of his life to the study of China where, as chief representative of the British Council, he retired and died. President of Section E, 1930. See E. W. Gilbert, (n. 26), pp. 211-226.

37. T. E. S., 9 September 1920, p. 487.

The Science Masters' Association discussed geography at its 1922 annual meeting, Douglas Berridge, Richard Gregory and O.J.R. Howarth being among the contributors.(38) The Board of Education, in a pamphlet on the teaching of history, remarked that it 'would be much improved by a better grounding in Geography' and that this was especially true of the teaching of world history, 'for in Geography we have always aimed in our schools at some knowledge of the whole world.'(39) To help crystallise ideas, R.N. Rudmose Brown,(40) O.J.R. Howarth and J. McFarlane(41) - all leading British Association geographers - published a book setting out the possibilities for secondary school geography and the contributions it could make to citizenship. Interestingly enough, they felt it necessary to add : 'It is obvious, however, from the very nature of the case that the [citizenship] teaching must be incidental rather than formal.'(42)

Even The Times joined the bandwagon : announcing that 'we now know that the character, the social and commercial development, and even the political destiny of a people are conditioned or determined by their geographical environment', it published a new atlas - a presumably profitable venture which has continued at a very high standard to the present day.(43)

A private discussion held at Le Play House(44) in the spring of

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38. S.S.R., 3, (1922), 106-111.

39. Board of Education, Educational pamphlet no. 37: the teaching of history (H.M.S.O., 1923), p.25.

40. 1879-1957. Educated at Dulwich College and Aberdeen University. Assistant professor of botany at Dundee, 1900-1902: arctic explorer; lecturer in geography at Sheffield, 1908-1931, and professor, 1931-1945. Also reader in geography at Manchester, 1920-1922. Secretary of Section E, 1915-1916, 1920-1925; vice-president, 1926, 1928, 1936; president, 1927; member of the Council of the British Association, 1933-1938.

41. 1873-1945. Took a First in history at Edinburgh. Lecturer in geography at Manchester, 1903-1919; head of the newly instituted department of geography at Aberdeen, 1919-1945. Secretary of Section E, 1909-1919; president, 1920. 'He was a frequent attender, with his wife, at the British Association annual meetings.' - Geog.J., 119, (1953), 250; ibid., 120, (1954), 119.

42. Brown, Howarth & McFarlane, The scope of school geography (Clarendon Press, 1922), p.154.

43. The Times, 10 January 1920, p.12.

44. Then the home of the Sociological Society. Pierre Le Play (1806-1882) was a French sociologist whose ideas were imported into England by Patrick Geddes (1854-1932) and, enshrined in the formula 'Place, Work, Folk', provided the paradigm for a sociological (cont. over)

1921 on the relation of geography and civics illustrates both the geographers' interest in the matter and their desire for the broadest possible approach to it. The meeting noted the recent widening of the concept of civics and tried to find a common ground between geography and sociology in order to establish 'how far geographical teaching can assist the development of the thought and feeling on which the Art of Community life [the definition of civics then used by the Civic Education League] is based'. The general consensus was that social geography, meaning the 'geographical expression' of the 'fundamental social tendencies which appear, under varying forms, in all communities', was a feasible project, but one in which the onus lay on the sociologists rather than the geographers. One thing was clear from the outset :

> It was stated, from the geographical side, that geographers would look with serious misgivings at much contained in such syllabuses as that compiled by the British Association Committee [i.e. Welldon]. Geographers have been educated to a world-view of people and affairs, and such documents do not embody a world-view. (45)

It is thus apparent that the first report of the Nunn committee fell on well prepared ground. Not only was there a widespread demand for the extension of geography teaching in schools : there was also a movement to link this with education for citizenship. Specifically, many agreed that the fundamental need of the time was the growth of that sense of international fellowship which the League of Nations epitomised. The study of how the peoples of the world live and work would, it was argued, lead to a greater appreciation of conditions prevailing in different nations and would help to generate that understanding of and sympathy for other races which was the prerequisite for international unity and peace. Geography had a vital contribution to make to the evolution of world citizenship and as such merited greater public esteem and claimed a more generous share of the school curriculum. As Nature observed in a warm and detailed comment on the Nunn report, 'When one considers the comparative merits of other subjects as a training for life and citizenship one wonders why [the inclusion of geography in

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44. (cont.) approach to regional studies. The Le Play Society, which was formed in 1930 as a break-away group from the Institute of Sociology (as the Sociological Society became), continued to operate until 1960. See E. John Russell's presidential address to the Le Play Society at its final conference (published as a pamphlet by the Frederick Soddy Trust, 1960).

45. Sociological Review, 13, (1921), 104-105.

advanced courses] has been so long delayed.'(46)

In 1926 Nunn's committee was augmented by four Scottish geographers, of whom the most prominent was John McFarlane, and the following year they reported on the teaching of geography in the secondary schools of their country. Again, the situation was regarded as 'highly unsatisfactory' and again, the theme of world citizenship appeared among the justifications advanced for the subject :

> Geography, along with history, offers the only means whereby pupils can be given that framework of precise facts which must underlie sound judgements of the national and international problems that confront the citizen in the modern complex world. (47)

The committee's views were communicated to the Scottish Educational Department and in 1928 Section E – interestingly, not in formal conjunction with Section L – discussed and roundly condemned the Department's reply.(48) Once more, the relation of geography to world citizenship was reiterated. Thus John McFarlane :

> We cannot teach world politics in schools, but we can give boys and girls in the advanced stages of their school courses an adequate knowledge of those geographical facts upon which the solution of so many important matters must ultimately depend.

Cyril Norwood, then president of Section L, spoke of the value of geography for those beginning to enjoy the benefits of secondary education who were 'not entirely suited by the courses of study at present existing' :

> For the ordinary average boy or girl no study presents an easier means of enabling them to play their part as citizens in the modern world, to understand things in general and to read the newspapers with intelligence.

The same themes were emphasised by W.J. Gibson, who spoke of 'the value of the subject as a means of widening the individual outlook, and of providing a needed equipment for citizens in a democratic State, who will have to form judgements on international as well as national questions'.(49)

During the decade after the war, then, there was a concerted

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46. Nature, 112, (1 December 1923), 809.
47. B.A.R., (1927), 301.
48. B.A.R., (1928), 639-648.
49. cf. P.M. Roxby's presidential address to Section E in 1930 : 'We may claim for human geography that, rightly studied, it is a vital element in training for national and international citizenship.' B.A.R., (1930), 104.

effort to dispel the image of geography as the mindless - not to say pointless - incantation of capes and boys and to replace it with a man-centred study, the study of the distribution of man over the surface of the earth and the relation to this of other geographical distributions. With this approach, the subject rested its claim to a larger share of the curriculum in part on its value in training for citizenship. It was argued that the concept of citizenship most appropriate to the times was a concept of world citizenship and not merely of empireship; that the specific virtue of geography was that it generated informed interest in other peoples; and that the quality of citizenship could not be directly instilled but could well emerge as a natural corollary of a greater appreciation of geographical data and geographical modes of thought.

These themes were worked out at the British Association and elsewhere during the nineteen-twenties. When the Association for Education in Citizenship came on the scene in 1934, its arguments for geography teaching were similarly couched in terms of internationalism.[50] The main burden of education for citizenship in the thirties lay, however, in the direction of education for democracy and in this context the science of greatest relevance was biology.

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50. The new statesman and nation, 14 July 1934, pp.66-67; Association for Education in Citizenship, Education for citizenship in secondary schools (O.U.P., 1935), chap. VI (contributed by H.J. Fleure).

Chapter XIII

Biology for citizenship

In Part I of this thesis the social relations of science debate has been discussed in fairly general terms. When the focus of attention is narrowed to the educational aspects of the debate, it becomes necessary to talk of individual sciences rather than of science as a whole, particularly when dealing with the political rather than the cultural function of science education. The science which provides the greatest scope for an examination of these educational aspects during the period under review is biology.

I have shown how, in treating of the public image of science as a whole, the British Association was basically on the defensive, justifying the continued pursuit of scientific knowledge to a largely sceptical lay audience. On turning to biology, a somewhat different mood may be discerned. The social effects of the biological sciences seemed to attract less public hostility than those of the physical sciences, partly because they were less widely known and partly because they appeared more unambiguously advantageous to society. The advocates of a greater rôle for biology in the educational system, insofar as they referred to the social relations of their subject, could therefore afford to be less defensive. Moreover, in dealing with the political function of biology teaching - its value in training for citizenship - there was increased scope for venturing into areas of controversy which the British Association Council tended to avoid in the more general context. Thus even within British Association circles one finds a marked boldness in the manner in which were advanced the claims of biology teaching to greater social prestige. Indeed, it was suggested that a widely disseminated appreciation of biology was essential to the continued vitality of a democratic society.

The opinions of the British Association as discussed in Part I have been elucidated by study chiefly of the decisions taken by the Council, of the activities of the general officers and of addresses delivered before the whole Association. It is more difficult, however, to identify what may be labelled as the British Association attitude to biology for citizenship since, at least during the earlier period covered in this chapter, there were no such general pronouncements on the issue. One must turn instead to the relevant Sections. The Sections, though, enjoyed a modicum of operational autonomy, so a variety of attitudes to any given question may be expected. It was, moreover, relatively easy for a particular group to influence a sectional organising committee - the Geographical Association's involvement in Section E is an example. While the published reports of sectional research committees and the consensus of public discussion indicate the views of a particular Section, a distinctive British Association attitude to such issues as biology for citzenship is less readily discernible.

It is significant that the main impetus behind the biology for citizenship argument came not from educationists but from professional practitioners of the life sciences. Among the latter, furthermore, it was zoologists who were most in evidence. Thus Section K and, to a lesser extent, Section L were concerned mainly with the academic aspects of biology teaching, while Section D was more actively involved in the social aspects. The professional practitioners were anxious about the relative public indifference to their subject, which contrasted strongly with the general interest in the physical sciences. In the long term, the correction of this imbalance required attention to the relative emphases in the school science curriculum. As will be shown in a little greater detail in the following paragraph, biology in general and zoology in particular were poorly regarded as school subjects in the mid nineteen-twenties. At a time when the social relations of science were increasingly coming to the fore, an obvious means of drawing attention to biology was to stress its social value as an educational tool. If biology was to achieve a more central position in the curriculum, then it was necessary to demonstrate its importance not only for the intending professional biologist but also for the great majority of pupils who would pursue quite different careers. Thus the debate over the function of school biology in training for citizenship was related not just to a concern about citizenship but also to a concern about the advancement of biology.

At the end of the First World War biology in boys' schools comprised a little nature study in the lower forms and such botany and zoology as was necessary for senior pupils intending to study medicine.(1) Girls were given botany as their principal, and sometimes only, science. Such biology as was taught consisted largely of distinct courses of botany

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1. This paragraph is based on E.W. Jenkins, From Armstrong to Nuffield : studies in twentieth century science education (John Murray, forthcoming), chap. IV.

and zoology : there was virtually no teaching of biology as a single, unified discipline. There was, moreover, a considerable public antipathy towards the teaching of zoology in schools, arising from its connections with sex education and from the suspicion that it involved cruelty to animals.[2] Although giving some encouragement to the development of botany and zoology, the Thomson committee on 'the position of natural science in the educational system', reporting in 1918, did not challenge the alleged educational superiority of the physical over the biological sciences. The advocates of biology teaching had therefore to contend both with the well-entrenched position of physics and chemistry and with the fragmentation[3] of their own subject. Although the system of School Certificate examinations was introduced in 1917, it was not until half a dozen years later that biology became a recognised subject. By 1930 the number of candidates offering biology had reached 1021, which represented less than 2% of the total entry. It was during the nineteen-thirties that the crucial growth occurred : in 1938 over 20% of School Certificate candidates offered biology. Simultaneously, botany lost something of its pre-eminence and zoology became more important, so that by the end of the period the three subjects were approximately equally popular for examination purposes. Many of the arguments which fuelled this rise in the educational status of biology and of zoology were concerned with the social significance of these subjects : not simply their material contributions to society but also, and more importantly, the value to society of all its members having had at least some training in biology.

Within the British Association, the idea that biology teaching should deliberately include an account of the relation of biology to social affairs was first mooted in a discussion staged by Section L and attended by representatives of Section D at the 1925 annual meeting.[4] G.W. Olive, headmaster of the Dauntsey agricultural school, told his audience:

> It is not sufficient to say that biology should be introduced into the curriculum of every school by the side of other science 'subjects'; it should merge imperceptibly into them, be correlated with literature, languages and history,

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2. For comments on this see the memorandum on the teaching of natural history in schools prepared by the zoology organisation committee of Section D : B.A.R., (1921), 263-267.

3. In the British Association this was marked by the division of the biology Section into separate Sections for botany and zoology in 1895.

4. B.A.R., (1925), 322, 376-377.

> and be linked up with the life of the nation, with economics, and with industrial sociological problems.

A little less sweepingly, W.J. Dakin, professor of zoology at Liverpool, also argued that in teaching biology 'its bearings upon human life should be clearly indicated.' He went on to list some of the causes of the neglect of biology, at the head of which he placed ignorance on the part of educational authorities and apathy on the part of the general public. At this stage it was not suggested that human life itself formed an integral part of the subject matter of biology at school level.

The following year there came a striking statement of the educational functions of biology in which the social aspects of the question were given an unprecedented emphasis. The occasion was the presidential address to Section D at the 1926 Oxford meeting of the British Association; the speaker was J. Graham Kerr.(5) The address(6) was devoted entirely to what Kerr described as 'at the present time of transcendent importance to the future not merely of our nation but, indeed, of our civilisation' - the rôle of biology in the training of the citizen. In his address Kerr, who seems to have been motivated more by the need to improve standards of citizenship than by a desire to foster the advancement of biology, raised for the first time a number of the issues which were to be central to the biology for citizenship debate. He did not, in 1926, see any threat to society from external sources but he did find cause for considerable anxiety in the recent 'tremendous advances in the evolution of our social organisation' which, in the absence of corresponding developments in the training of citizens, presaged 'a condition of instability' and 'the risk of complete disaster'. Particularly was he concerned about the consequences of vastly more effective means of communication, which seemed to set a premium on the power of advocacy at the expense of natural qualities of leadership. Eight years later the need for an education which would enable people to resist the enticements of mass propaganda was to be the driving force behind the foundation

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5. 1869-1957. Educated at the Royal High School, Edinburgh, and at Edinburgh and Cambridge Universities. Regius professor of zoology at Glasgow, 1902-1935. F.R.S., 1909. M.P. (Cons.) for the Scottish Universities, 1935-1950. Applied biological principles to the devising, in 1914, of the system of camouflaging ships which was universally adopted during the Second World War. Kerr was 'a strong advocate of the value of a biological training'. (D.N.B.) President of Section D, 1926; member of Council, 1939-1948.

