SCIENTISTS, TRADE UNIONS AND LABOUR MOVEMENT POLICIES FOR SCIENCE AND TECHNOLOGY : 1947-1964

VOL I

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Summary

This thesis describes the history of the scientific Left beginning with the period of its most extensive influence in the mid-1940s as a movement for the planning of science and ending with the Labour Party's programme of 1964 claiming to harness science and socialism. Its central theme is the external and internal pressures involved in the project to align left-wing politics, trade unions and social responsibility in science.

The problematic aspects of this project are examined in the evolution of the Association of Scientific Workers and the World Federation of Scientific Workers as organisations committed to trade union and science policy objectives. This is presented also in the broader context of the Association's attempts to influence the Trades Union Congress's policies for science and technology in a more radical direction. The thesis argues that the shift in the balance of political forces in the labour movement, in the scientific community and in the state brought about by the Cold War was crucial in frustrating these endeavours. This led to alternative, but largely unsuccessful attempts, in the form of the Engels Society and subsequently Science for Peace to create new expressions of the left-wing politics of science.

However, the period 1956-1964 was characterised by intensive interest within the Labour Party in science and technology which reopened informal channels of political influence for the scientific Left. This was not matched by any radical renewal within the Association or the Trades Union Congress and thus took place on a narrower basis and lacked the democratic aspects of the earlier generation of socialist science policy.

Keywords: Science Policy; Social Relations of Science; Marxism; Labour Movement; Scientific Trade Unions.

FOR ALEX AND ROSE

CONVINCING QUESTIONS

'I've noticed', said Mr. K, 'that a lot of people are put off by our teaching because we know the answer to everything. Couldn't we, in the interests of propaganda, draw up a list of questions which appear to us quite unresolved?'

- Bertolt Brecht

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INTRODUCTION

1. Aims

Raymond Williams has described the relative neglect by comparative and analytical history and the sociology of culture of the significance of 'cultural groups'. He has written that:

> The group, the movement, the circle, the tendency seem too marginal or too small or too ephemeral, to require historical and social analysis. Yet their importance, as a general and cultural fact in the last two centuries, is great: in what they achieved, and in what their modes of achievement can tell us about the larger societies to which they stand in such uncertain relations.[1]

The object of attention in the present study is the mode of achievement and failure of such a group. A loosely knit group of British socialist and marxist scientists had by the close of the Second World War established a dominant position in the scientific community in the discussion of the cultural, social and political aspects of science.

A prominent figure in this group, Hyman Levy, wrote in 1945 that:

> The tradition of science *versus* politics as against science *cum* politics, has been very strong, and those who dared to defy this tradition ten to twenty years ago did so at their professional peril...But the constant reiteration of certain themes has had its effect - the contradiction between Poverty and Plenty, Nazism or Fascism as a danger to freedom in science, the modern trend of scientific practice towards destructive rather than constructive ends. Gradually it became clear that all these were in fact aspects of the same underlying social difficulties, and this has been reinforced by the rising tempo of war and social oppression. The change in outlook in the past ten years amounts almost to a revolution in thought.[2]

And that 'revolution in thought' had also its organisational and policy dimensions. This group of left-wing scientists was not restricted to its most visible and eminent members which included J.D. Bernal, P.M.S. Blackett, J.G. Crowther, J.B.S. Haldane, Lancelot Hogben, Hyman Levy, Joseph Needham, N.W. Pirie, W.A. Wooster, C.F. Powell and C.H. Waddington but to a much wider circle of scientists active, for example, in the Association of Scientific Workers (AScW).

I view the major achievement of this group in the light of its transformation, particularly during the Second World War, of its theoretical perspective into corresponding organisational forms and policies. I have discussed elsewhere the project for the unionisation and politicisation of scientific and technical workers under the auspices of the AScW in the 1940s. I have set out to trace further in the present study the fate of their contribution, particularly to the trade union and labour movement, from the height of their influence at the publication of Science and the Nation[3] in 1947 to the recrudescence of their approach to national science policy in the Labour Party's programme for the harnessing of science and socialism in the General Election of 1964.

I examine their politics and policies as they were expressed in the policies and programmes of scientists' organisations such as the AScW, the World Federation of Scientific Workers and the Engels Society. In addition I consider their contribution to the development of the TUC's thinking about science and technology and ultimately to the Labour Party.

I believe that the examination of the history of the scientific

Left and the factors in its post-war decline are relevant to a number of contemporary themes. These include a) the inherent tension between the unionisation and politicisation of scientific and technical workers; b) the involvement of trade unions in decision making over scientific and technological change; c) the relationship between technical expertise and the labour movement; d) the understanding of recurrent problems of national science policies; e) the development of alternative strategies for science and technology.

These themes begin to emerge in my review of the existing studies of the history of the scientific Left which I undertake in the second section of this introduction. In the third section I go on to outline the kind of post-war policies advocated by the scientific Left and in the fourth the actual course taken by British science policy in the period 1947-64. The fifth and sixth sections deal respectively with the problems of defining the scientific Left and my methodological approach.

2. The scientific Left and its histories

A number of studies have charted the historical and sociological formation and development of the scientific Left in the 1930s and early 1940s and especially in the context of its relationship to the wider phenomenon of what has been labelled 'the social relations of science movement'.

An early account by Wood tended to identify the social relations of science movement with the more prominent representatives of the scientific Left although this has subsequently been challenged.[4] Wood's principal interest was in the relationship of British intellectuals generally with communism and his approach was doubly marred firstly by a reliance on a very limited range of

published sources but secondly by the residual influences of the Cold War. He ascribed the adherence of left-wing scientists to Marxism as arising from 'nihilistic tendencies'! Wood concentrates on a selective account of the intellectual productions of Bernal, Haldane, Levy and Needham but makes little attempt to locate them in their social and historical perspective. He neglects the extent to which they shared common ground with more liberally minded scientists in pressing for the reform of pre-war British science. Wood also neglects the organisational dimension of their activities as a primary aspect of their commitment to Marxism.[5]

More recently Robert Filner has attempted an account of science and politics in England between 1930 and 1945 primarily based on a biographical approach. Filner concentrates his attention on several of the major figures of what he also describes as 'the social relations of science movement' Hyman Levy, J.B.S. Haldane and J.D. Bernal. He contrasts the views of these left-wing scientists with the right-wing proponents of the Society for Freedom in Science J.R. Baker and Michael Polanyi. A central theme of Filner's account is thus the confrontation between Baker and Polanyi's ideology of science based on the idea of the autonomy and social detachment of scientific practice and the advocates of the planning of science.[6]

However, as with Wood, Filner tends to neglect the organisational aspects of the history in favour of the purely intellectual features. He attempts in his conclusions to redress the balance by reference to the influence of the scientific Left on the Association of Scientific Workers and the World Federation of Scientific Workers. But I believe he tends to conflate the more

diffuse discussions of the social relations of science taking place, for example, within the British Association for the Advancement of Science, with the more politically coherent project of the scientific Left.