6. B.A.R., (1926), 102-112.

of the Association for Education in Citizenship.(7)

How could the teaching of biology help to avert this threat of 'complete disaster'? Kerr identified two stages in the educative process : the development of intellectual powers - in the case of science education, powers of observation and deduction - and the acquisition of information. For the former he had no doubt that the physical sciences were more appropriate than the biological. It was for the latter that biology came into its own.(8) There were three general facts which Kerr argued the teaching of biology should impart to the budding citizen. The first was 'the great fact of evolution' which, contrary to some popular opinion, was no longer a mere hypothesis. The second was 'the broad fact of inheritance'. Kerr was very anxious to point out that inheritance is only partial, not simply because the evolutionary process depends upon the possibility of variation, but more significantly because proper appreciation of this fact 'provides the citizen with his surest safeguard against the talk of those who make it their business to belittle, if not to deny, the ever-present differences in the capacities of their fellow-men' : a necessary prerequisite for the eugenic cause which Kerr supported.(9) Thirdly, he emphasised the continuing 'struggle for existence in nature and the consequent elimination of the unfit'.

Once these basic principles had been assimilated, Kerr wished the pupil to embark on the study of 'the biology of communal life' and of communal evolution - the salient features of which he identified as increasing size, increasing specialisation of constituent individuals and increasingly sophisticated organisation - and thence proceed to the study of human society. Human society, he argued, was a biological phenomenon : knowledge of biological facts and appreciation of biological principles were necessary for its understanding and therefore essential in the training of citizens. The biological approach to social problems would, he hoped, lead both to a clearer recognition of the persistent intercommunal struggle and to a fresh appraisal of economics.

Kerr spelt out some of the social implications of such an education.

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7. cf. Chapter XI, pp. 303 - 305 above.
8. Addressing Section D as he was, Kerr appropriately remarked that 'by Biology I mean more especially Animal Biology.'
9. cf. J. Graham Kerr, 'Biology and the race', Nature, 120, (10 September 1927), 353-355.

It would, for example, be 'a potent power on the side of social stability, inasmuch as it would help to develop the scientific habit of mind with its constant distrust of the ably stated "case"' - the antidote to the excessive influence of mass communication which so perturbed him. Recognition of the importance of the individual for the community would lead to greater diversity in educational provision above the elementary level and simultaneously would restore to parents that sense of responsibility for their children which the growth of mass State education had appeared to erode. Conversely, the 'biological fact' of communal evolution in which the individual became ever more dependent on the community implied the need for increased attention to those subjects 'which have to do with the citizen's relations to and duties towards the community - such as discipline, ethics, patriotism and loyalty to country and comrades, and the past history of the community and race'. Continuing in this vein, Kerr declared :

> The biologist would like to see still another reawakening of ancient custom, namely, the more effective shackling of personal liberty in the bonds of duty towards the community. ... A biologically educated community, while according to the individual in his ordinary affairs the widest range of personal freedom, would take measures to prevent effectively its interference with the public welfare whatever might be the form of this interference.

Although such extracts from his address indicate sympathy with the eugenic school of thought, Kerr 'deliberately avoided' explicit discussion of that thorny subject. He similarly avoided another vexatious aspect of the social functions of biology teaching, especially in its zoological components : sex education. What remained in his address was still fairly controversial : the thesis that biology should be taught in schools and that it should be taught because it would give the citizen such a knowledge and outlook on social affairs as would conduce to the strengthening of society. Biological considerations suggested a certain relationship between the individual and his community; a biological education was necessary if this relationship was to be widely understood and put into practice. The novelty lay in the proposition that biological considerations were relevant to questions of citizenship at all and, conversely, that these questions affected how and why biology should be taught in schools.

At this time the official attitude to biology teaching was being formulated by the Consultative Committee of the Board of Education, which completed its famous report on The education of the adolescent at the end of 1926. What came to be known as the Hadow Report was more enthusiastic than the 1918 Thomson Report about biology teaching and argued the case in the 11 + range of education chiefly in terms of hygiene, for which a course of study of 'simple forms of animal life' was an essential adjunct to botany. By hygiene was meant both personal hygiene - which allowed the possibility of sex instruction - and 'a brief account of the public health service'. The committee believed it was 'especially important'

> that instruction in elementary physiology and hygiene, developing out of the lessons in elementary biology, should be given to all boys and girls in Modern schools and Senior classes. ... Such instruction in biology and elementary physiology, if properly carried out, might provide the basis for a right attitude to many social problems.(10)

There is, however, nothing in the context of this quotation to suggest that the social problems mentioned included anything as sweeping as the problems of social organisation which exercised Graham Kerr. Personal welfare seems to have been the main consideration. The function of school biology was, correspondingly, the dissemination of appropriate information rather than the inculcation of a particular outlook on society.

An invitation from the botany Section to hold a joint discussion at the 1927 meeting of the British Association on 'biology and education' was rejected by the organising committee of Section L on the grounds that the matter had already been considered at the 1925 meeting.[11] It was, however, raised in the zoology Section, where R. Douglas Laurie[12] gave a paper on the position of biology in the school curriculum.[13] Laurie argued that 'biology should be included as an

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10. Board of Education, Report of the Consultative Committee : the education of the adolescent (the Hadow Report) (H.M.S.O., 1927), p.224.

11. Section L minutes, 7 January 1927. cf. B.A.R., (1925), 376-377.

12. 1874-1953. Educated at Birkenhead School and Liverpool and Oxford Universities. Head of the zoology department at Aberystwyth, 1918-1940 (professor, 1922-1953). Founder and first president of the Association of University Teachers, 1919-1920; general secretary, 1920-1953. 'He was a dedicated zoologist with a keen interest both in nature study in the field and the social implications of his subject in such studies as that of eugenics.' - Harold Perkin, Key profession (Routledge & Kegan Paul, 1969), p.157. Secretary of Section D, 1913-1923.

13. B.A.R., (1927), 335-336.

integral part of the education of every boy and girl', especially of those who 'are preparing for citizenship without thought of going through the universities'. If biology was to be of value in training for citizenship, it was necessary that both botanical and zoological aspects should be combined : without the one, school biology could not 'cover adequately the relation of the living to the non-living world', while without the other, 'it fails in its human significance as a foundation for hygiene, human physiology, and social science.' Botany in girls' schools should therefore 'be converted into biology'; similarly, 'botanists and zoologists should unite in claiming for biology the place due to it in the time-table of boys' schools.' As a result of this paper Section D appointed a committee under Laurie's chairmanship to consider the issue in greater detail.

Laurie's committee produced its first report the following year,(14) a report which has been described as of 'seminal importance' for the cause of secondary school biology.(15) Its significance was recognised at the time : a Section L committee under Richard Gregory reprinted its introduction in a report published in the same British Association annual volume!(16) Indeed, this section of Gregory's report was the only one of which the Science Masters' Association approved.(17) Following the lead given in his original paper, Laurie's committee stated strongly that a genuinely biological syllabus was required and that an ad hoc mixture of botanical and zoological topics treated individually was quite inadequate. In justifying the claims of biology, the committee built on the hints given in the Hadow Report concerning the informational value of the subject :

> Instruction in the physiology of reproduction and sex should be given, but if the syllabus be well planned such instruction will occur naturally in the course of the general work, and not as a matter for special and separate consideration. Teachers are therefore relieved of the invidious task of giving the child sex instruction based upon human physiology, the essential facts being learned in ordinary school work.

The informational value of the subject was, however, only one aspect of the social function of biology teaching. Laurie had spoken of its 'human significance as a foundation for ... social science'

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14. B.A.R., (1928), 397-429.
15. E.W.Jenkins, op.cit. (n.1 above).
16. B.A.R., (1928), 461-464.
17. cf. S.S.R., 11, (March 1930), 238.

and his committee was at pains to emphasize the importance of biology in generating a more acute understanding of social affairs :

> Concern for [the pupil's] own relation to the social scheme of human life ... can best be served and utilised by the inclusion of biological studies ... since the social and economic development of the human community is conditioned ultimately by biological laws, as an unbiassed consideration of any given political or economic problem will show. ...
>
> Modern biological science ... is now in large measure concerned with physiological, ecological and economic topics. ...
>
> The general vocation of all pupils is citizenship, and the importance of biological studies for this end has already been urged.

The theme that biological laws apply to human no less than to animal life, and that this should be made explicit in the teaching of the subject, was stressed - in contrast to the 1925 Section L discussion - and the theme was extrapolated to include reference to the concept of biological community :

> Consideration should be given throughout to the relation of the organism as a whole to its natural environment and to the interrelations between all the living creatures which make up a biological community. Reference should be made, wherever possible, to local industries in their relation to the biology of human communities.

Unlike Graham Kerr, however, Laurie's committee did not attempt to indicate the detailed social implications of the biological approach to human society.

The Science Masters' Association began to show an interest in the subject shortly after the publication of the Laurie committee's first report. An article by E.W. Shann, biology master at Rugby, in the School Science Review for December 1928 suggested that the time had come to reflect upon the post-war growth of school biology and 'the best educational use to which it can be put', and paved the way for a discussion at the 1930 annual meeting.[18] The president that year was the chemist J.C. Philip, who was to preside over Section B of the British Association in 1936. In his address he spoke of the purpose of education as the development of character, culture and citizenship and wondered how science furthered those ends. On the citizenship issue he said :

> No boy in whom interest in science and its applications has not been awakened, in some degree at least, is properly equipped to play his part in modern life, whatever his

18. E.W. Shann, 'Biology in secondary schools', S.S.R., 10, (December 1928), 126-133.

> occupation or profession may be. Every member of a modern community should have some intelligent appreciation of the innumerable contacts which science makes with his daily experience.

To this broad, if vague, social argument he added Richard Gregory's favourite theme that 'by linking with science the idea of service to the community we are doing good work for education in the widest sense.' Turning in a little greater detail to biology, he suggested that its educational significance lay not simply in its cultural but also in its informational value :

> The youth who has had no opportunity of studying the phenomena of growth and reproduction, the facts of physiology and bacteriology, of heredity and evolution, is scarcely prepared to deal in a rational manner with many personal and social questions which call later for an intelligent answer.(19)

In the subsequent discussion,[20] it was agreed that biology should be given equal status with physics and chemistry at School Certificate level and should not be regarded as a soft option. It was pointed out that

> Biology, nowadays, is concerned with the health and wealth of a nation as well as with the efficiency of the individual and, as such, cannot be neglected by any country which desires a place in the sun. One of the greatest lessons of biology is that no plant or animal, and not even man, lives for itself or himself or even by himself.

A biological education was not relevant simply for personal well-being : it was essential for the coherence and effectiveness of society as a whole. There were, however, considerable differences of opinion as to how the curriculum might be framed so as to bring out these social aspects. A proposal that it should include 'an elementary knowledge of, at least, the evidences of evolution, and the principles of heredity' was only passed after the reference to heredity had been deleted, and then with a large number of abstentions. No one suggested that it should deal with such concepts as that of the biological community. The Association as a whole did not, in fact, appear to be seriously committed to a course of school biology which had for one of its aims the influencing of the pupil's attitude to society in the sense understood by, for example, the Laurie committee.

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19. J. C. Philip, 'School science : its purpose and scope', S.S.R., 11, (March 1930), 169-180; esp. pp. 172-174.
20. ibid., pp. 223-226.

Some of these themes were pulled together in an article by Henry Cawthorne published in the School Science Review later that year.[21] He reiterated the point made by Laurie in 1927 that genuinely biological study was needed : 'Biology is not given its true place in the syllabus when a little elementary botany is included in the science scheme.' He further argued, as had the Hadow and Laurie committees, that such study would provide a simple and inoffensive means of giving sex instruction :

> The boy who has followed intelligently and in a natural manner the reproduction processes in many different animals and plants, without the exciting of any morbid interest, will have a firm foundation on which the responsible adult or the irresponsible playfellow may build. [emphasis in original]

And he stressed that school biology derived its unique social value from the information it imparted :

> Some of the more important aims of science teaching can be satisfied only when biology is given its place in the syllabus. ... The informational value to the individual of school biology - in view of its dealing with such topics as animal nutrition and practical bacteriology - is, however, probably greater than that of any other school science. The informational value to the nation of a universal knowledge of some elementary biological principles is also comparatively large.

He added that such considerations had already led in America to attempts to teach 'civic biology'.

In his 1926 address to Section D, Graham Kerr mentioned eugenics as one of the 'general considerations which naturally come to the mind of the biologist when he thinks of his subject in relation to this ... vitally important problem of the training of the future citizen', only to drop the subject immediately.[22] Perhaps he felt he had stirred up enough controversy already. The onset of the economic crisis did, however, encourage some intellectuals to express pro-eugenic ideas more freely.[23] They were particularly worried by evidence that reproduction rates in the middle classes were substantially lower than in the working classes and feared that in the long run this would lead to a

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21. Henry Cawthorne, 'Biology and the science syllabus', S.S.R., 12, (October 1930), 55-61.
22. B.A.R., (1926), 111.
23. G.R. Searle, 'Eugenics and politics in the 1930s', an as yet unpublished paper given to a seminar in the history and philosophy of science department, Leeds University, in May 1977.

worsening of the genetic quality of the race, on the grounds that 'in respect of perseverance, of ambition, of aesthetic taste, of grasp of moral principle - the very qualities that make for good citizenship', the prosperous middle class was, self-evidently, 'exceptionally well endowed'.(24)

The eugenists regarded it as biologically proven that an individual's character was determined largely by his genetic inheritance and that environmental factors had little or no influence. They therefore argued that political action on such social problems as alcoholism, feeble-mindedness, certain diseases and long-term unemployment should be based on discouraging or even forcibly preventing their victims from reproducing, since their offspring would tend to inherit and perpetuate the same defects. On the other hand, the 'abler' middle classes had a moral duty to reproduce more prolifically and thus gradually raise the average quality of the race. But, as F.A.E. Crew ruefully remarked in a Nature editorial, 'economic security means more to the average man of the middle-class than does the decline of the Empire or the suicide of the race.'(25) So it was proposed that the economic disincentives of a large family should be removed by a system of family allowances and that the biological foundations of the eugenic case, and the sense of moral obligation deriving from it, should be made clear through an appropriate educational programme.

This philosophy was propagated most notably by the Eugenics Education Society and the related British Social Hygiene Council.(26) Having lost popularity after the war, eugenics seemed to gain a new lease of life at the end of the twenties and the beginning of the thirties as the economic situation worsened. Its success depended on inducing people to recognise that biological considerations lay at the root of many social problems and on persuading them to accept the particular interpretation of these problems promulgated by eugenists. They had therefore a close interest in the biology for citizenship debate.

As mentioned in chapter V, the British Association tended to avoid

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24. F.A.E. Crew, 'Differential fertility and family allowances', Nature, 130, (20 August 1932), 253-255.

25. ibid., p.255.

26. For the E.E.S. see Lyndsay Farrall, The origins and growth of the English eugenics movement 1865-1925 (Ph.D. thesis, Indiana, 1969), chap. VI. For the B.S.H.C., see n.43 below.

discussion of eugenics altogether. The 1931 meeting provides virtually the only exception to this. In Section D the leading supporters and opponents of eugenics discussed the population question, E.W. MacBride arguing that 'the only remedy' for the increasing imbalance of reproduction rates between different social classes 'seems to be the spread of the knowledge of the means of birth control, and in the last resort compulsory sterilisation'.(27) More significant for this chapter, though, was a discussion in Section L on 'eugenics in education'.(28) Among the participants were C. Wicksteed Armstrong, Ruggles Gates, Julian Huxley and E.W. MacBride, all outspoken exponents of the eugenic cause.

Since the eugenic philosophy was ostensibly based on a 'biological' analysis of social issues, the educational programme deriving from it saw the social function of biology teaching as the instilling in pupils of a 'biological' outlook on society. This outlook was typified by Ruggles Gates, professor of botany at King's College, London and vice-president of the Eugenics Society, who expressed anxiety about the dysgenic effects of the tendency of a civilised society 'to protect its weaker members against the rigours of a natural environment' and about the consequences of differential fertility. He complained loudly that social questions were not analysed biologically : 'Almost every important legislative measure since the War, when our racial and economic resources were so greatly in need of conservation, has been effective rather in hastening racial degeneration by its disregard of the fundamental facts of biological inheritance.'(29) If this situation was to change, then the educational system must play its part :

> An enlightened public opinion on eugenic questions requires some background of biological instruction in the mass of the people. Increased biological teaching in schools is necessary, to enable the next generation to visualise the problems of race and of heredity. ... An elementary acquaintance with biology should be regarded as essential for all pupils in secondary schools.

E.W. MacBride, professor of zoology at Imperial College, similarly outlined the educational implications of the eugenic position, especially the need 'to drive home the importance of heredity'. Instead of an abstract account of, for example, Mendelian genetics, he argued that the

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27. B.A.R.,(1931), 397-398.
28. ibid., 507-508.
29. See T. Lloyd Humberstone, 'Knowledge and social service', Nature, 129, (16 January 1932), 73-74.

school biology course should teach 'a knowledge of sex reproduction and the pressure of population on the means of subsistence' and should be based on 'the habits and activities rather than ... the structure of well-known animals'. Such a course would give more direct access to the implications of heredity for human society.

If heredity was thus connected with sexual reproduction on the one hand and eugenics on the other, it is perhaps understandable that an organisation like the Science Masters' Association should be wary of it. The surprise, rather, is that the British Association should sanction the expression of such strongly pro-eugenics views in these two discussions. This was, however, the period when eugenics reached its (albeit low) peak of social acceptability in this country. It would be misleading to infer that the British Association supported the eugenic cause. One may note, for example, that both Graham Kerr and Douglas Laurie refrained from expounding the subject, despite their deep interest in it. At the 1931 meeting both sides of the argument were heard in Section D, though the Section L discussion was curiously one-sided. In 1933 Gowland Hopkins observed that various lines of evidence, 'all of which should be profoundly welcome', pointed to the influence of environmental as opposed to inherited factors over the development of individual character.(30) As the decade progressed, the issue became one of great social and political, as well as scientific, controversy and as such was not one in which the British Association cared to meddle. The 1931 meeting was the only occasion, during the period covered in this thesis, on which the British Association undertook an explicit discussion of eugenics.

One element of the social argument for biology teaching not yet mentioned is the economic one. Towards the end of the decade it was frequently remarked that the Empire provided a considerable number of posts for trained biologists, but that suitable candidates were not forthcoming. It was, however, a question for debate as to whether this implied per se that a greater effort should be made to teach biology in schools. Henry Cawthorne was firmly of the opinion that it did not, and quoted a professor of biology as saying that he preferred his students not to have had any previous knowledge of biology.(31) The first report of the Laurie committee played down the vocational aspect of school biology, but at the same time quoted official sources to the effect that employment prospects

30. B.A.R., (1933), 20-21.

31. Henry Cawthorne, Science in education (O.U.P., 1930), p.15.

for biologists were relatively bright - due to lack of competition - and observed that 'some excellent Colonial appointments for botanists, mycologists, zoologists, and entomologists are at the disposal of the Secretary of State for the Colonies.'[32] The committee's second report, published in 1930, made the same point, while still being careful to put it into perspective among the other justifications with which it was concerned :

> There has been now for some time a shortage of trained biologists for vacancies overseas. It is on grounds of general education and culture and as a background for citizenship, that the Committee is most concerned to press for the introduction of Biology into all schools as a subject to be taken by all scholars. But with Biology so recognised the supply of Biological experts required for posts at home and overseas would be forthcoming. (33)

A similar mixture of motives was evident in T.G.Hill's presidential address to the botany Section in 1931 :

> The British Commonwealth of Nations is, in the main, an agricultural Empire : the great need for trained botanists for its administrative and technical service is patent; the problem is their supply and their training. ... No one wants an undue specialisation in the schools, but I would point out that the fundamental problems of the world are biological problems, for which reason I do most strongly urge that every encouragement be given to those who show a biological trend of mind to follow their bent. (34)

Hill's arguments were further elaborated during a subsequent discussion in his Section.[35]

Not unnaturally, the government also showed an interest in this question. The prime minister appointed a committee of the Economic Advisory Council under Viscount Chelmsford in March 1930 'to consider the obstacles which stand in the way of the education and supply of biologists for work in this country and overseas'. The committee was greatly impressed by the lack of suitably qualified biologists for government positions at home and abroad and for teaching posts in schools, and made a number of recommendations to ameliorate the situation, principally along the lines of improving conditions of service and of upgrading the status of biology relative to physics and chemistry in the secondary school curriculum. By the end of 1931, however, when the prime minister in his

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32. B.A.R., (1928), 406-407.
33. B.A.R., (1930), 263. The Laurie committee continued to sit for the rest of the decade, but no further report was produced.
34. B.A.R., (1931), 214.
35. ibid., pp.485-487.

capacity as chairman of the Economic Advisory Council wrote a foreword to the committee's report, the economic situation had changed so drastically that he was forced to observe :

> Since information as to the normal requirements of the [Colonial] Service was furnished to the Committee, the position has been altered as a result of the existing financial stringency. ... Little expansion of the Colonial scientific service can be looked for in the existing financial conditions. ... It must be uncertain how soon there will be an effective demand for an increased supply of men with biological training. (36)

The obvious moral was that manpower arguments were not the ideal means of promoting biology in schools.[(37)] In his presidential address to Section L in 1934, Henry Tizard pointed out : 'The lessons of the last few years teach us that public statements about the shortage of specialists in any branch of science and technology are apt to have an unfortunate effect in schools and in universities; for they may be out of date before a normal period of advanced training is finished.' He concluded that it would be a good policy 'deliberately to keep the supply somewhat short of the demand',[(38)] though this understandably provoked a deal of protest. J. B. S. Haldane, for example, indignantly wondered : 'Should a biologist regard himself as a mere commodity? ... A training in biology is of value not merely for success in science, but also for success in citizenship.'[(39)] Tizard, however, stuck to his point that training more science specialists than could be guaranteed appropriate employment might have serious social consequences : 'Which is more likely to make a man a good citizen? To find that the world wants him, or to find that it does not?'[(40)]

Even before the slump shattered the norms of economic forecasting, advocates of biology teaching at both school and university level used manpower arguments sparingly, if at all, and never in isolation. Laurie's committee is typical of the general approach in this respect. The

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36. Economic Advisory Council, <u>Report of the committee on education and supply of biologists</u> (H.M.S.O., 1933) (the Chelmsford Report), p.4. The foreword is dated 28 December 1931 : the text of the report was signed already on 20 May 1931. Although the Report bears the publication date 1933, this is probably a misprint for 1932. For comment on the report see J. Ritchie, 'The supply of biologists', <u>Nature</u>, <u>129</u>, (20 February 1932), 257-258.

37. cf. E. W. Jenkins, op. cit. (n.1 above).

38. <u>B.A.R.</u>, (1934), 215; cf. chapter V, p.107 above. See also Tizard's presidential address to the Science Masters' Association: <u>S.S.R.</u>, <u>15</u>, (March 1934), 277-291.

39. <u>Nature</u>, <u>134</u>, (13 October 1934), 571.

40. ibid., (20 October 1934), 629.

Chelmsford committee itself, though established precisely for manpower reasons, adopted a similar attitude :

> An adequate standard of intellectual equipment will not be obtained until biology is definitely recognised in the schools as a cultural subject apart from its value for medicine and for the professional biological services. Biology should be brought to the notice of every boy and none should leave school without some knowledge of it. (41)

In addition to the difficulties inherent in making manpower planning practicably viable, there seems to have been a general feeling that the image of biology as an educational subject would not be greatly enhanced by promoting too close an association with severely utilitarian aims : the intangible qualities of culture and citizenship served the purpose better. On the other hand, the great practical and economic benefits accruing from the application of biology to such fields as medicine and agriculture could scarcely be ignored by those concerned with public attitudes to biology. The social value of these applications could, however, be advertised without implying that the main function of biology in the educational system was to generate the requisite numbers of applied biologists.

The multiplicity of the arguments being used to promote the teaching of biology in schools and to link up such teaching with social issues was underlined at a national conference staged by the British Social Hygiene Council in December 1932. The British Social Hygiene Council owed its existence to the Eugenics Education Society, founded in 1907.(42) In 1914 the Society set up the National Council for Combating Venereal Disease which, having become established in its field and wishing to broaden its interests, changed its name to the British Social Hygiene Council in 1925. This in turn became the British Social Biology Council in 1950, the Ministry of Health having accepted full responsibility for work on venereal disease and the term 'social hygiene' being deemed no longer culturally acceptable. Among the declared aims of the body created in 1925, in addition to its inherited concern with venereal disease and a primary commitment to 'preserve and strengthen the family, as the basic social unit', were : 'to promote educative and social measures directed towards the development and

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41. Economic Advisory Council, op. cit., para. 118 (viii).
42. See n.26 above.

control of the racial instinct' and 'to emphasise the responsibility of the community and the individual for preserving or improving, by educative and social measures, the quality of future generations'. A conference under the auspices of such a body could be expected to have much to say on the subject of biology for citizenship.(43)

The conference bore the title 'The place of biology in education'. It numbered among its patrons 'five Ministries, the chairmen of the Advisory Council to the Department of Scientific and Industrial Research, of the Medical Research Council, and of practically every educational body of importance'. It was attended by 'administrators and leaders of research ... side by side with men of high standing in the educational world'. In the opinion of the Nature correspondent, 'it would be difficult to imagine a gathering of greater weight.'(44) The conference proceedings were edited and published in book form by J.G. Crowther.(45) I shall confine the following analysis to themes that belong to the broad heading of biology for citizenship, though other justifications were also advanced. Such themes were much in evidence. As the Nature correspondent wrote :

> On every side, the biological aspects of citizenship grow more significant and the need for biological education more urgent. The fundamental note of the Conference was the recognition of this need, and of the corollary that in every stage of education, and for girls as well as for boys, biology must have its place. (46)

At this conference as during previous discussions of the issue, the rôle of biology in education for citizenship was considered from two points of view. The one stressed how familiarity with biological concepts and biological modes of thought influenced the pupil's attitude to his own life and to his relation to the society in which he lived. The other concentrated on the need to equip citizens with the basic data of biology. The distinction is between biology as a method of approaching social issues and biology as a source of socially relevant information,

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43. For further details of the British Social Hygiene Council, see Ann Scoggins, The development of social biology (M.Ed. thesis, Chelsea College, 1976), chap. IV and Biology and human affairs, 16, (1950), 57-60.

44. S.A.McDowall, 'The place of biology in education', Nature, 130, (10 December 1932), 899.

45. J.G.Crowther, ed., Biology in education (Heinemann, 1933). At that time the British Social Hygiene Council did not have its own journal. In 1935 it started publication of Biology - a journal for schools and teachers; in 1943 this was renamed Biology and human affairs.

46. S.A.McDowall, art. cit., p.899.

and bears some resemblance to the distinction between the rationalists' concern with the social importance of scientific method and the British Association's emphasis on the social effects of actual scientific discoveries.

The ethical functions of science, it will be recalled, had been discussed at the two most recent meetings of the British Association (see chapter III above). The subject was raised again at the biology in education conference. The nutritionist William Hardy quoted from Smuts' 1931 address and suggested that the ethical value of natural science lay in the exaltation of reason at the expense of emotion, which he thought was then much needed. While the physical sciences developed this critical spirit in the context of the inanimate world, the biological sciences did so in the context of the living world, where there was much greater danger of the emotions exerting undue influence. A biological training therefore gave the student direct practice in countering the emotional by the rational and thus increased his ability to behave ethically. Hardy claimed that 'biology ... alone can bring out the ethical side of natural science, and that, to me, is the main reason why biological knowledge should be broadcast.'[(47)] Douglas Laurie, too, placed great hopes on the ethical potential of biology, especially since the traditional sources of ethics seemed to be losing their authority :

> Many of the old sanctions for conduct have weakened or have gone, and the furnishing of new sanctions is falling in no small part to the lot of Biology. The influence of biology in training for life should make for both stability and progress.

Other speakers, however, took a more critical view of the claim that biology could exert so powerful an ethical influence and of the assumption that such influence as it could exert was automatically beneficial. Michael Sadler, the distinguished Master of University College, Oxford, agreed that 'an education which is inhospitable to biology cannot effectively prepare for life', but he was anxious that biology should not be used to substantiate wrong ideas. Especially was he perturbed by the 'smoothly optimistic version of biology which whittles down sin', the notion that sin was merely 'a rapidly evaporating relic of an earlier stage in human evolution'. 'Experience', he remarked drily, 'leads me to take a more serious view.' The retired headmaster of Rugby, W.W. Vaughan, was similarly concerned that the ethical and moral implications

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47. All quotations are taken from n.45. Except for cases of ambiguity, detailed references to this book have been omitted in order to avoid unnecessary proliferation of footnotes; quotations may readily be located by use of the index.

of biology should not be over-rated :

> I believe that biology is important for morality and that we shall have a more moral nation as the people know more about biology, but to stress that as the reason for introducing it and strengthening it in our schools seems to me a disastrous mistake. The mysteries of morality are not to be solved by introducing another subject into our curriculum.