In a number of subsequent papers Filner has elaborated his views of the positive achievements of 'the social relations of science movement'.[7] These included the promotion of 'intensive and extensive discussions on the contemporary and historical relationship between science and society and the setting out of strong arguments for the organisation and direction of science long before such ideas were taken for granted, and they called for the social and political responsibility of the scientist long before the crisis of the atom bomb (and, later, Vietnam) brought many American scientists to the same conclusions'. He also argues that the organisations formed by the social relations of science movement in the 1930s and 1940s were historical precedents and 'training grounds for English and American organisations in the sixties and seventies'.[8] But Filner fails to recognise the significance of the scientific Left's emphasis on the unionisation of scientific workers and their efforts to link a Marxist account of the social relations of science to the mainstream of the British labour movement. Neither does he account for the ultimate dissipation of much which the social relations of science movement had achieved.

Gary Werskey in a number of contributions has gone much further down the road of presenting a more historically and politically sophisticated account of the scientific Left of the 1930 and 1940s. Werskey has attempted an appreciation of both the theoretical and

practical dimensions of the work of socialist and marxist scientists. He has also recognised the heterogenous character of what Wood and Filner describe as 'the social relations of science movement' by identifying both a 'reformist' and a 'radical' faction within the movement.[9]

However, his most substantial work, The Visible College,[10] reverts again to an essentially biographical approach through an examination of the political biographies of Levy, Haldane, Hogben, Bernal and Needham. Werskey addresses three central themes which are 'a reassessment of the kinds of intellectuals who found their way into the pre-war Left'; 'the discovery of what a particular grouping within the Left was doing and saying at the time'; and the impact of the thirties generation of scientific socialists on his own generation of 'radical' scientists.[11] But the core of the work is a critique of 'Bernalism' which he identifies as the heart of the theory and practice of the scientific Left.[12] Thus Werskey focuses on the work of J.D. Bernal and his allegiance to the Communist Party as the key to understanding the historical significance of the movement. But as Hilary and Steven Rose have pointed out 'his failure to understand the political forces which led workers and intellectuals to join the Communist Party in the 1930s gives his work an unfortunate cold war flavour, of intellectuals manipulated by Comintern intrigue'.[13] It is perhaps significant in this context that 'Bernalism' was first used as a pejorative label by J.R. Baker in his review of Bernal's The Social Function of Science in 1939 to attack the advocates of planning.[14]

Nevertheless Werskey offers a useful account of the formation

of the scientific Left against the background of the prevailing ideology of 'High Science' of Cambridge of the 1920s.

The limitations of the 'collective biography' approach are apparent in a relative neglect of the articulation of the scientific Left within the trade union and labour movement particularly in the 1940s. And, for example, P.M.S. Blackett is deserving of greater attention as socialist scientist of the 1930s who combined an active role in the AScW, membership of the TUC's Scientific Advisory Committee, the role of scientific advisor to the Labour Party and a number of influential government advisory positions in a political career which stretched over thirty years.[15]

In the later parts of The Visible College Werskey addresses the question of the post-war decline of the scientific Left. Werskey's explanation relies heavily on an 'internalist' account which locates the central weaknesses in 'Bernalism as theory' and 'Bernalism as practice'.[16] In an earlier account Werskey had indicated that greater weight should be given to the changed post-war relationship between science and the state in the rift between the 'reformist' and 'radical' wings of 'the social relations of science movement'.[17]

William McGucken in contrast to Werskey's collective biography has written a history in which left-wing scientists form only a subsidiary element of a much broader but nevertheless coherent 'social relations of science movement'. He appears to set out to recapture the movement from the left by stressing its heterogenous nature and the involvement of eminent figures of the scientific establishment. McGucken writes that:

> The movement involved, and in several cases altered, Britain's major scientific organisation - the Royal Society, the British Association for the Advancement of Science, the British Science Guild, and the Association of Scientific Workers. It also saw new organisations created, both outside and inside government - the Parliamentary Science Committee (later the Parliamentary and Scientific Committee), the Society for Freedom in Science, the Scientific Advisory Committee to Britain's War Cabinet and its peacetime successor, the Advisory Council on Scientific Policy. Unlike others who have written on the social relations of science movement, I have proceeded by examining its connections with all of these and other bodies.[18]

Indeed McGucken takes Werskey to task for failing to incorporate 'the social relations of science movement' as a major theme of The Visible College. He further criticises Werskey's view of the British Association's Division for the Social and International Relations of Science as 'an institutional locus of an alliance of radical and liberal scientists'. He believes that Werskey overlooked:

> ...the social concern and related activities that were a major feature of British Association life from 1931, and so has failed to understand that the novel aspect of the 1941 conference (Science and the World Order, DSH) was the Association's active pursuit of its new goal of impressing upon the state the importance of cultivating science for the benefit of the nation.[19]

He also points out Werskey's relative neglect of the role of the Parliamentary Science Committee, the wartime aspirations of the AScW and the efforts of the Royal Society to reform the British Government's organisation of scientific advice:

> But Werskey's five subjects and other leaders of the scientific Left both knew and greatly appreciated the efforts made by officers of the Royal Society, notably Hill, to have scientists brought into the executive levels of government.[20]

McGucken denies the proposition that 'the scientific Left was still, as of 1945, in its ascendancy' by asserting that its position had been fundamentally undermined by the rise of the Society for Freedom in Science and its advocacy of an autonomous role for science unfettered by any form of state planning. However, McGucken's view is sustainable only by ignoring the continuing growth and success of the AScW into the immediate post-war period and particularly its influence within the trade union and labour movement. He is simply mistaken to assert that by 1947 the AScW had come to support the principles upheld by the Society for Freedom in Science.[21]

McGucken has usefully focused on the relationship between science and the state as it was influenced by the activities of the various scientists' organisations. But it is surely too narrow a view to suggest that 'the social relations of science movement' reached some kind of 'natural termination' in the Labour Government's reforms of the organisation of British science in 1947. As a consequence of this view McGucken has little to say concerning the subsequent fate of the AScW or initiatives such as the formation of the Scientific Advisory Committee of the TUC. Thus he neglects the issue of the unionisation of scientific workers and the potential implications of the links being formed by a politically aware section of the scientific community with the labour movement. This I argue is one of the most significant outcomes of the period which McGucken examines.

The problem with McGucken's analysis is that he attempts to suggest that a greater coherence can be attributed to 'the social relations of science movement' than was in face the case. He

therefore fails to grasp the conflicting and diverse political goals which lay behind some of the developments which he examines.

Rainer Rilling has emphasised as a key feature the developing links between the left-wing orientation of some scientists in the 1920s and 1930s and trade union forms of organisation expressed in the National Union of Scientific Workers and its later incarnation the Association of Scientific Workers.[22] Rilling identifies in a similar way to Werskey three separate tendencies within the movement with diverse social and political goals. These tendencies he locates in terms of a 'class paradigm' of social relations:

> (1) ...eine antifaschistische, auf die Reorganisation des Productivkraftsystem und die Modernisierung der Politik und Produktion abzielende staatsmonopolistische Reformfraktion innerhalb der herrschenden Klasse Englands, für welche auf der Seite der Wissenschaft etwa die Zeitschrift "Natur" und ihr einflussreicher Herausgeber Gregory stehen mag;
>
> (2) eine ebenfalls antifaschistische, liberale, bürgerliche Strömung innerhalb der akademischen Wissenschaft, als Ausläufer der ursprünglichen Hauptkraft in der englischen Wissenschaft, die mit dem Zussamenbruch des politischen Liberalismus als Repräsentant des "liberalen Ethos" in der Wissenschaft zunehmend an Bedeutung verloren hatte;
>
> (3) endlich eine auf die Arbeiterbewgung orientierte, gewerkschaftlich organisierte und grossenteils sozialistisch-kommunistische Richtung aus der High Science und der Rank and File Science gleichermassen.[23]

Rilling's analysis draws upon a range of studies of the emergence of political consciousness among scientists which sets it in the broader framework of the professionalisation of science.[24] Thus 'the social relations of science movement' of the 1930s becomes one episode in a longer term historical process.

Kay MacLeod, for example, in a study of the AScW between its formation as the National Union of Scientific Workers in 1917 and its rebirth as a trade union in the early 1940s has set its history in the broader context of the social and economic changes in the role of the scientists:

> The history of the AScW is the history of a marginal but significant institution, born of economic and political necessity, reflecting the aspirations of a new and vocal interest group in the British professional community. As such, it also, in many ways reflects the relationship between economic and social and political change and the transformation of scientific activity from the vocation of the amateur to the occupation of the professional.[25]

However, MacLeod argues that the attributed connection between the AScW and the so called 'social relations of science movement' both obscures and oversimplifies the complex and idiosyncratic nature of the movement. She argues that there was in fact little ideological agreement between the handful of influential marxist and socialist scientists who might have conspired to make up a coherent philosophy or programme of action. This view is undermined by the subsequent development of AScW policy during the Second World War. Nevertheless she is correct to suggest that the AScW provides empirical historical evidence relevant to 'the disposition of scientists to form or resist political versus professional organisations and the difficulty of reconciling professional and social responsibilities within one organisation'. Of the early history of the National Union of Scientific Workers, in the period immediately following the first world war, Roy and Kay MacLeod conclude that:

> ...the inherent conflict of economic and political interests which divided academic, governmental and industrial scientists within the Union, frustrated its political ambitions, and enfeebled its trade union activities.[26]

The subsequent history of the AScW's renewal of its trade union status under the influence of the scientific Left during and following the Second World War has been integrated into the more generalised study of the phenomenon of 'white-collar' unionisation. The AScW figured as one of the unions incorporated in the major work on the growth of white-collar unions in the post-war period by George Bain and his colleagues.[27] The union also provided the focus for work on the propensity of professional employees, such as scientists and engineers, to join trade unions rather than professional organisations.[28]

Roberts, Loveridge and Gennard incorporated the AScW in their study of industrial technicians and technicians' unions set against the background of the increased industrial militancy of technical workers. Following a historical review of the various technicians' unions, including the AScW, the Draughtsmen and Allied Technicians Association (DATA) and the Association of Supervisory Staff, Executives and Technicians (ASSET) they conclude that:

> Although the leadership of these unions has tended to be committed ideologically to left-wing Socialism and even Communism, the collective bargaining policy actually adopted has reflected the practical requirements of the membership. The ideological wish of the leadership to attack the capitalist system, and the interests of the members in securing immediate tangible monetary gains, have come together in a mutually satisfying aggressive policy to secure higher pay and improved conditions of employment.[29]

Blume from the perspective of a 'political sociology of science' has emphasised the potentially antagonistic contradiction between 'instrumental' and 'ideological' interests. He suggests

that 'radicalisation is a movement of the left' while 'unionization of British scientists is likely to be largely a status-conscious movement of the right'.[30] Considerable attention has been given to attempting to locate the mechanisms of unionization and politicisation through the linking of the evolution of class structure to the behaviour of white-collar workers and their unions.[31]

However, in concluding their review of the literature on social stratification and trade unionism Bain, Coate and Ellis write that:

> ...much of the literature surveyed rarely comes to terms with what should be its core evidence: the detailed development through time of a union's goals and behaviour and its membership's social position and perspectives. In consequence, it never confronts the central questions which that historical experience throws up; under which conditions and for what reasons do workers, whether manual or white-collar come to see themselves as socially connected with interests in common and under what conditions are those interests perceived to involve a confrontation with the existing social order?[32]

I have argued earlier that the post-war fate of the scientific Left was to a large degree mediated by their involvement and contribution to the trade union and labour movement. And it is this specific experience which I aim to address in the present study. I suggest that a distinctive feature of their political perspective was that their proposals for the direction of scientific and technological change were addressed not simply at the level of the ruling class but embraced the need for the active engagement with the working class and its representative organisations.

I attempt, therefore, to present the mode of decay of the influence of the scientific Left through the AScW, its relationship

to the TUC, through the role of communist scientists (organised around the Engels Society) and through the relationship of the scientific Left to the Labour Party. And in doing so I have attempted to see this process reflected in the formation of and conflict over science and technology policies for the labour movement.

In the next section I outline the characteristic statement of policy formulated by leading activists of the AScW published in 1947. Science and the Nation embodied both the lessons of the left-wing scientists' experience of the war and a programme of reform for post-war reconstruction.

3. Science and the Nation

The espousal of a Marxist analysis of the social relations of science by these left-wing scientists encompassed a theory of the relationship between science and society, a view of the history of science and a political programme for the mobilisation of scientists for the transformation of society along socialist lines.