He illustrated the limited effectiveness of biology in this direction by pointing out that biology students were not noticeably more moral than their colleagues from other disciplines.

There was, then, some doubt as to whether biological teaching was indeed fundamental to the development of higher standards of ethical behaviour. Psychological considerations added to this doubt : F. A. Cavenagh, professor of education at Swansea, stressed that 'the value of the study of biology for moral training may be exaggerated, and it would be a fallacy to exaggerate the mental training supposed to come out of biology.'(48) The question of how the debate on the psychological theory of transfer of training affected the biology for citizenship argument will be examined in detail below.

The conference on the whole concurred with Vaughan's 'timely warning' that arguments about general individual ethical standards should not be emphasised in the campaign for increased biology teaching.(49) On the other hand, there was unanimous agreement that the teaching of biology could help to impart apposite personal habits in such matters as hygiene, nutrition and general domestic welfare and that this constituted a powerful argument in favour of the subject. There was some considerable hesitation, however, as to whether this theme should be extrapolated to include individual sexual behaviour. Most speakers agreed that simple instruction in the physiology of sexual reproduction could be given naturally in the context of the school biology course and that a course which omitted all reference to reproduction was seriously inadequate; but whether this should be used as an argument for increased biology teaching was another matter. Too close an association in the public mind between school biology and sex instruction had, it was thought, seriously prejudiced the former. As Walter Morley Fletcher, secretary of the Medical Research Council, delicately put it : 'The fear ... of impropriety residing somewhere in Biology has hampered and delayed the proper development of school teaching in biological

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48. Cavenagh was a leading member of a Section L research committee which produced an authoritative report on the theory of formal training in 1929.

49. S.A. McDowall, art. cit., p.900.

subjects.' Although J. G. Crowther claimed that 'this misunderstanding has now been removed',[(50)] it was on the whole deemed tactically unwise to emphasise the connection between school biology and sex education.

In addition to tactical considerations, it was pointed out that, anyway, the dissemination of the relevant biological facts would not necessarily generate higher standards of sexual behaviour. Frederick Mander, general secretary of the National Union of Teachers, observed: 'It is a fundamental fallacy to assume that human conduct can be activated merely by factual knowledge. ... The springs of human conduct must flow from something very much deeper than factual knowledge even of biology.' Or, in the words of the Times Educational Supplement, 'a social and religious purpose should underlie all these tentative efforts to understand the processes of life.'[(51)] At least on the individual level, the conference did not offer much to support Smuts' boast that 'science may be destined to become the most effective drive towards ethical values.'[(52)]

A somewhat different aspect of sexual reproduction - its relation to the issues of heredity and eugenics - was considered in detail by S.A. McDowall, chaplain and assistant science master at Winchester and a confirmed eugenist. McDowall summarised the previous fifty years of social history as 'the practical abolition of natural selection in civilised man and the substitution of an artifical selection of the least fit'.[(53)] He argued that it was the 'duty' of teachers not only to impress these 'facts' on their pupils but also to show them how family allowance schemes and 'voluntary sterilisation of the unfit' might help to reverse the deterioration of the race. Miss S. Kelsey, an assistant mistress at Eltham Hill School, suggested that enough heredity should be included in the biology syllabus 'to make possible in later life an intelligent consideration of the Science of Eugenics', but she did not elaborate. In his introduction to the edited proceedings, J.G. Crowther mentioned some of the issues debated by eugenists as questions which 'cannot be understood without biological knowledge':

> How can people decide on suitable legislation for the treatment of the mentally disordered? ... How are backward

50. J.G. Crowther, op. cit., p. vi.
51. T.E.S., 17 December 1932, p.465.
52. B.A.R., (1931), 13. cf. Chapter III, n.6 above.
53. cf. Ruggles Gates, p.330 above.

> races to be treated? ... Our children must understand the biological aspects of the racial problem if they are to have a peaceful future.

On the whole, however, there was little attempt at a concerted examination of the relation between eugenics and school biology such as had been undertaken by Section L in 1931. This is slightly surprising in view of the origin and declared aims of the British Social Hygiene Council. But although the conference was organised by the Council, its participants were drawn from a much wider circle and they would not have been expected necessarily to share the Council's interests. As the Science Masters' Association had discovered in 1930, the connection of biology with heredity and eugenics was an even greater embarrassment than its connection with sex instruction. For a group of men trying to increase the popularity of biology in the educational system, it made sense not to over-emphasise these more controversial aspects of the subject.

On moving from the value of biology teaching for individual ethics to its importance for the community as a whole, the conference was more certain that it was an essential element in the formation of the responsible citizen. This, again, was argued from two points of view : biology as a way of looking at society and biology as a body of socially relevant factual knowledge. The most extreme statement of the former point of view came from J.G. Crowther :

> How can we expect to understand other human beings and ourselves if we do not study biology? ... Individual and social life is a branch of biology. Clearly civilisation is a part of the subject matter of biology. When people come to understand that the whole of life, everything that happens to a human being, is a part of the subject of biology, they are astonished to discover that biology is often not taught at all. (54)

Crowther gave an example of how the study of biology in this sense could contribute to citizenship :

> A study of the organisation of a living body strengthens the student's conception of the idea of organisation, and when this idea is carried into the realm of social philosophy, the demand for the better organisation of civilisation is to be expected. (55)

He therefore concluded that 'the young who will ultimately govern now need a knowledge of biology to help in the control of an industrial and scientific civilisation.'(56)

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54. J.G. Crowther, op. cit., p.3.
55. ibid., p.4.
56. ibid., p.41.

In a not dissimilar vein, Alan Gardiner, head of science at Bradfield, suggested that, without a grasp of biological principles, future politicians and administrators 'are bound to suffer a severe handicap in facing the social and economic questions of the day'. It was not only the leaders of society who needed such a training : it was necessary for all members of society if they were to take that intelligent interest in political affairs which was vital to the efficient functioning of democracy. Thus Morley Fletcher declared : 'There can be no true interest, no uniform interest in State-craft, either in the affairs of our own nation or in world affairs, on the part of those who are ignorant of the laws of life.'

Many speakers developed the theme that as biology revealed more and more about the general social environment, so its importance in the educational system grew. Douglas Laurie, for example, in the spirit of his committee's 1928 report, suggested that one of the chief functions of biology teaching was to furnish 'a background which will help towards an appreciation of the biological foundations of society'. G.S.M. Ellis of the National Union of Teachers argued that 'biology is fundamentally important because of the concepts which may be carried over from it to the sociological studies, history, geography and citizenship.' S.A. McDowall was even more forthright :

> It is the clear duty of the Public Schools to give to every boy such general training in biology as will enable him to understand ... the biological factors in sociology and economics. This training in citizenship we owe to Society and its importance cannot be over-estimated.

The notion that biology should be widely taught because of the pertinence of biological concepts and modes of thought - as opposed to biological data - to sociology, citizenship and the control of civilisation attracted two sorts of criticism. The first was concerned with the vulnerability of such a programme to political manipulation. J.W. Stork, biology master at Charterhouse, was wary of the teaching of 'biological sociology' because 'without a much greater foundation of biology than [sixth formers] can ever hope to have this does more harm than good.' His point was that pupils should not be presented with 'scientific' statements about the nature of society which were beyond their capacity to criticise.(57) The Times Educational Supplement was deeply

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57. cf. J.W. Stork, 'Biology and the school curriculum', Report of the 22nd annual conference of educational associations (1934), pp.17-22, esp. p.21 : 'A superficial knowledge of Biology may be very dangerous indeed.'

suspicious of the motives behind the arguments for a socially-oriented course of biology :

> Some persons, apparently interested in pure biology, seek to use it for the purpose of social adventures that are definitely adverse to the Christian structure of society. They are not contented with the Hadow Report. (58) ... A high standard of veracity ... is not always to be derived from controversial books on social biology. (59)

The second criticism of the notion that the value of biology in training for citizenship derived from the applicability of biological concepts and attitudes to social affairs was based on the psychological theory of transfer of training.[(60)] In its original form this theory maintained that the brain was made up of a number of distinct faculties. If a given faculty was exercised on one particular subject, it was believed to be strengthened as a whole and thus to be better able to handle any future subject. For example, it was thought that in studying physics one acquired an aptitude for close observation of physical phenomena and for careful deduction from such observations; that in the process, the generalised faculties of observation and deduction were improved; and that this improvement could be transferred from the specific field in which it originated - in this case, physics - to other fields far removed from physics, or even science. This theory dominated educational thought in the nineteenth century. It was long used to justify the pre-eminence of classical studies at school and when advocates of physics and chemistry sought to gain a place for their subjects in the school curriculum they had to couch their arguments in terms of faculty psychology. Around the turn of the century a number of factors, chief among which was the impact of the ideas of Johann Herbart,[(61)] seemed to render the theory totally untenable. During the following decades, however, more sophisticated psychological research led to a modified

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58. The leader had previously quoted that passage from the Hadow Report referred to in n.10 above.

59. T.E.S., 17 December 1932, p.465. cf. J.A. Lauwerys, Education and biology (Sands, 1934), pp.v, 51, 53.

60. For an authoritative contemporary review of faculty psychology, see the report of the Section L committee on formal training : B.A.R., (1929), 302-309. An historical sketch is provided in appendices IV and V of Board of Education, Report of the Consultative Committee : secondary education with special reference to grammar schools and technical high schools (the Spens Report) (H.M.S.O., 1938).

61. The best recent account of Herbartianism is R.J.W. Selleck, The new education (Pitman, 1968), chap. VII.

position. This was that transfer of improvement between fields could, indeed, occur, provided: (i) that there were 'common usable elements', of material, method or ideal, in the two fields concerned; (ii) that the pupil had been made deliberately aware of the nature of what he had learnt; and (iii) that the transfer was effected consciously. Thus transfer, though possible, was neither universal nor automatic.

How did this affect the debate about the educational functions of biology? The psychological subtleties of the issue seem, not surprisingly, entirely to have escaped many of those involved. Graham Kerr, for example, disparaged the value of biology for mental training only because he thought that the physical sciences did the job better, and not because of doubts about the concept of mental training itself. A number of speakers at the 1932 conference argued that biology was educationally important precisely on account of its rôle in mental training. F. A. Cavenagh had to remind them that psychological research disproved their easy faith: 'It would be a fallacy to exaggerate the mental training supposed to come out of biology. It is simply not true to say that biology increases the powers of observation or accuracy.' One may note, though, that if this was true of biology it was equally true of physics and chemistry; the entrenched position of the latter subjects in the school science curriculum could no longer logically be justified in terms of a simplistic theory of mental training.

The modified theory of transfer of training implied that the broader social arguments for biology teaching had to be advanced with a certain degree of sophistication, which was usually conspicuously absent. For example, Crowther's claim that the study of the organisation of a living body would influence the pupil's attitude to the organisation of society could only be valid under fairly specific conditions: the teaching would have to be such that the 'common usable element' - the concept of organisation in this instance - was made explicit in each context and that the pupil was led to a conscious appreciation of the similarity between the two contexts. Again, if there actually were any 'biological factors in sociology and economics', then they would have to be deliberately emphasised in any course of biology intended to make such factors a part of training for citizenship.

In short, psychological considerations required that the broader social arguments for biology teaching - i.e. biology as a source of socially applicable concepts - were only viable if often controversial issues of a social and political nature were to be allowed to impinge on the biology curriculum to a far greater extent than thitherto. Otherwise, aptitudes developed during the course of ordinary school studies would have no significant influence on pupils' attitudes to social affairs. Whether such a curriculum was desirable, from the point of view either of education or of the public attitude to biology, depended on one's appraisal of the social functions of education in general and of biology teaching in particular. Bearing in mind that school zoology was at this time still fairly suspect, and that the Science Masters' Association was distinctly wary of the teaching of heredity, an explicitly socially-oriented course of biology could not have failed to arouse widespread opposition. One could, of course, claim that anything less was inadequate both as a representation of the scope of biology and as a preparation for citizenship. Crowther's outburst that 'the whole of life, everything that happens to a human being, is a part of the subject matter of biology' and, by implication, should therefore be included in the biology syllabus, had at least the deceptive virtue of simplicity, but it rendered 'biology' so general as to be totally meaningless. Julian Huxley's 'any subject is capable of being examined by the scientific method'[62] performed an analogous service for 'scientific method'.

It was, however, possible logically to argue an educational rôle for biology in terms of training for citizenship without getting into such deep waters. This involved demonstrating that familiarity with biological data - as opposed to biological concepts - was essential for modern living. By stressing directly applicable facts rather than purportedly transferable concepts one could side-step psychological controversies and avoid a syllabus overburdened with difficult social and political questions. There were many matters for which biological knowledge could be claimed relevant. Health, both individual and communal, was the most obvious and encompassed everything from personal hygiene to urban sanitation to fresh air and exercise. The art of feeding onself adequately required some knowledge of biological affairs, as the recent discovery of the nutritional importance of vitamins emphasised. An elementary acquaintance with physiology would facilitate the prevention of disease and might even be of value in the dissemination of necessary knowledge about sexual reproduction. Some more general social problems such as food policy, the health service, the care of the mentally sub-normal and safety at work involved biological data, which had therefore to be widely available before intelligent public discussion could enable decisions to be reached democratically. It was in this sense

62. cf. Chapter IV, n.7 above.

that A. V. Hill told the conference : 'To be totally ignorant of biology is to be an incompetent citizen.'

There was, then, a considerable variety of aspects to the thesis that biology was an essential element in education for citizenship. The citizenship theme, moreover, was only one of a number of arguments for an increased educational rôle for biology. At the end of 1932 there was, certainly, a degree of anxiety about citizenship - felt, perhaps, most strongly by those who allied themselves with the eugenic camp - but concern about the advancement of biology was probably a more potent source of motivation. If biology was to make significant headway as an educational subject, then the public apathy of which W. J. Dakin complained had to be overcome. To this end, the teaching of biology had to be shown to be pertinent to the present interests and future occupations of pupils from a wide range of backgrounds. Since all pupils had in common citizenship of a democratic society, an emphasis on how biology - whether as a body of relevant knowledge or as a source of transferable concepts - could contribute to training in citizenship would help to create a more favourable public attitude to biology. Such an emphasis implied the need for a syllabus that was much more man-centred than thitherto. A similar syllabus had already been advocated by those arguing the case of geography for citizenship. The social relations of biology, however one considered them, necessitated both a larger and a reoriented rôle for biology in the educational system.