The scientific Left thus fundamentally challenged the hegemonic view of the autonomous status of science espoused by the majority of the Royal Society and the British Association although there was common ground on some elements of reform.[33] But in the context of the economic crisis of British capitalism in the early 1930s (which significantly affected the career prospects of many young researchers) and the rise of fascism, the orthodox view of science appeared reactionary and obscurantist. The Soviet Union appeared to be an alternative model which successfully demonstrated the convergence of

the potential of science for the alleviation of social ills with the socialist transformation of society. This contrasted with the apparent inability of Western capitalist societies to use to the full the social benefits of science and technology.

Both the standing of the Soviet Union and the imperatives for the planning of science (and by science) were greatly enhanced by the experience of the Second World War. The achievement of this movement of left-wing scientists was expressed in their ability to formulate a coherent programme and framework for the post-war reconstruction of British science. This finally appeared as a Penguin paperback, Science and the Nation, in 1947. It was the collective product of key members of the AScW and its print run of 50,000 copies indicated the degree to which the ideas of the scientific Left had gained popular currency.

The intellectual roots of the book lay, for example, in Bernal's The Social Function of Science (1939) and another collective work of the socialist and communist left Britain without Capitalists (1936).[34] However, it owed as much to the wartime experience of the Association's membership and their involvement in the war effort. The historical lessons of science planned on the basis of socially agreed objectives and the new forms of scientific planning (such as operational research) were not lost.

Science and the Nation eschewed an overt endorsement of socialism but was implicitly predicated on the radical hopes aroused by the Labour victory of 1945 and the prospects for a socialist programme for social and economic reconstruction. It was optimistic regarding the potential of science as a key element

in the progressive transformation of society proposing the planning and application of science for social objectives as opposed to private interests. Science was to be the motive force in the solution of the principal 'tasks of the epoch', solving the pressing problems of domestic reconstruction and the international problems of hunger and want. It was at the same time a uniquely comprehensive survey of Britain's scientific and technological endeavour in its aspiration to shape a national science policy.

Blackett, the then President of the AScW, wrote in the introduction that:

> This book is the spare-time work of a group of mostly young men and women, scientists, engineers and social scientists, who are united in the desire to see the quickest application of scientific and technical advances for the benefit of mankind. They or, we, if I may count myself as one of them, are frankly and proudly partisan in our attitude to the main social tasks of today. Just as during the war few people considered neutrality in the fight against Fascism, as either gallant or wise, so we find little to admire in those of our scientific colleagues who, faced by the great social problems of our time, are so frightfully scientific that they are unable to make up their minds on which side they stand.[35]

In its early chapters Science and the Nation set scientific research in the context of an expansionist economic policy whose aim was the creation of full employment, social security and rapid technological development. The nationalisation of such basic industries as coal and electricity was to be the lever for state intervention to regulate the economy in the interests of the whole community. Whilst retaining a substantial private sector, national planning would, nevertheless, lay down the terms of reference for the

whole of industry. Social objectives could therefore be set without nationalising the whole economy.

The book surveyed the state and possibilities of scientific research in the spheres of production, consumption and social policy. The economic imperatives of the needs of the post-war economy were evident in the major emphasis on the function of science in the productive base of the economy. There was a fundamental assumption that social benefits would automatically be derived from increased economic growth founded on massively increased commitment of resources to research and development. However, a vastly enhanced role for science was envisaged in general education, politics and culture. Such a popularisation of science was construed as essential in the creation of a 'democratic citizenship alive to the potentialities of science'.

The major industrial sectors reviewed in the book included fuel and power, chemicals, engineering, transport, communications, agriculture and two 'industries of the future' - plastics and fermentation. (The depth of treatment of these various sectors reflected the AScW's own representation in membership terms in particular industries.) Generally for each sector unfulfilled research needs were identified and methods and mechanisms for meeting such needs were considered such as research and development contracts. The solutions usually entailed more investment in research and greater employment of expert knowledge. Less attention was devoted to the survey of the food and consumer goods industries and building and home design. However, the social function of science would also be to assess the nature of social needs as well

as to improve the quality of consumer goods.

Science and the Nation's optimism regarding the progressive potential of science was tempered by the awareness that technological advance in an unplanned society could have a damaging effect on employment levels. And thus a recurrent theme of the book is that:

> To make full use of the potentialities of science for the benefit of all men a degree of national and international planning is needed which will enable the required goods and services to be produced, while offering to each man and woman opportunities for work.[36]

Thus one dimension of planning concerns the relation of science and technology to other social and economic institutions but another dimension of planning is that of the internal relations of science.

The book addresses science as a social institution which itself requires reform if it is to adequately serve more general social and economic goals. The government organisation of civil science, its system of financial support and the communications system of science are all scrutinised. Science and the Nation building on policy proposals AScW had developed in the context of the Second World War proposed machinery to plan and coordinate government, university and industrial research.[37] The core of these relationships would be a Central Scientific Office (with the status of a Cabinet Office) which would be responsible for overall policies of manpower planning, research priorities and the allocation of resources for research. The idea of establishing a Ministry of Science was rejected in favour of strengthening of existing research

establishments or transfers to more appropriate departments.

Policy for fundamental research in the public sector would in part be determined by the involvement of research committees in universities (which would include representation of scientific workers) and at a national level by a university council. Policy for fundamental research in the private sector would be encouraged through the existing structure of research associations together with the promotion of new ones where necessary. The problem of the frustration of research in the private sector was identified as being underpinned by the restriction on freedom and openness in the publication of research results; the lack of cooperative research; and in innate conservatism in capitalist investment in science. However, the writers assumed that such obstacles could be overcome through the stimulus of advisory activities of the Central Scientific Office and legislation to reform the patent laws to promote a freer interchange of scientific work. Policy for research in the public sector would be determined by direct intervention.

Science and the Nation advocated a greater political role for scientists in order to ensure the fullest use of science and particularly promoted the advisory role of scientists in government:

> The task of a government is to relate its social objectives to the material and factual possibilities, and the mobilisation of scientific advice and effort is a necessary condition of its work.[38]

However, the advisory function of scientists was set also in the context of the need for the independent appraisal of government

science policy which had been undertaken, for example, by the AScW.