With reference to the analysis worked out in chapter V above, biology as a body of socially useful knowledge may be said to correspond to the British Association line on the social relations of science and biology as a source of transferable concepts to the rationalist line. As hinted in the opening pages of this chapter, the activities of Section D in particular give the paradoxical impression that the British Association was actually following the rationalist justification for the political function of biology teaching. This ambiguity was further apparent in Gowland Hopkins' presidential address at the 1933 meeting of the Association.[63] He spoke of the public apathy towards the tremendous developments that had recently been achieved in the biological sciences and contrasted it to the great popular interest aroused by the progress

63. B. A. R., (1933), 1-24, esp. pp. 18-21.

of the physical sciences.[64] The chief cause of this disparity lay, he thought, in 'the neglect of biology in our educational system'. This imbalance impoverished the cultural and philosophical life of the nation but, in Hopkins' view, it had a second and more serious consequence : 'It is ... because of its extreme importance to social progress that public ignorance of biology is especially to be regretted.' 'Biological truth', he emphasised, was 'a necessary guide to individual conduct and no less to statecraft and social policy'. In expounding this theme he seemed to advocate the rationalist line on the social functions of biology :

> With frank acceptance of the truth that his own nature is congruent with all those aspects of nature at large which biology studies, combined with intelligent understanding of its teaching, man would escape from innumerable inhibitions due to past history and present ignorance, and equip himself for higher levels of endeavour and success.

He chose, however, to illustrate this by reference to nutrition, which was a prime example of the informational rather than the conceptual value of biology to society. Moreover, he later explained the thinking behind his proposal for a modern version of Salomon's House in terms of the social implications of scientific knowledge and not of scientific method.[65]

Later in the same meeting Josiah Stamp came out strongly against the rationalist line, condemning the futility of 'government by scientific technique, technocracy, or any other <u>transferred</u> technique' since 'human wills ... can never be regulated by the principles which are so potent in mathematics, chemistry, physics, or even biology.'[66] In its memorandum to the sectional organising committees in December 1933, the Council of the British Association made it plain that in considering how the development of science affected society it would deal neither with the application of scientific method to general social problems nor with changes in social organisation which scientific advance seemed to suggest, but only with strictly practical applications of science. Within the confines of this programme there was still scope for arguing that biology merited greater educational priority on account of its social importance, along the lines taken by, for example, A. V. Hill at the 1932 conference. 'If Boswell's memory was accurate, it seems

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64. Henry Dale had made the same point in his Norman Lockyer lecture to the British Science Guild in November 1931 : see <u>Nature</u>, <u>128</u>, (28 November 1931), 897-898.

65. cf. Chapter IV, p. 80 above.

66. <u>B.A.R.</u>, (1933), 583.

that the zoologists were opposed to the British Association taking any action on the memorandum,[67] which is a strange contrast to their previous enthusiasm for a socially relevant course of school biology. It does, however, illustrate the difficulty of identifying a consistent British Association attitude to the issue.

The relation between the demand for a socially-oriented course of school biology and the demand for the development of the social sciences is a complex theme that runs through all of the three main approaches to the social relations of science debate. Hopkins, for example, seemed to support this idea in his 1933 presidential address, though the British Association as a whole equivocated. In his series of talks for the B. B. C., the rationalist Julian Huxley argued that 'we must regard society itself as a proper object for scientific treatment. .... The Government ought to organise research on social subjects';[68] that more biology in schools would 'encourage a sensible attitude to life';[69] and that the development of social science would promote 'a scientific attitude to social problems'.[70] This central tenet of the rationalist faith was criticised by the radicals as irrelevant to fundamental social progress, most notably by Blackett and Levy in their conversations with Huxley.[71]

The radical position nevertheless, was not that clear-cut. Lancelot Hogben - admittedly, not the most typical of radicals[72] - was professionally committed to the development of the social sciences through his tenure (1930-1937) of a unique chair of Social Biology at the London School of Economics, where he gained a controversial reputation for himself.[73] A radical who adhered more strongly than Hogben to orthodox marxism, the science journalist J.G. Crowther, was the most outspoken advocate of the importance of the social sciences and their

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67. Boswell, <u>A narrative</u>, p.224. cf. Chapter IV, n.79.
68. Julian Huxley, <u>Scientific research and social needs</u> (Watts, 1934), pp.31-32.
69. ibid., p.222.
70. ibid., pp.223-224, 264.
71. cf. Chapter IV, nn.10-14 above.
72. cf. Chapter VII, n.57 above.
73. Werskey, <u>Visible College</u>, pp.187-190.

influence on school biology at the 1932 Social Hygiene conference. A third radical, the geneticist J. B. S. Haldane, discussed the social functions of biology in his 1934 Norman Lockyer lecture to the British Science Guild.(74) Like Hopkins, he remarked that popular books in the physical sciences, especially astronomy, had a far larger market than equivalent books on biology, which caused him to comment that the layman was ready to admit his ignorance of the former but already had 'very definite ideas about the application of biology to human affairs'. Haldane argued that 'a science of social biology must exist and must develop'; in particular, he stressed the need for trained specialists in such fields as human genetics, population studies, nutrition, reproduction and housing. It may be that radicals working in the biological sciences were the more ready to go along with the rationalist emphasis on the application of biological thought to social affairs.

As described at the end of chapter XI above, the threat to democracy posed by the combined forces of economic crisis and the rise of totalitarianism led in May 1934 to the formation of the Association for Education in Citizenship. In 1935 the Association published a book on secondary schools. It is particularly significant in the present context that the chapter dealing with the rôle of science was written 'with special reference to biology'.(75) Its authoress, Doris L. MacKinnon, professor of zoology at King's College, London, indicated a number of ways in which biology could contribute to citizenship. Both factual and conceptual aspects of the question were considered. She spoke of the function of biology in mental training, which was especially valuable since its dispassionate methods were developed in areas where the emotions were most likely to be involved.(76) In emphasising the importance of the power of clear thinking, she was consciously following the Association's line that democracy was endangered by its vulnerability to mass propaganda and that its best defence lay in strengthening the critical abilities of the general population.(77) She attached even greater importance, however, to the informational value of her subject,

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74. F. A. E. Crew, 'Human biology and politics', Nature, 134, (8 December 1934), 865-866.

75. Association for Education in Citizenship, Education for citizenship in secondary schools (O. U. P., 1935), chap. XIII.

76. cf. William Hardy's speech to the 1932 conference: p. 336 above.

77. The book referred to in n. 75 devoted two chapters to 'clear thinking'. See also S. R. Humby's paper to Section L in 1936: 'The critical powers should be trained so that the young citizen will be apt to suspect the abundant panaceas of the self-interested and the thoughtless.' B. A. R., (1936), 431.

which gave it a unique educational significance : 'Since, of all the sciences, biology has the most obvious contacts with human life, its subject-matter is of vital importance in the education of the potential citizen.' She illustrated her theme by reference to health :

> Intelligent application of the rules of personal hygiene is possible only when elementary biological principles have been grasped; and surely the more intelligently the citizen looks after his body's health, the better for the State ? ... Training in elementary biological principles is necessary to prepare the future citizen for intelligent appreciation of public schemes for improvement of the national health.

Another example of the social importance of apposite knowledge was the question of population : without some acquaintance with the biological factors influencing the size and quality of population, argued MacKinnon, 'the uninstructed layman would fall an even surer prey to prejudiced demagogy.'

The Association for Education in Citizenship was also willing to follow the rationalist line, that biology was valuable in training for citizenship on account of the concepts which could be transferred from the strictly biology contexts in which they were developed to wider social spheres. Thus MacKinnon claimed that biology could contribute to social stability, since it taught that all plants and animals, including man, were mutually dependent :

> What he has learnt at school of biological interdependence may make him a better citizen of the world; and it should help him to work for peace among the nations. For no nation lives to itself alone, and what brings disaster upon one involves all that are associated with it.

The study of biological evolution, too, could influence the pupil's attitude to social affairs and to his responsibility for them :

> The man who has learnt early that the future of the human race will be determined by its present, just as its present depends on what has happened in its past, this man is less to be excused for backing a short-sighted policy in public affairs when his opinion, as citizen in a democracy, is called for at the poll.

Responsible participation in the decision-making processes of democracy required both a knowledge of the basic data of biology and the sort of outlook on social affairs that could be derived from them.

Another book published in 1935 was The frustration of science, produced by a group of radical scientists mostly connected with the Association of Scientific Workers.(78) This book gave little support

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78. Daniel Hall et al., The frustration of science (George Allen & Unwin, 1935). cf. Chapter VI, nn.48-52 above.

to those who felt that the development of the social sciences held the key to social progress and that this warranted the up-grading of the appropriate subjects in the school curriculum. As Brightman observed :

> The book pleads not so much for the participation of the scientific worker in the actual task of government on such lines as those outlined by Prof. Miles Walker in a well-known address, (79) or even of the contribution of a detached, scientific attitude to political questions, as for the body of scientific workers to throw in their lot with one or other of the main contending forces.

He added :

> This contention will no doubt disappoint many who believe that the study of difficult political, social and economic questions by the scientific method is a most fruitful line of advance. (80)

The question of the social sciences was one of the main features of the 1935 meeting of the British Association, at which the Association found itself under considerable pressure to foster their development. The argument was, however, conducted in terms of the application of scientific method generally to social problems and made no reference to the issue of social biology. The resolution which emerged from the meeting was put forward by the economics and psychology Sections : the biological Sections were not involved. After some debate the Council decided that encouragement of the rationalist attitude to the social relations of science was against the best interests of the British Association. Later that year Gowland Hopkins reinforced its decision by pointing out that beyond the confines of his own speciality the scientist could contribute little, as a scientist, to social affairs.(81)

The issue was raised again at the 1936 Blackpool meeting. In his presidential address Josiah Stamp reminded his audience, not for the first time, of the great difficulties inherent in attempts to solve social problems in a democratic community by the application of scientific method to economic planning. He did, however, suggest that something could be achieved by the reallocation of resources so as to give greater priority to 'the science of man' - by which he meant physiology, psychology, economics and sociology. Indeed, he argued that such reallocation was vital if the development of the physical sciences was not to wreak havoc on society. His advocacy of the social sciences found much support; but, as in 1935, there was no specific mention of

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79. i.e. His presidential address to Section G in 1932. See chapter III above.

80. Brightman, 'Science and citizenship', Nature, 135, (16 March 1935), 414-415.

81. See chapter VI above.

biology, either as a professional discipline or as an educational medium, in this context.(82)

The rôle of education, and particularly of science education, in helping to overcome social problems loomed large in what Josiah Stamp described as the 'outstanding session' of the Blackpool meeting(83) : a discussion in Section L on 'the cultural and social values of science'.(84) During this discussion Daniel Hall argued, similarly to Doris MacKinnon, that science education could contribute to national and international peace since it could 'teach boys and girls in their earliest formative years that all the world over men and women are, collectively and statistically, very much alike' and thus help to break down religious, ethnic and class prejudices. He also suggested, as many had done before him, that 'the specific value of a background of science is that it will encourage, if not create, the habit of acting on reason instead of on emotion.' Lancelot Hogben, however, insisted that the educative importance of science did not derive from 'gratuitous assumptions about the transfer values of particular disciplines'.

For Hogben the question of the place of science in education was emphatically one to be discussed in social rather than in academic or in vaguely cultural terms : he insisted that the claims of science rested primarily on 'the social fact that the use and misuse of science intimately affects the everyday life of every citizen in a modern community'. It was not sufficient for teachers merely to indicate how science was actually used by society :

> What is far more important is a recognition of the potential of human welfare inherent in scientific knowledge which existing social machinery fails to exploit for the commonweal. ... Education for citizenship demands a knowledge of how science is misused, how we fail to make the fullest use of science for our social well-being, and, in short, a vision of what human life could be if we planned all our resources intelligently. (85)

The driving force behind Hogben's anxiety over the state of science teaching was that neglect of science as the major source of urgently necessary material progress and misuse of science in the production of armaments, coupled with widespread indifference among both scientists and non-scientists to this situation, threatened the survival of democracy.

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82. See chapter VII above.
83. Manchester Guardian, 17 September 1936, p.5.
84. B.A.R., (1936), 429-432; John Boyd Orr et al., What science stands for (George Allen & Unwin, 1937), chaps. IV - VI.
85. John Boyd Orr, op.cit., pp.120-121.

Hogben was a firm adherent to the marxist view that the pursuit of knowledge for its own sake was nonsensical and that continued belief in it was dangerous for society :

> The only valid distinction between pure and applied research in natural science lies between enquiries concerned with issues which may eventually and issues which already do arise in the social practice of mankind. ...
>
> The defects of the present content and outlook of humanistic education as a preparation for leadership in a democratic society may all be summed up in the single statement that knowledge is encouraged as a means to more knowledge instead of being a means to action. (86)

In order to correct this, he argued that science teaching should be 'permeated with the historical outlook' in such a way as to demonstrate the relations between social and scientific progress :

> A course of general science adapted to the requirements of citizenship should be orientated towards the elucidation of the major constructive achievements of natural knowledge in the evolution of civilisation. (87)

Hogben thought that such progress as had already been achieved in the direction of socially relevant science teaching was due to 'the efforts of educationists with very little encouragement from scientific specialists in the universities' - though the evidence of this chapter casts doubt on his analysis. He illustrated his point by complaining of the excessive academic influence on school biology : 'It has few, if any, explicit contacts with the social applications of biological discoveries or with the everyday experience of children brought up in congested urban centres. (88) Such contacts were essential both for an appreciation of the radical interpretation of the process of scientific development and for an understanding of how closely the implementation of scientific knowledge and the survival of democracy were related.

A Nature leader published a couple of months before the Nottingham meeting of the British Association was struck by the 'grim reality of nations self-contained, self-striving and living in a fear-haunted hostility which keeps us on the brink of unimaginable dangers', and discussed how education might be used to avert the impending catastrophe. The leader observed that dictators 'have at least learned to use the machinery of their schools', whereas, in Britain, 'the world of education moves on with calm serenity and is by no means convinced that, if it neglects the problems which none of its students can ultimately avoid, it neglects a

86. Lancelot Hogben, The retreat from reason (Watts, 1936), pp. 8, 12.
87. John Boyd Orr, op. cit., p. 123.
88. ibid., p. 120.

vital duty.' The leader-writer, who was a Council member of the Association for Education in Citizenship, remarked that education for citizenship could not be left to the vagaries of a curriculum founded on the theory of transfer of training. Although 'indirect' methods were perhaps appropriate to part-time adult education, for those in full-time education it was far more effective to use 'direct' methods : i.e. to extract from each individual subject as much as was immediately relevant to issues of citizenship. The introduction of studies of 'the social sciences, the structure of government, modern political and industrial problems' was therefore urged as a way of highlighting important citizenship issues. The leader recognised that such a course would be controversial but thought that a lesser danger than ignorance : 'If a scientific approach to social and political problems be not taught, young people will be left unprotected, both now and in later life.'(89)

At Nottingham, the British Association was faced with renewed calls that it should concern itself with the social effects of science and with the development of the social sciences. The educational aspects of these issues were considered in several Sections. In his presidential address to Section K, E.J. Salisbury, professor of botany at University College, London, spoke of the derisory public attitude to botany and attributed it largely to the way the subject had been taught in schools. He set out to show how botanical factors permeated both the cultural and the practical life of society and observed that the general ignorance of these factors was the outcome both of an adverse educational tradition and of the indifference of the professional botanist to the social ramifications of his work. Such ignorance constituted not only a serious cultural impoverishment but also a hinderance to social progress : Salisbury argued that 'a sympathetic understanding of botanical thought and progress' was essential for an adequate appreciation of such public problems as agricultural policy, land utilisation, afforestation, drainage and water supply, the preservation of rural areas and the provision of national parks. The generation of this sympathetic understanding, for which appropriate school courses of botany were clearly important, was a pre-requisite for the responsible public discussion that accompanied decision-making in a democractic society :

> Only on the foundation of a knowledge of plant life and its requirements can an educated public opinion be built up that will receive and give effect to well-considered legislative

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89. J. Wickham Murray, 'Citizenship', Nature, 140, (10 July 1937), 43-44.

action. Moreover, it is perhaps truer of these pressing questions than of most that a sympathetic and informed public opinion is essential to the continued effective operation of any policy however well conceived and enlightened. (90)

The claims of physiology to greater public consideration were advanced in a discussion held by Section I in which it was suggested that, far from being the preserve of medical students, physiology should take its place as a subject of general education.[91] This was argued both from the value of the knowledge it imparted and from the outlook which that knowledge generated. Winifred Cullis, professor of physiology at the Royal Free Hospital, suggested that the practical value of physiology - 'the science behind the practice of health' - indicated the need for its wide-spread teaching : 'It is vitally important that everyone should know something of it for his own physical welfare and to enable him to take a proper share in developing the health and well-being of the community.' Good citizenship involved being able to contribute knowledgeably to those public issues - Cullis instanced public health, control and distribution of milk, food policy, housing, unemployment benefit, vaccination, contraception and eugenic sterilisation - which involved physiological considerations. H.E. Magee argued that public education in physiology would lead to 'the raising of the general level of health and physique'. On the principle that education should proceed from the familiar to the unfamiliar, R.C. Garry, professor of physiology at Dundee, proposed that human physiology could be made the basis of school biology. Physiology, he claimed, 'imparts a foundation of knowledge absolutely essential for every citizen of a democracy, it is good science, good biology, and is admirably adapted to school instruction'. It is interesting that, in contrast to discussions in the late nineteen-twenties, the rôle of physiology in sex education was not mentioned by any of the speakers at Nottingham.

In addition to its practical significance, Winifred Cullis spoke of the 'biological <u>outlook</u>' which would accrue from the study of physiology and which 'would be of the greatest value, especially to legislators and Members of Cabinet'. The leaders of society had to be sufficiently imbued with this outlook to know when to call in the physiological expert and to be able to evaluate his advice. L.P. Lockhart, chairman of the Association of Industrial Medical Officers and a member of the Nottingham-

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90. <u>B.A.R.</u>, (1937), 227-236, esp. p.236.

91. <u>B.A.R.</u>, (1937), 411-412, 474-485. For Lockhart's paper see <u>The Lancet</u>, <u>ii</u>, (1937), 1177-1179.

shire Education Committee, developed this theme in arguing the need for physiology teaching in secondary schools and universities :

> It is from these institutions that the majority of our legislators, administrators, industrial leaders, and influential teachers emerge to deal with a world in which it is impossible to get a truly objective view of reality without some sound physiological understanding. ... A modern democracy must be physiologically minded if it is to solve its problems effectively.

Social developments had led to increasing concentration of power and influence; it was vital that those upon whom this power devolved should be sufficiently 'physiologically minded' to appreciate that physiological factors lay behind many social problems and to be able to summon and assess appropriate expert assistance. Continued neglect of such considerations, warned Lockhart, could have serious consequences : 'If we allow the physiological basis of most of the social unrest in the world to become fogged by political argument we shall do irreparable harm.' Physiology was, in fact, so important an element of education for citizenship in a democractic community that Nature declared : 'The time has clearly arrived when the place of physiology or human biology in school science courses must be given serious attention.' It therefore regretted that the Section I discussion had not been arranged in conjunction with Section L : the discussants had all been professional physiologists or doctors, to the exclusion of educationists.(92)

Section L, meanwhile, was considering the report of a research committee on the place of science in adult education.(93) This report stressed the need to deal with 'the social implications of science and its impact on the life of the community', both because of the inherent importance of the matter and because it was thought that adult students would naturally be interested in it. A recent Board of Education memorandum was criticised for underrating these aspects of science. In defining the aims of science teaching in adult education, the committee applied to science as a whole some of the social justifications that had already been used in the narrower context of biology. For example :

> A student will be led to recognise the part played by science and scientific achievement in moulding the society of to-day, and he will thus acquire a fuller understanding of human activity and of the manifold aspects of social development.

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92. R.C.Garry, 'Physiology in general education', Nature, 140, (16 October 1937), 659-660. Garry was one of the participants in the discussion with which this leader dealt.

93. B.A.R., (1937), 305-332.

> By apprehending the impact of science on the life of the community, a student will appreciate many of the forces that are continually re-shaping the fabric of our social life.
>
> In realising the function of science as a co-operative enterprise of mankind, unhindered by racial or geographical frontiers, the student acquires a sense of social solidarity which should assist in the removal of barriers between nations and between different sections of society. (94)

The biology for citizenship argument was in a sense a special instance of the wider science for citizenship argument. Appended to the report were a number of specimen syllabuses, including one called 'chemistry and citizenship' and another called 'the biological sciences and modern problems'.

This account of the relations between the campaign for an increased educational rôle for biology and the campaign to influence public attitudes to biology by demonstrating its importance in training for citizenship may be rounded off by looking at the Science Masters' Association. In 1930 its support for a socially-oriented course of school biology had been distinctly ambiguous. By the end of the decade, however, its views had changed to the point where it established a series of 'Science and Citizenship' lectures. The first such lecture was delivered by Richard Gregory at the Association's 1938 meeting. Gregory emphasised the social value of science in general and of biology in particular :

> Science can render the fullest service to the community by harnessing the relations between the scientific workers and the general citizen so that a nobler type of citizenship becomes possible, adequate to defend us against the dangers to which civilisation is exposed. ... Preparation for citizenship must involve instruction in the principles of human biology : a course of general biology should open and close with man in the centre of the picture.

He did not, however, indicate in detail how such a man-centred course of school biology would contribute to citizenship : he simply based his argument on the premise that education was 'the deliberate adjustment of a growing human organism to its environment'.(95)

A fuller analysis of the social function of biology teaching was undertaken in the second 'Science and Citizenship' lecture, given by Lancelot Hogben in 1942.(96) The focus of his attention was the university training most pertinent to intending secondary school teachers.

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94. ibid., p.309. cf. Chapter X, n.120 above.
95. Nature, 141, (15 January 1938), 128-129.
96. S.S.R., 23, (1942), 263-281.

He argued that :

> Biology can justify its claim to a place in universal instruction if, and only if, it can establish its credentials ... as an essential part of the intellectual equipment of the individual for the responsibilities of citizenship.

In contrast to totalitarian countries in which the educational system was geared with startling effectiveness to the advancement of the prevailing ideology, 'no single country could claim to have an educational system designed with equal singleness of purpose to encourage the survival of democracy.' Since social progress had in large measure been brought about by the application of scientific discoveries, the future development of democracy depended on the public 'understanding what technical possibilities are realizable'. It was therefore necessary to impress upon the intending teacher the rôle played by the biological sciences in the identification and satisfaction of social needs :

> Biological instruction which can justify its claim to a place in a curriculum designed to promote intelligent citizenship must give prominence to what aspects of biology are most relevant to human needs.

Hogben went on to specify these aspects, which related chiefly to the many-sided fields of nutrition and health.

It was the practical value of biology to society which, for Hogben, constituted its importance in training for citizenship in a democracy. The notion that its importance derived from biological concepts which could be transferred from the animal to the human context attracted his scorn :

> Recognition of man as an animal is no longer a sufficient excuse for facile analogies between human and animal societies without due regard to what sort of an animal man is.

There was scope for a biological approach to social studies, certainly, but it had to be a good deal more critical and more sophisticated than the shoddy thinking that sustained Nazi racialist theories. The main thrust of a socially relevant course of school biology lay in emphasising the practical applications of biology; undergraduate courses for future teachers had therefore to pay greater attention to these applications and less to the esoteric preoccupations of traditional academic biology.

At the same meeting of the Science Masters' Association, L.J.F. Brimble gave a lecture on 'Biology as a social science' in which he called for 'a more live realisation in schools of the sociological implications of biology'. He stressed the need to cater for those who did not require specialist knowledge of biology and argued that school courses should take the 'historical background, the philosophy of science and the impact of science on society' into consideration. He was anxious that courses should dispel the notion that biology was of little practical use to society :

> Biology is not just botany plus zoology; it is the science of life, and if it is going to win the place it deserves in the educational system of the country, then it must be treated as such. ...
>
> Principles of social biology confront us at every turn. For example, individual and public health, nutritional standards, housing, population movements, race and nation, problems of family life, relations and responsibilities of one person to another, social policy of the State.

Although Brimble suggested that one justification for the sort of course he was advocating was its relation to 'the strong movement which is now taking place in favour of the development of the social sciences', he interpreted biology more as a science whose applications were important for society than as a component of the science of society.(97)

The meeting of the Science Masters' Association in April 1945 was the scene of the third 'Science and Citizenship' lecture, given by J.G. Crowther. The lecture was a somewhat rambling account of the national organisation of science from the radical perspective, with no mention of biology teaching and, indeed, scant reference to education at all. Crowther did, however, conclude with the suggestion that the Science Masters' Association might follow the precedent of the British Association's Division and set up its own Social Relations Committee. This would enable it to take 'a leading part in securing the necessary changes in the school curriculum, and incorporating the kind of science teaching and books required for the new scientific professions'.(98) The social value of biology was underlined by other speakers, though : most notably in lectures by Alexander Fleming on penicillin and by Cyril Bibby of the Central Council for Health Education on the function of school biology in health education. A discussion on the rôle of science in the future educational system considered how science teaching could prepare pupils for 'the difficult and exciting job of living in a rapidly changing world' and emphasised the need 'to show the relation between scientific discovery and social cause and effect'.(99)

By the end of the Second World War, however, as the conference on 'scientific research and industrial planning' organised by the British

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97. ibid., pp.340-341.
98. S.S.R., 26, (1945), 284.
99. ibid., pp.372-376.

Association's Division made clear,[100] the radical approach to the social relations of science issue was falling into disrepute. The rationalist approach, too, was beginning to lose its impetus. Correspondingly, although the social significance of biology as a body of useful knowledge remained, biology for citizenship arguments based on radical ideas about the social conditioning of science or on the notion of transferable concepts and attitudes lost their force. As the values of pure science were reasserted in the professional scientific world, pressure on the educational world to project a socially relevant image of biology through citizenship arguments faded.[101]

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100. See chapter IX above.

101. See E.W. Jenkins, op. cit. (n.1 above). For the history of recent attempts to teach social biology, see Ann Scoggins, op. cit., (n.43 above), chap. V.

Chapter XIV

Discussion

In this brief final chapter I wish to draw together certain issues discussed at specific points in the foregoing pages which have a bearing on the thesis as a whole and which may be of general interest for any future studies in this field.

The basic analysis of the social relations of science debate between the two world wars, as articulated most fully in chapter V, describes three distinct schools of thought. The most important feature of this analysis is the scope it gives for an appreciation of the non-radical elements in the debate. Such studies as have been made of this aspect of the social history of science have concentrated on its radical side to an extent that creates the impression that concern with the social relations of science was essentially a radical prerogative. Yet one cannot look at the British Association or glance through the pages of Nature without realising that there were important sides to this debate other than the radical one. Current knowledge of these other sides is limited to Gary Werskey's account of what he calls 'reformist' scientists. My study of the British Association brings to light the inadequacies of Werskey's account and attempts to generate a more fruitful analysis which can make possible a more balanced understanding of the controversies over the social relations of science during the years 1919 - 1945.

My analysis, then, deals with three categories. They provide á valuable framework for handling the major issues of the social relations of science debate but, like any attempt to deal with people in categories, difficulties arise when individuals are assigned to a specific set of attitudes to these issues. Consider, for example, the radical category, which embraces J.D. Bernal, P.M.S. Blackett, J.B.S. Haldane, Lancelot Hogben, Hyman Levy and Joseph Needham. While each of these men possessed many of the essential attributes of this category, there are significant inconsistencies. Bernal could equally well be described as an extreme scientific rationalist for whom the marxist interpretation of science was a tool to be used in working towards the total scientific control of man and society. Hogben was probably less interested in marxism than in attacking the artificial ugliness of urban industrial life ; he called himself a scientific humanist and was hailed as a rationalist by Julian Huxley.(1) Needham felt that his prior commitment to the Anglican Church precluded him from too close an association with marxism. Substantial divergences of outlook among individual radicals are apparent in their several reactions to the foundation of the British Association's Division. The radical category, then, needs to be used with a certain amount of caution.(2)

Gary Werskey approaches the category he labels 'reformist' in terms of 'outsider politics' ; i.e., the efforts made by established scientists outside political circles to argue the case for a greater involvement of scientists in public affairs. There is a fair amount of overlap between this category and my category of 'rationalist', but I believe that the latter facilitates a greater understanding of the outlook of these scientists insofar as it indicates why they felt that science could contribute to public affairs and hence why they participated in the social relations of science debate. Taking Richard Gregory and Rainald Brightman as typical rationalists, the journal Nature, which between the wars was essentially their joint production, gives ready access to the rationalist viewpoint. Other statements of this viewpoint may be found in the writings of such men as Daniel Hall, Julian Huxley and H. G. Wells. There were also some scientists like P.G.H. Boswell and Allan Ferguson who seemed to support the rationalist attitude in a more muted and critical fashion. Again, however, as in the radical category, there were substantial differences among the scientific rationalists, with varying degrees of emphasis on the marxist critique of pure science, on the scientistic approach to social affairs and on the freedom of the individual scientist.