The idea that technical expertise conferred 'rights of leadership' was explicitly denied:

> ...there is not, fortunately, among scientists any widespread acceptance of the 'technocratic' point of view, which sees the technicians as the real ruling class in society, benevolently dispensing benefits to ordinary men in accordance with their needs. This fantastic but internally logical development of the Platonic master and slave relation is entirely opposed to the purposes of this book.[39]

Increasing popular awareness of scientific and technological development was seen as an important aspect of democracy. The growing links between the trade union movement and scientific workers was cited as a further feature of extending democratic planning based on an awareness of the technical and scientific aspects of policy:

> Several unions, in preparing to meet the problems of peace, have used the help of scientists and their trade union organisations. In many towns and cities scientific and manual workers have collaborated in considering the future of the industries of their areas. The Trade Unions are learning in this way to use, in the preparation of constructive and sound policies, the help of technical advisers who are themselves in sympathy with their objects; twenty years ago such advisers would have been hard to find but since that time there have been great changes of outlook in the scientific profession.[40]

The reconstitution of the TUC's Scientific Advisory Committee initiated by the AScW was cited as further evidence of these new relationships.

4. The Development of Post-War Policies for Science and Technology in Britain: A Synoptic Sketch

Although the period 1947 to 1964 witnessed a rapid expansion of Britain's scientific and technological activities these developments were shaped according to a pattern substantially different from that envisaged by the authors of Science and the Nation.[41] Significant features of this period were the enhanced role of the state in the support and direction of scientific and technological change, and the expansion and incorporation of scientific and technical expertise. However, these changes were worked out within specific historical constraints. These included the weakening of Britain's economic and political status brought about by the war, the continuation of an institutional framework largely established in the inter-war period, the legacy of colonialism in terms of its impact on defence policy and the British commitment to the Western alliance. The priorities of rearmament and weapons development rapidly supervened in the context of the Cold War and helped to determine the concentration of resources on 'big science'. And to some extent as a by-product of the military development of science-based technology, the electronics industry began to provide the material basis for revolutionising production processes through automated or computerised equipment.[42] At the same time the transition from the period of post-war austerity to one of relative affluence brought with it the emergence of extensive product innovation and the creation of the mass consumer market.

Drawing on lessons of the wartime mobilisation of science the post-war Labour Government initially sought to harness science to the needs of reconstruction. Civil science spending by the research

councils and other departments, and the universities is estimated to have risen from £6.5 millions in 1945-46 to £30 millions in 1950-51.[43] Similarly the Labour Government had accepted a Cabinet committee recommendation that the output of scientists and engineers should be doubled within a decade. Its reforms of the machinery of scientific advice and coordination were embodied in the creation of the Advisory Council on Scientific Policy (ACSP) for civil research and the Defence Research Policy Committee (DRCP) for military research and development. Despite the fact that Sir Henry Tizard was appointed to chair both bodies this arrangement effectively institutionalised the bifurcation of civil and military research.

The Labour Government also attempted to improve the productivity and efficiency of British industry through the greater application of science and technology. This was, however, undertaken largely through the existing machinery by enlarging the role of the Department of Scientific and Industrial Research (DSIR) and the Research Associations (RAs). DSIR laboratories were, for example, instructed to engage in projects of short-term economic and social importance. A committee on industrial productivity (also under the chairmanship of Tizard) was established which included representatives of government, private industry and the trade unions. A significant institutional innovation was the creation in 1948 of the National Research and Development Corporation (NRDC) to support the inventive activities of private individuals, the universities and government research teams.[44]

However, the Attlee Government's endeavours to redeploy science and technology for social and economic purposes were overshadowed by

the economic crisis generated by the accumulation of wartime debts and loss of markets and then the onset of the Cold War with its requirement for a programme of rearmament and sophisticated weapons development. The pattern of state support for research and development became firmly concentrated on the key military fields of nuclear technology, aviation and electronics. Defence research spending, administered through the Ministry of Supply, rose from £34 millions in 1945 to £63 millions in 1950. The primacy of nuclear physics in civil research and the nuclear energy programme in national fuel research was geared to the goal of establishing Britain's independent nuclear deterrent. The Labour Government's uneasy relationship with private industry and its belief that private industrial research was not up to the task of developing the new science-based weapons technologies led to an emphasis on the expansion of the state's own nuclear and aviation research facilities. This brought about a continuing extension of secrecy in science.

The Conservative Government which took office in 1951 amplified the trends already established by Labour. 'Mission-oriented' programmes in military and other departments went ahead at the expense of the coordination of science and technology policy for broader economic and social goals. The imbalance in state support reached perhaps its most extreme in 1955-56 when it has been estimated that between 80-90% of total government funding for research and development was absorbed by defence, aviation and atomic energy projects.[45]

The major institutional innovation of this period was the separation of nuclear research in 1954 from the Ministry of Supply

with the creation of the United Kingdom Atomic Energy Authority (AEA). This body was given overall responsibility for military and civil research in the field and its income doubled within four years, rising from £47 millions in 1954-55 to £105 millions in 1958-59. These new institutional arrangements had arisen from the imperatives created by the successful testing of Britain's hydrogen bomb and a decision to launch a massive civil nuclear power programme. The further evidence of Britain's imperial decline signalled by the Suez fiasco and the anxiety over the vulnerability of oil supplies contributed to the enthusiasm for civil nuclear power. The continued emphasis on civil and military nuclear development was a major influence on university research priorities with grants flowing into high energy physics and related disciplines.

The Ministry of Supply (later renamed the Ministry of Aviation) continued to be responsible for expanding state support for civil and military aeronautical and electronics research and development. Thus the most costly areas of civilian research and development, nuclear energy and aviation, were placed in 'mission-oriented' agencies, together with related defence work.

While the government research budget in nuclear, aviation and defence generally, escalated rapidly support for industrial research (i.e. excluding defence contracts) dwindled. Although funds for the DSIR were increasing and its administrative structure was tightened up following the Jephcott Report of 1955 it was unable to complete its post-war expansion plans until the end of the decade. The Government's commitment to the RAs was weakened with a decline of its contributions to their aggregate income from 35% to 23%. By the end

of the 1950s the RAs accounted for only about 3% of industrial research. The Government's overall share of national research expenditure fell from 74% to 66% between 1955-56 and 1958-59. At the same time expenditure by private industry rose from £77 millions to £160 millions.[46] However, industrial research was overwhelmingly concentrated in the largest firms in the aircraft, electronics and electrical engineering, and chemical industries and this uneven pattern was again a result of heavy defence contracting.