My third category is the British Association. This differs from the other two in that it deals with an organisation having an official constitution rather than with a number of individuals whom historians have grouped together. It therefore deals with a more coherent set of views, but one that is perhaps more difficult to relate to individual scientists. The outlook of the Association as a whole has been elucidated partly from addresses delivered before the entire Association but chiefly from the activities of its general officers and its Council and, slightly more ambiguously, from reports of research committees endorsed by the appropriate Sections and published with the Council's consent.

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1. See Julian Huxley's introduction to Lancelot Hogben, The retreat from reason (Watts, 1936).

2. In his thesis Gary Werskey does discuss some of the difficulties inherent in his concept of a 'Visible College'.

These sources reveal a consistent approach to the social relations of science debate which differs both in motivation and in content from the rationalist approach. Yet among those responsible for the formulation of the British Association approach one finds not only rationalists but also those who disavowed all concern with the social relations of science. The British Association category, then, represents not so much the views of identifiable individuals as the resultant of a number of competing forces, a compromise which was acceptable to the Association as a whole and to the lay public which it tried to reach.

The three categories which I have used in analysing the social relations of science debate are essentially categories of outlook and of motivation rather than of people. Obviously it is people who have the outlook and motivation, and to a fairly considerable degree it is possible to relate individual people to one or other category. The fact that one cannot always consistently and unequivocally assign individuals to them does not of itself invalidate the use of these categories as a basis for interpreting what was a very complex issue. A completely accurate categorisation would necessitate almost as many compartments as there were individuals, which would hinder rather than promote understanding of the essential themes. The uncertainty principle seems to operate in history as elsewhere.

In defining my categories and assessing their membership I have depended principally on what people said and wrote rather than on what they did. I introduced the word 'debate' because the previously used word 'movement' implied a misleading degree of consensus on the question of the social relations of science, but 'debate' is also an appropriate word in that it suggests a clash of ideas more on the plane of rhetoric than on the plane of action. To see how the debate was reflected in the actual practice of science one would need to study the professional work of the relevant scientists and to investigate the development of science policy before and after the Second World War. The British Association was primarily involved in professional science and concerned itself with public attitudes to science chiefly in order to generate a social atmosphere in which science could flourish; its participation in the social relations of science debate was motivated by the desire to influence public attitudes rather than by the desire to modify the professional practice of science. Insofar as the attitudes of the lay public can be affected by rhetoric, an emphasis on the word rather than the action is appropriate to this study of the British Association. The desire to modify the professional practice of science formed some part of the motivation for the rationalists' participation in the debate and a much greater part of the radicals' motivation : a purely rhetorical emphasis becomes correspondingly less satisfactory.

This thesis is concerned with public attitudes to science. The methodological problems of identifying these attitudes have already been discussed in the Introduction. The British Association perceived that the lay public was distinctly wary of science. Science as a system of ideas and values seemed to conflict with prevailing cultural and political norms. Science as the source of technological innovation also provoked public hostility, especially during the economic depression and the build-up to the Second World War. Even during the nineteen-twenties there was much public anxiety, epitomised by the Bishop of Ripon, over the notion that science had unleashed forces which society seemed ethically unequipped to handle. Technological pay-off had been used too long and too successfully as a justification for science for it to be possible for scientists to dissociate themselves from the practical applications of their work; the British Association therefore tried to persuade the public that despite appearances to the contrary these applications were considerably to the benefit of society. The fields of nutrition and health provided particularly apposite material for this aspect of the defence of science.

The defence of science on the non-material plane is an altogether more complex theme. The basic British Association line was to reassert the traditional values of pure science and to argue that these values reinforced those of the prevailing culture. Science was depicted as an enterprise exacting the socially esteemed qualities of intellectual excellence and intellectual honesty. It was said to broaden the outlook of man and to give him a better understanding of his place in Creation. Both the process and the outcome of scientific research were claimed to increase the individual's capacity for appreciation of spiritual truths. Particularly in its efforts to promote recognition of the cultural values of science through the educational system, the British Association argued that pure science was congruent with the traditional humanities which shaped the values of a liberal democratic society.

On the whole the British Association eschewed the 'contentious field of immediate political thought'. It did, however, consider the relevance of pure science to some more general political needs, especially in its concern with the function of science in education for citizenship. Here the main emphasis was on science as a body of knowledge useful, indeed essential, to the citizen of a modern democracy. The Association also stressed a wider political aspect of science when talking of science as an enterprise involving the free collaboration of scholars of all nations : it transcended national barriers and so embodied the ideal of internationalism which was held to be the principal bulwark against world war. The very impersonality of scientific results - a source of the public complaint that science was dehumanising - was turned to account in the claim that it gave science the power to unite people of different nations in a single enterprise.(3)

Although the rationalists generally concurred with the British Association's articulation of the values of pure science, the main thrust of their account of the social importance of science on the non-material plane rested on the significance of scientific method. They claimed that scientific method was the necessary and, on the whole, sufficient key to the solution of the great majority of social and political problems. As democratic society faced enormous difficulties generated, apparently, by the inefficiences of the traditional means of government, they argued strongly that the method which had secured such outstanding progress in science should be set to work on society. Democracy would survive only if it was conducted scientifically. The rationalist approach to education for citizenship therefore emphasised the importance of training in scientific method and of disseminating the scientific outlook on social affairs. It was further argued that the institution of science was itself essentially democractic : for example, the charter produced by Richard Gregory for the British Association's Division in 1941 claimed that the basic principles of democracy were embodied in the scientific community.

There were serious difficulties in projecting to the lay public a picture of the non-material values of science which emphasised primarily the function of scientific method in guaranteeing the survival of democracy. The most obvious point is that there is no one thing called scientific method. The rationalists never got beyond Thomas Huxley's 'trained and organised common sense' - a quality of undoubted importance in social affairs, but one which hardly provides an adequate description of scientific activity. Indeed, Ronald Tobey has suggested that Einstein's work on relativity damaged the public credibility of science

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3. This impersonality relates to R.K.Merton's canon of 'universalism', the notion that science is everywhere equally true because independent of all extra-scientific influences. For an interesting discussion of universalism, see Leslie Sklair, Organised knowledge (Paladin, 1973), pp.110-113.

in America precisely because it underlined the limitations of common sense.[4] Even if a single scientific method could satisfactorily be defined, it would remain to be proven that it could be transferred from the study of nature to the running of a democractic society. It is by no means clear that these two activities have much in common. For example, decision-making processes in science, where the relevant factors are theoretical framework, experimental evidence and expert judgment, are very different from decision-making processes in a democracy, where in principle issues are resolved by voting. Again, the criteria for the acceptableness of a scientific proposition involve consideration of its compatibility with the existing body of knowledge and with experimental evidence, and of its fruitfulness in generating fresh ideas ; wholly other criteria apply to the assessment of political propositions. Furthermore, science is concerned with the pursuit of more or less objective knowledge : democracy is concerned with accommodating the claims to consideration of competing groups so as to secure the maximum well-being for the greatest number. It was difficult simultaneously to argue both that the values of science were at one with the values of liberal democracy and that the methods of science were so superior to the traditional methods of government that they should be brought into the running of society. 'Government by scientific method' appeared to lead to Miles Walker's unacceptable technocratic tyranny rather than to the survival of democracy.

The rationalists never succeeded in resolving these contradictions. The radicals avoided them by arguing that socialism rather than science held the key to progress in the political sphere. Except perhaps during the early years of the Second World War, the British Association also avoided them, by placing greatest emphasis on the intellectual, aesthetic and cultural values of pure science and by stressing only those political values deriving from science as a body of knowledge useful for responsible citizenship and from science as the epitome of internationalism. On this more modest approach, science was seen as compatible with, rather than the guarantor of, liberal democracy.

The rationalists were perturbed by the inefficiencies of 'non-scientific' government and it was quite consistent with their anxiety for greater efficiency that they should support such 'scientific' philosophies as that of the eugenics movement. There were also some within the British

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4. Ronald C. Tobey, <u>The American ideology of national science, 1919-1930</u> (U. Pittsburgh P., 1971), chap. IV.

Association - Graham Kerr and Douglas Laurie, for example - who held similar ideas, but generally it is clear that the British Association was motivated, in accordance with its statutes, by concern for the advancement both of science as a whole and of individual sciences, and not by the need for greater social efficiency. This is apparent in the manner of its participation in the social relations of science debate, and also in the way it claimed an enhanced position in the educational system for such subjects as geography, geology and biology. In the educational context it was necessary not simply to argue in terms of subject maintenance - the need to secure the future of the sciences by the production of sufficient numbers of trained recruits - but also to demonstrate that these particular disciplines were of value to all pupils irrespective of intended career. It was therefore important to show that they contributed to the cultural and political functions of education. But behind these arguments lay a basic concern with the advancement of science, which required both an adequate supply of professional scientists and a sympathetic lay public.

Finally, it is interesting to consider why the need to defend science arose at this particular time. That there should be a heated debate about the social relations of science during the nineteen-thirties is not especially surprising : technological unemployment and the growing threat of war generated hostility to science at the same time as they exacerbated the rationalists' anxiety about social inefficiency, while the increasing influence of the marxist view of science after 1931 gave scientists additional cause to think about the public aspects of their work. But the Bishop of Ripon delivered his famous sermon already in 1927, and the British Association was busy advertising the cultural and political values of science throughout the nineteen-twenties. Why, then, was it necessary to mount a public defence of science not only during the thirties but throughout the period covered in this study?

Although the threat of the Second World War directed attention to the destructive potential of science-based technology, the First World War, which had seen the introduction of the armoured car and poison gas, equally brought into the limelight what many regarded as the unacceptable face of science. Similarly, although the economic depression gave it a special immediacy, fear of the effect of mechanisation on employment is a theme which can be traced through many generations of human history and which does not belong uniquely to the nineteen-thirties. The justification of science in terms of its applications, and the defence of science from criticism on account of those applications which provoke public hostility, have been recurrent issues ever since applied science began to make an impact on society.

At the beginning of chapter XI I discussed briefly how the years immediately following the First World War were years of social disorder and political disillusion. Neal Wood has shown how during the nineteen-twenties this situation developed into an atmosphere of nihilism, especially among literary intellectuals who withdrew 'in revulsion from all social and political responsibility' into a private esoteric world of their own.(5) T.S. Eliot's The Wasteland (1922) is the archetypal product of this movement. Wood goes on to argue that the futility of such nihilism was a major factor in the subsequent interest of many intellectuals in communism during the nineteen-thirties. This general disillusion with politics may have had two consequences for the public image of science. On the one hand it may have contributed to the tremendous interest - manifested by the huge market for such popularisers of science as Eddington and Jeans - in the more esoteric achievements of science, most notably, of course, relativity.(6) On the other hand, the disillusion with politics may have extended to disillusion with science, insofar as science was an element in the social and political environment. In either case, there was an opportunity, or a need, for educating the public in the values of science.

In 1920, as recounted in chapter II, the British Association came under pressure to reassess its function in the scientific world. With its centrality in the life of the working scientist being steadily eroded by the development of professional scientific institutions, there was good cause for the Association to increase its commitment to the rôle of public interpreter of science. This was the more necessary as the First World War had greatly increased the formal connections between science and the State, a process of which the foundation of the Department of Scientific and Industrial Research in 1915 was one symptom. As the growing influence of science on society evoked discernible public hostility to science, the British Association was well placed to undertake its public defence of science.

During the course of this study the need for further research in certain areas has become apparent. On the organisational level, the

5. Wood, Communism, chapter IV.

6. cf. Levy's remark that Jeans 'became escapist just at the most critical period of social stress' by delving into abstract thought and holding himself 'aloof from the social struggle': chapter V, n.3 above.

British Science Guild and the Society for Freedom in Science surely deserve more detailed attention than they have hitherto received. Beyond this there is the general problem of how public attitudes to science are formed, how they have been influenced and, indeed, how they can be assessed by the historian. The British Association provides an important source of insight into such questions, but other sources might also be investigated. For example, scientific journalism and popular books on science offer rewarding material in this respect. The British Association made use of the educational system to influence public attitudes to science : it would be interesting to study how other organisations have made similar attempts and how successful they have been, or can be. Further insight into the social relations of science debate could be derived from an examination of writings on the history of science : the radicals produced histories demonstrating the validity of the marxist interpretation of science, and other histories were written in support of different interpretations. Finally, the influence of religious attitudes on attitudes to science and to its social relations would seem to merit deeper study. It seems likely, for example, that there were connections between the scientific rationalists and the anti-theistic rationalists. Again, certain sectors of the public were suspicious of science not simply because its findings sometimes conflicted with current interpretations of Revelation but also because they distrusted the scientist whose success in dealing with the world of logical thought and experiment appeared to generate disdain for spiritual values. It was this sort of attitude that made it necessary for scientists like William Bragg publicly to testify that their work had deepened rather than diminished their appreciation of the spiritual.

Appendix I

Meetings and Officials, 1919-1946

Year	Place	President	Treasurer	General Secretaries		Year
1919	Bournemouth	C. Parsons	John Perry	H. H. Turner	J. L. Myres	1919
1920	Cardiff	W. A. Herdman	E. H. Griffiths			1920
1921	Edinburgh	T. E. Thorpe				1921
1922	Hull	C. S. Sherrington		F. E. Smith		1922
1923	Liverpool	Ernest Rutherford				1923
1924	Toronto	David Bruce				1924
1925	Southampton	Horace Lamb				1925
1926	Oxford	Prince of Wales				1926
1927	Leeds	Arthur Keith				1927
1928	Glasgow	William Bragg	Josiah Stamp			1928
1929	South Africa	Thomas Holland		F. J. M. Stratton		1929
1930	Bristol	F. O. Bower				1930
1931	London	J. C. Smuts			P. G. H. Boswell	1931
1932	York	Alfred Ewing				1932
1933	Leicester	Gowland Hopkins				1933
1934	Aberdeen	James Jeans				1934
1935	Norwich	W. W. Watts	P. G. H. Boswell	Allan Ferguson	F. T. Brooks	1935
1936	Blackpool	Josiah Stamp				1936
1937	Nottingham	Edward Poulton				1937
1938	Cambridge	Lord Rayleigh				1938
1939	Dundee	Albert Seward				1939
1940–1945	no meeting	Richard Gregory	H. Hartley			1940–1945
1946	(London)					1946

O. J. R. Howarth was secretary throughout the period.

"The Association is really run by the general secretaries and the treasurer, with the technical members of the Council as auxiliaries; these gentlemen are are always chosen from the most eminent scientific talent of the country, and they constitute a body even more exclusive than the Council of the Royal Society" - William J. Pope, in a letter to Nature, 106, (1920), 111.