From 1956 onwards as Britain's nuclear deterrent became fully operational expenditure on military research and development tended to stabilise. The period of the Conservative Government under Macmillan (1957-63) was characterised by a growing concern that the country's spending on research was not contributing sufficiently to national economic growth and that the priorities of the previous era had led to a neglect of economically and socially relevant areas of research. Both the Trades Union Congress (TUC) and the Federation of British Industries (FBI) were critical of the Government's failure to address the problems of the modernisation of Britain's industrial base. And the Labour Party was able to mount an effective political attack on the Conservative's record on science and technology issues. (In mounting this attack the Labour Party was able to draw upon the ideas and advice of many of those scientists who had been involved in the immediate post-war efforts to bring about the planning of science.[47])

In 1959 Lord Hailsham was appointed as a Minister for Science although he explicitly rejected an interventionist role. His major concern was to ensure the expansion of basic research within the

existing institutional framework and to strengthen the educational underpinnings of science and technology. Under Hailsham, for example, DSIR grants to the universities and to the Colleges of Advanced Technology (CATs) expanded rapidly and overall research council funds quadrupled. But he failed to address either the problem of the need to accelerate the pace of industrial innovation or the problem of the criteria of choice for research and development projects.[48]

The ACSP and the DSIR were increasingly anxious over the increasing evidence of the failure to effectively manage the national research and development effort. However, neither body was in a position to coordinate or establish budgeting priorities for rising public expenditure on science and technology. Vig argues that '... by 1962-63, a serious institutional crisis had developed over government aid to science and technology'.[49] For example, expenditure on civil science had been rising for a number of years at an average of 12-13%. And the conspicuous failure of Britain's missile programme was symptomatic of both its financial and technological limitations.

Following the Robbins Report of October 1963 which proposed a major expansion of higher education, the Conservative Government established a 'federal' ministry, the Department of Education and Science. This was to embrace two distinct areas of responsibility; on the one hand general education and on the other university education, civil science and technology. Another government committee, chaired by Sir Burke Trend of the Cabinet Secretariat, was set up to consider specifically the government organisation for science and technology.

Trend reported at the same time as Robbins and proposed the strengthening of the Office of the Minister for Science. He also proposed a reorganisation of the research councils on functional lines including the establishment of a new council to replace the DSIR, the Industrial Research Development Authority (IRDS). However, the Conservative election defeat in October 1964 curtailed their intention to implement the Trend proposals whose organisational changes anyway fell far short of the much needed fundamental restructuring of science and technology policy.

And it was partly on the promise of a more fundamental attack on Britain's social and economic problems through science and scientific planning that the Labour Party came to power. The problems of industrial modernisation and innovation, of priorities and of planning mechanisms were at the core of Labour's critique of Tory policy and of their programme for recovery. New priorities were promised, relevant to the country's immediate economic and social needs, determined by an interventionist Ministry of Technology. Wasteful military and 'prestige' programmes would be cut. Harold Wilson at the 1963 Labour Party Conference in Scarborough, in a now famous phrase, had promised to 'harness Socialism to science, and science to Socialism' and to remake Britain 'in the white heat of scientific revolution.'[50]

5. On Defining the Scientific Left

I discussed above (see section 2) a number of studies which identified the emergence in the 1930s and early 1940s of a relatively coherent group of socialist scientists. This scientific Left, as

distinct from other reforming elements within the scientific community, was defined by a belief 'that only a society transformed along socialist lines would be prepared to make the fullest and most humane use of scientists and their discoveries'.[51] The central theoretical influence of Marxism on the group has been traced to the impact of the contributions of the Soviet delegation to the 1931 International Congress of the History of Science and Technology held in London.[52]

The Communist Party of Great Britain, whilst having a considerable attraction for and influence on the scientific Left, by no means defined its raison d'etre. Members of the scientific Left displayed a variety of formal political affiliations which included membership of the Labour Party or the Communist Party but also included a general sympathy with the goals of the Labour movement rather than specific organisational ties. However, it was a case that left-wing scientists of this period saw no conflict between participation in socialist politics and the pursuit of professional eminence. Neither did they see any conflict between the promotion of the professional, cultural and political status of scientists and the promotion of a broader social revolution. On the contrary they assumed the intrinsic liberatory and socially progressive nature of science.[53]

However, the period from 1947 to 1964 was one in which the original coherence of the scientific Left became increasingly fragmented. This fragmentation involved both the breakdown of its political and ideological framework and a loss of influence and support within the scientific community.

As a consequence of these historical developments, which are discussed in my study, I have tended to use the term 'scientific Left' in two distinct but related senses. Thus the first sense in which I have used the term refers to that relatively coherent group of socialist and Marxist scientists which emerged in the 1930s and 1940s. The second sense refers more generally to scientists who were broadly in sympathy with the organisations and goals of the Labour movement.

These shifts in the meaning of the scientific Left are reflected in the periodisation adopted in the following chapters. From 1947 to 1956 (discussed in Part I) it is the first sense of the 'scientific Left' which is predominant. The period 1956 to 1964 (discussed in Part II) involves the use of the broader and more general meaning of the 'scientific Left'.

As I have already suggested, underlying these shifts and displacements were profound social and political transformations. The central terms of the original definition of the scientific Left were brought into question between 1947 and 1956 during the height of the Cold War. The Communist Party suffered a decline as a central reference point for radical socialist politics. The increasing evidence of the repressive nature of Stalinism in the Soviet Union brought into question the model of socialism which the Soviet Union had thought, hitherto, to embody. For scientists the Lysenko controversy, in particular, brought into conflict their professional and political roles. And the evidence of the distortion of science by a socialist state was fully exploited by the Right at the expense of the Left. Attitudes to the Soviet Union became a source of schism within the scientific Left.

The apparent ability of post-war capitalist society to incorporate and adapt to the increasing pace of scientific and technological change undermined the orthodox Marxist analysis.[54] The coincidence between the general critique of capitalist society and the promotion of scientific and technological progress no longer appeared to be self-evident.

In Part II of the thesis where I have discussed the period 1956 to 1964 the political reference point for the activities of left-wing scientists was increasingly the Labour Party. The Soviet invasion of Hungary in 1956 served only to deepen the crisis of Marxism and the international communist movement. It initiated a mass exodus from the British Communist Party with many members moving into the Labour Party. Although the ideas of the need for the planning of science within a socialised economy and the direction of research for social welfare remained important goals they were now less precisely located within a defined model of a socialist society.

6. A Note on Method and Sources

There are a number of approaches that can be adopted in an attempt to unravel the political and ideological shifts which are embodied in the policy debates discussed in the present study. These changes may be studied at either the 'micro' (individual) or the 'meso' (institutional) or 'macro' (societal) levels.

For example, the method of the 'collective biography' (or 'prosopography') can be adopted at the 'micro' level as a means of identifying the common background characteristics of a group of actors by means of a collective study of their lives.[55] The changing structure and function of an organisation may be delineated by monitoring the

changing composition and nature of its membership. Morris Berman, for example, uses such an approach in his study of The Royal Institution between 1799 and 1844 to suggest that 'the evolution of organized science, and the common perception of "what science is all about", cannot be understood without constant reference to changing class structure and vested interests...'[56]

Gary Werskey has also employed the 'collective biography' to reveal the roots of the political actions of the radical scientists of the 1930s. He writes that he chose that particular approach as opposed to a 'more abstract account of the scientists' movement in the thirties - because I believe that no significant social phenomenon can be understood apart from the motives and aspirations of the persons who shape it'.[57] However, a danger of this approach is that of reducing the significance of social movements to the individual motives and aspirations of prominent participants. Thus a limitation of concentrating on the 'micro' level is that of neglecting the structural and institutional frameworks which condition and constrain political action. I have already noted (see section 2) McGucken's criticism of Werskey's relative neglect of the impact of 'the social relations of science movement' on organisations such as the Royal Society, the British Association for the Advancement of Science and the Parliamentary and Scientific Committee. I also suggest that the important dimension of the scientific Left's relationship with the trades union and labour movement (particularly in the post-war period) is understated.

Thus in the present study of the inter-relationships of scientists, the labour movement and questions of science policy in

the post-war period I have adopted an approach at the 'institutional' level as more appropriate to the object of study. I have sought to identify the evidences and indications of political and ideological change through the internal conflicts, programmes and policies of some key organisations such as the Association of Scientific Workers, the Trades Union Congress, the World Federation of Scientific Workers, the Labour Party and the Communist Party of Great Britain. I have also tried to indicate the links with the broader changes in the social and historical context.

Oral history has been a relatively recent methodological innovation, used particularly in the context of community and labour history, in the attempt to elucidate the power relations between, and the class background of, the makers of history. Advocates of oral history emphasise its claims to give a 'voice to the voiceless'.[58] In a similar way to 'collective biography' it has arisen from the critique of the more orthodox documentary-political view of history. In its more radical forms oral history has sought to convey the voice of dissent (particularly of the working class) in society without the mediating or alienating influence of a 'scientific' academic history in which 'social facts' are treated as 'things'.

However, Gregor McLennan in his review of methodologies of history has clearly identified a number of limitations with this approach which relate directly to my own reasons for relying primarily on the more traditional archival and documentary sources.[59] Firstly, oral history tends to define the priorities of history in terms of a specific source and technique. It does not confront directly the need for specific theoretical and political change. Secondly, oral

history does not dispose of the problem of the 'external' or 'objective' relation of the historian to the object of study and thus '... however sympathetic that historian may be the subjects' reports are as transparent or opaque as documents'.[60] Thirdly, the content of much oral history undercuts the idea that there is any automatic link between a methodological technique and a political objective. It seems to me, therefore, that oral history as a method provides no reason for accepting the testimony of any social group as more or less valuable than any other. It still begs the question of the need for an organising theoretical framework.

With these considerations in mind and in view of the 'institutional' approach of my study I have given priority to the available archival and documentary sources in preference to interviews or oral accounts. This was reinforced by the fact that the key figures in the organisations which I consider were both highly articulate and self-conscious of their political role. In contrast to other sections of the labour movement, for example, they tended to set down their ideas and beliefs consistently over time - if not in a published form then in private papers, reports, memoranda etc. I felt, therefore, that the archival sources available to me would perhaps yield firmer and more reliable evidence across a broad range of events and issues than the contemporary recollections of participants.

My principal sources have thus included, for example, the archives of the AScW, the published annual reports of the TUC and the unpublished minutes of the TUC's Scientific Advisory Committee. Such institutional sources were also supplemented by access to

collections of papers of important actors in the history, in particular, J.D. Bernal and P.M.S. Blackett. These more personal sources were especially helpful in elucidating the more formal organisational accounts contained in committee minutes and the like. Full details of the sources I have used are given in my bibliography.

In adopting this approach I hoped to capture the changing balance of social and political forces acting on and within the organisations studied and to illuminate the changing relationships of the Labour movement to science and technology.

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PART I

SCIENTISTS, MARXISM AND THE TRADE UNION MOVEMENT:

1947 - 1956

CHAPTER 1

THE ASSOCIATION OF SCIENTIFIC WORKERS: POLITICS, TRADE UNIONISM AND SOCIAL RESPONSIBILITY

1. Introduction

In February 1941 the Registrar of Friendly Societies had confirmed the registration of the Association of Scientific Workers as a trade union. I have described elsewhere the rapid growth in membership and wartime role of the AScW as an active critic of the state's handling of the scientific aspects of the war effort.[1] The Association had in particular pursued the recruitment of scientists, engineers and technicians in industry. Between May 1941 and May 1942 membership had increased from 2,000 to 4,500 and then in the next twelve months to around 9,000. Adopting trade union organisational forms and strategies it had sought to harness the professional and economic frustrations of scientific and technical workers to a distinctive conception of the social relations of science. This conception was underpinned by a Marxist account of science in society and the consequent social responsibilities of scientific workers. A key feature of this approach was the advocacy of the rational organisation and planning of science which had received its most potent expression in J.D. Bernal's The Social Function of Science (1939).[2]

The AScW brought into alignment an ideologically committed group of (mostly academic) left-wing scientists with a growing base of scientific workers which was to provide a powerful foundation for extending the influence of the planning of science movement.

The Association had argued the failure of the state and industry to use technical workers for the war effort and had pointed to the failure of coordination between government departments and private industry. Out of the wartime experience of the central organisation of science, the use of scientific planning techniques and the great influx of scientists into state administration the Association developed policies for the re-organisation of British science in the period of reconstruction. These ideas were cogently expressed in Science and the Nation (1947)[3] but had been prefigured in a successful series of wartime conferences. Planning had been the key feature of these meetings - Science and the War Effort (1942), the Planning of Science (1943) and Science in Peace (1945) - which had attracted leading figures of the political and scientific establishments. The setting up of the Advisory Council for Scientific Policy (ACSP) in 1947 owed much to the agitation of the AScW.[4]

Under the presidency of Prof. P.M.S.Blackett (1943-1947) the Association was particularly successful in developing its links and influence within the trade union movement. In 1942 the AScW had affiliated to the Trades Union Congress (TUC) and had subsequently played an active role in Congress discussions. As a consequence the role of science was given prominent consideration in the TUC's policies for post-war reconstruction. Blackett was instrumental in the re-constitution of the TUC's Scientific Advisory Committee.[5]