Appendix II

The Sections of the British Association

This appendix gives a list of the Sections of the British Association, with the dates of their foundation and brief notes on their development.

Section A	:	Mathematical and physical science (1832)
Section B	:	Chemistry (1895)
1832-1894	:	Chemical science and mineralogy, including application to agriculture and the arts
Section C	:	Geology (1851)
1832-1850	:	Geology and physical geography
Section D	:	Zoology (1895)
1832-1847	:	Zoology, botany, physiology, anatomy
1848-1865	:	Zoology and botany, including physiology
1865-1894	:	Biology - (i) zoology and botany (ii) anthropology, anatomy, physiology
Section E	:	Geography (1869)
1833-1834	:	Anatomy and physiology
1835-1840	:	Anatomy and medicine
1841-1847	:	Physiology
1851-1868	:	Geography and ethnology
Section F	:	Economics (1936)
1833-1855	:	Statistics
1856-1935	:	Economic science and statistics
Section G	:	Engineering (1901)
1836-1900	:	Mechanical science
Section H	:	Anthropology (1884)
		cf. Section D
Section I	:	Biomedical sciences (1969)
1896-1920	:	Physiology, including experimental pathology and experimental psychology
1921-1956	:	Physiology
1957-1968	:	Physiology and biochemistry
		cf. Sections D and E
Section J	:	Psychology (1921)
		cf. Section I
Section K	:	Botany (1895)
		cf. Section D

Section L : Education (1947)
1901-1946 : Educational science

Section M : Agriculture (1912)

Section N : Sociology (1960)

Section X : General (1954)

The Conference of Delegates of Corresponding Societies (1885-1970)

Appendix III

Dramatis personae

Brief biographical details of the more important figures in this thesis are given in footnotes at appropriate places in the text. This appendix provides an index of such footnotes so as to make biographical information readily retrievable and to enable the reader to identify the major figures at a glance.

R. Baden-Powell (1857-1941)	XI,	12	John R. Baker (b.1900)	IV,	44
W.H. Barker (1882-1929)	XII,	25	J.D. Bernal (1901-1971)	III,	12
P.M.S. Blackett (1897-1974)	III,	40	Viscount Bledisloe(1867-1958)	VII,	70
P.G.H. Boswell (1886-1960)	IV,	46	Rainald Brightman (d.1968)	III,	7
F.T. Brooks (1882-1952)	VI,	63	R.N.R. Brown (1879-1957)	XII,	40
Ritchie Calder (b.1906)	III,	53	Sydney Chapman (1888-1970)	VIII,	47
A.G. Church (1886-1954)	II,	23	Lilian J. Clarke (1866-1934)	X,	67
J.G. Crowther (b.1899)	VII,	5			
F.G. Donnan (1870-1956)	VII,	117			
A.C.G. Egerton (1886-1959)	VII,	118	Alfred Ewing (1855-1935)	III,	25
C.B. Fawcett (1883-1952)	XII,	15	Allan Ferguson (1880-1951)	IV,	68
A.P.M. Fleming (1881-1960)	III,	44	H.J. Fleure (1877-1969)	XII,	17
H.B. Gray (1851-1929)	XII,	7	Richard Gregory (1864-1952)	II,	7
J.B.S. Haldane (1892-1964)	III,	13	A. Daniel Hall (1864-1942)	V,	32
A.V. Hill (1886-1977)	IV,	21	Lancelot Hogben (1895-1975)	III,	14
F.G. Hopkins (1861-1947)	IV,	28	O.J.R. Howarth (1877-1954)	II,	3
Julian Huxley (1887-1975)	IV,	4			
James Jeans (1877-1946)	V,	1			
J. Graham Kerr (1869-1957)	XIII,	5			
R. Douglas Laurie(1874-1953)	XIII,	12	Hyman Levy (1889-1975)	III,	15
J. McFarlane (1873-1945)	XII,	41	H.J. Mackinder (1861-1947)	XII,	26
J.L. Myres (1869-1954)	II,	28			
Joseph Needham (b.1900)	III,	16	T. Percy Nunn (1870-1944)	XII,	23
John Boyd Orr (1880-1971)	V,	14			
T.W.F. Parkinson (d.1926)	XII,	4	J.C. Philip (1873-1941)	VII,	39
Michael Polanyi (1891-1976)	VIII,	129			
Robert Robinson (1886-1975)	VII,	71	P.M. Roxby (1880-1947)	XII,	36
Lord Rutherford (1871-1937)	VII,	72			

Appendix IV

Ages in October 1936

(cf. chapter VII, n.100)

I Those present at the British Association Council meeting, 9 October 1936 (1)

F.W. Aston	59
P.G.H. Boswell	50
W.H. Bragg	74
F.T. Brooks	53
F. Balfour-Browne	61
W.T. Calman	65
F. Debenham	53
W.G. Fearnsides	56
Allan Ferguson	56
R.B. Forrester	-
H.M. Hallsworth	59
H.S. Harrison	-
T.G. Hill	60
Julian Huxley	49
Edward Poulton	80
W. Campbell Smith	48
Josiah Stamp	56
F.J.M. Stratton	54
C. Tierney	-
W.W. Vaughan	71
Gilbert Walker	68
W.W. Watts	76
F.E. Weiss	71
J.S. Wilson	-
24 men of whom 4 unknown	1219
	÷ 20
	61 years

(1) Names from Council minutes.

II Gary Werskey's radicals (2)

J.D. Bernal	35
P.M.S. Blackett	38
J.B.S. Haldane	44
Lancelot Hogben	41
Hyman Levy	47
Joseph Needham	36
C.H. Waddington	31
W.A. Wooster	33
	305
8 men	÷8
	38 years

(2) Werskey, 'Outsider politics', p.71 n.

III The C.S.A.W.G. caucus (3)

J.D. Bernal	35
Eric Burhop	25
R.C. Evans	26
John Fremlin	23
F.W. Hughes	-
*A.E. Kempton	25
Reinet Maasdrop	-
C.B.O. Mohr	-
Dorothy Needham	40
Joseph Needham	36
Antoinette Pirie	-
Norman Pirie	29
R.L.M. Synge	22
C.H. Waddington	31
*Arthur Walton	28
Maurice Wilkins	20
*Nora Wooster	28
W.A. Wooster	33
18 people of whom 4 unknown	401
	÷14
	29 years

(3) Kay MacLeod, A. Sc. W., p.343n, + Bernal.

* Assuming an age of 25 at the time of gaining the Ph.D.

Appendix V

The wartime conferences of the Division

(cf. chapter IX, n.69)

I 25-27 July 1940, at Reading, on 'Science in national and international aspects'
Cancelled for practical reasons. See chapter IX, p.218.

II 26-28 September 1941, at the Royal Institution, on 'Science and world order'
See chapter IX, pp.218-236.

III 20-21 March 1942, at the London School of Hygiene and Tropical Medicine, on 'European agriculture: scientific problems in post-war reconstruction'
Arose from a paper given by John Russell at II. See Adv. Sci., 2 (vi), (1942), 121-178.

IV 24-25 July 1942, on 'Mineral resources and the Atlantic Charter'
Arose from discussions at II. See Adv. Sci., 2 (vii), (1942), 185-253.

V 20-21 March 1943, at the Royal Institution, on 'Science and the citizen : the public understanding of science'
Three sessions on the dissemination of science to the lay public and one on 'science as a humanity'. See Adv. Sci., 2 (viii), (1943), 281-339.

VI 16-17 April 1943, at Chatham House (the home of the Royal Institute of International Affairs), on 'Co-operative systems in European agriculture'
Follow-up to III. See Adv. Sci., 2 (viii), (1943), 356-359.

VII 10 November 1944, at Chatham House, to welcome the Indian scientific delegation then visiting Britain
Discussion on science in social and international planning, with special reference to India. See Adv. Sci., 3 (x), (1945), 99-105.

VIII 12-13 January 1945, at the Royal Institution, on 'The place of science in industry'
See Adv. Sci., 3 (x), (1945), 106-156.

IX 7-8 December 1945, at the London School of Hygiene and Tropical Medicine, on 'Scientific research and industrial planning'
See chapter IX, pp. 237-241.

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The arrangement of this bibliography is as follows :

I	Unpublished sources	:	(a) Manuscripts
			(b) Theses
			(c) Other
II	Published primary sources	:	(a) Government publications
			(b) Primary books
III	Published secondary sources	:	(a) General reference works
			(b) Secondary books
			(c) Secondary articles
IV	Journals		

I (a) Manuscripts

(i) The British Association

During the course of my work many of the British Association papers were transferred from the Association's headquarters in London to the Bodleian Library, Oxford. I understand that in due course all the papers of purely historical relevance will be deposited in the Bodleian. A rough list of what has already been deposited may be obtained from the Department of Western Manuscripts at the Bodleian. I examined some of the following material in London and some in Oxford, but there seems little point in distinguishing the location.

The minute books of the British Association Council are complete for the period 1919-1945. Minutes of the sectional organising committees are less complete : in Section L, for example, only those from 1925 onwards are available. There is a full set of minutes for all the various committees of the Division for the Social and International Relations of Science for 1938-1939, and a box labelled 'correspondence conc. the 1939 annual meeting' contains papers dealing with the four public meetings staged by the Division during 1939. I could not find the wartime minutes of the Division among the British Association papers, but photocopies of a set belonging to Solly Zuckerman were kindly made available to me by Gary Werskey (see chapter IX, n.4).

(ii) Individual officals of the British Association

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Allan Ferguson (general secretary, 1935-46) : Papers, held in the Department for the History and Social Studies in Science, Sussex University. Much of value.

Richard Gregory (Council member, 1916-1932; president, 1939-1946) : Papers, held in the Department for the History and Social Studies in Science, Sussex University. Of marginal relevance only.

J.L. Myres (general secretary, 1919-1932) : (a) Praeterita ('things past'), a very informal typescript autobiography in the possession of his son Dr. J.N.L. Myres and cited with his kind permission. See chapter II, n.25. (b) Papers, held at the Bodleian Library, Oxford, box on the Section L adult education committee

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Carroll Pursell, ' "A savage struck by lightning" : the idea of a research moratorium, 1927-1937', Lux et Scientia, 10, (1974), 146-158

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S.A. Walkland, 'Science and Parliament : the origins and influence of the Parliamentary and Scientific Committee', Parliamentary Affairs, 17, (1963-64), 308-320

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IV Journals

Journals are listed here in alphabetical order according to abbreviations used in citing them. Where relevant I have added in parenthesis the name of the organisation responsible for publication.

Adv. Sci. : The Advancement of Science. Continuation of B.A.R. from 1939. (The British Association)

Ann. Sci. : Annals of Science

B.A.R. : Report of the British Association for the Advancement of Science. Continued as Adv. Sci. from 1939. (The British Association)

Biog. Mem. F.R.S. : Biographical Memoirs of Fellows of the Royal Society

Biology and Human Affairs (The British Social Hygiene Council)

B.J. Ed. Stud. : British Journal of Educational Studies

B. J. H. S. : British Journal for the History of Science

Durham Research Review

The Electrical Review

The Electrician

The Engineer

Engineering

English Historical Review

Geog. J. : Geographical Journal (Royal Geographical Society)

Geography : Continuation of Geog. T. from 1926. (The Geographical Association)

Geog. T. : Geographical Teacher. Continued as Geography from 1926. (The Geographical Association)

Hist. Ed. : History of Education

Hist. J. : The Historical Journal

J. Chem.Soc. : Journal of the Chemical Society

J.M.G.S. : Journal of the Manchester Geographical Society

J. of Botany : Journal of Botany

J. of Ed. : Journal of Education

The Lancet

The Leeds Mercury

The Listener

Lux et Scientia

Manchester Guardian

Mem. & proc. of the Manchester Lit. & Phil. Soc. : Memoirs and proceedings of the Manchester Literary and Philosophical Society

Minerva

Nature

New Scientist

The New Statesman and Nation

Not. Rec. Roy. Soc. : Notes and Records of the Royal Society

Ob. Not. Roy. Soc. : Obituary Notices of the Royal Society

Parliamentary Affairs

Proc. Phys. Soc. : Proceedings of the Physical Society

Proc. Roy. Soc. : Proceedings of the Royal Society

Progress : Progress and The Scientific Worker (published jointly by the British Institute of Social Service and the Association of Scientific Workers, 1931-1935)

Q.J.R.A.S. : Quarterly Journal of the Royal Astronomical Society

Report of proceedings at the .... annual Trades Union Congress

Report of the .... annual Conference of Educational Associations

Science (The American Association for the Advancement of Science)

The Scientific Worker Ceased publication in 1929; amalgamated with Progress (q.v.) in 1931; continued independently from 1935. (The Association of Scientific Workers)

Sci. Stud. : Science Studies

Sociological Review

Soc. Stud. Sci. : Social Studies in Science

S.S.R. : School Science Review (Science Masters' Association)

Stud. Sci. Ed. : Studies in Science Education

T.E.S. : The Times Educational Supplement

The Times

Yorkshire Post

O weariness of men who turn from GOD
To the grandeur of your mind and the glory of your action,
To arts and inventions and daring enterprises,
To schemes of human greatness thoroughly discredited,
Binding the earth and the water to your service,
Exploiting the seas and developing the mountains,
Dividing the stars into common and preferred,
Engaged in devising the perfect refrigerator,
Engaged in working out a rational morality,
Engaged in printing as many books as possible,
Plotting of happiness and flinging empty bottles,
Turning from vacancy to fevered enthusiasm
For nation or race or what you call humanity;
Though you forget the way to the Temple,
There is one who remembers the way to your door:
Life you may evade, but Death you shall not.
You shall not deny the Stranger.

T. S. Eliot
Chorus from The Rock (1934)