The Association expressed its international commitments as the moving spirit in the formation of the World Federation of Scientific Workers. This international grouping of scientists' trade unions, founded in 1946, created links between organisations in the communist

and non-communist worlds.[6]

Within Britain the Association's success in building contacts with a broad spread of trade union and scientific societies was illustrated by the post-war conference, Science and Human Welfare (February 1946), which was sponsored by the AScW and had the support of the British Association of Chemists, the Institution of Professional Civil Servants, the Association of University Teachers, the Physical Society, the Nutrition Society and the Institution of Electronics.[7] The Association also was the focus of British atomic physicists in their response to the national and international issues of social responsibility raised by the military exploitation of atomic energy. It was the Atomic Sciences Committee of the AScW which played a key part in the creation of the British Atomic Scientists Association which provided an independent forum for the appraisal of government atomic policy.[8]

Thus the AScW emerged as an influential proponent of a political conception of the social relations of science both in relation to the trade union movement and to the scientific community.

In the present chapter I form an account of some of the factors which were to undermine the Association's influence. These include general factors associated with the onset of the Cold War but also factors specific to the impact of the Cold War on left-wing scientists.

Under the presidency of J.D.Bernal (1947-1949) the Association promoted politices which were closely linked with those of the Communist Party. This connection substantially weakened its

relationship to the TUC. The AScW's criticisms of Government policy on science and on broader questions of economic policy set it against the TUC's official position of support for the Labour Government. The Association came under increasing pressure as the TUC launched a major attack on communist influence within the labour movement.

This pressure was compounded by the Labour Government's own purge of civil servants with communist or left-wing sympathies. The shadow of suspicion had been thrown over the loyalties of left-wing scientists by the case of the spying of Dr. Alan Nunn May.

The relationship of the Left with the scientific community was further marred by the Lysenko controversy. In the hands of the Society for Freedom in Science the case of Lysenko's official endorsement by Stalin and the attack on genetics in the Soviet Union was used to discredit the idea of the dependence of scientific development on social and economic circumstances.

I go on to discuss the fact that in addition to the features associated with the Cold War, the AScW was plunged into an organisational and financial crisis for other reasons. The favourable conditions for recruitment created by the second world war had been eroded by the transition to peace. The membership of the AScW dropped from approximately 17,500 in 1947 to approximately 12,500 in 1950. The union came under pressure from other trade unions better able to represent the specific interests of different sections of scientific and technical workers. The post-war reforms of the Labour Government had removed some of the discontents which had fuelled earlier AScW campaigns.

In the final section of the chapter I consider the continuing effects of these constraints on the science policy work of the AScW in the early 1950s. The attempt of the scientific Left to regroup became evident in the campaign around the idea of the 'constructive use of science'.

2. Science, Planning and the Post-War Crisis

2.1. Planning and Freedom in Science

In the ambiance of post-war reconstruction there developed to a limited extent a rapprochement between the advocates of the planning of science in the AScW and the 'defenders' of the freedom of science in the Society for Freedom in Science.[9] The most influential of the protagonists in the freedom versus planning debate had been present at the conference of the 7th and 8th December 1945, arranged by the British Association's Division for the Social and International Relations of Science.[10] Polanyi restated in his address, 'the Social Message of Pure Science', the central themes of the SFS; the dangers of totalitarianism to which the planning of science is exposed; the criticism of the thesis that the content and direction of scientific development should be determined by social needs. His central concern was for the maintenance of the autonomy of scientific investigation with the corollary that the social utility of knowledge was secondary.

Polanyi argued that public support for science should be provided on the grounds of the pursuit of knowledge for its own sake:

> The claims of science are part of the claims of all scholarship for respect and for academic independence and freedom, and men of science are pledged to values more precious than material welfare.[11]

Bernal, speaking on the second day of the conference, had addressed himself precisely to the question of freedom arguing that 'creative activities and original thinking cannot be carried out under compulsion' and he argued for the association of those who believe in planning with those who feel most strongly about the freedom of science. He went on to emphasise the democratic element in the organisation of science especially in the determination of research priorities.[12]

Bernal's address drew a positive response from Polanyi who subsequently wrote to Bernal:

> I just read in 'Nature' an extract of your speech at the BA. I quite agree that the divergent views which you and I have represented in the past few years on the subject of freedom in science have now been sufficiently clarified between the two parties holding them. A union of efforts is also urgently needed in view of the great problems confronting us throughout the world.[13]

Polanyi suggested the reform of patent law as an area of shared interest where cooperation between the SFS and the AScW might be a practical possibility.

Bernal replied that:

> The Association of Scientific Workers has been giving considerable attention to the problem of patents. I am sending you a copy of their memorandum in case you have not seen it. I would like to discuss your proposals with some of their members and when I have done so I will probably write to you again.[14]

The Association had for a number of years been concerned with the alleged abuse of existing patent laws by large industrial firms. It was argued that promising inventions were being shelved through the use of blocking patents.[15] However, this tentative move towards cooperation seems to have got no further. The Executive Committee of the AScW rejected any possibility of collaboration on the grounds that the Society was 'mainly anti-Soviet and anti-AScW'.[16]

In the autumn of 1946 Baker and Tansley, two of the principal propagandists for the SFS, had published in Nature a paper outlining 'the course of the controversy on the freedom of science' which attacked the AScW as one of the chief opponents of freedom.[17] A reply to Baker and Tansley was drafted by Bernal, Blackett, Bunting and Wooster at the request of the Association's Executive Committee. This reply (which Nature refused to publish),[18] 'Freedom and Organisation of Science', drew out the common ground and the major differences which existed between the Society and the Association. It argued that areas of mutual agreement existed on the general functions of scientific organisation, the supply and training of scientists, scientific communication and funding. However it pointed out that:

> Granted common aims of the greatest development of science under the most ideal conditions for its pursuit, there is a difference in means proposed for achieving these ends. Those on which the Society for Freedom in Science lays most emphasis are negative. They demand a minimum of interference from or even contact with outside interests.[19]

In contrast to the SFS the Association advocated the national direction of research (pure and applied) and the integration of

research with social needs.

The prospects for reconciliation between the SFS and the AScW and the establishment of broadly based unity between these conflicting political wings of the scientific community were undermined by Tansley and Baker's attack on the Association. The Executive Committee's rejection of collaboration with the SFS on the grounds of its 'anti-Sovietism' reflected the predominant influence of its communist members. Various leading figures of the SFS had not only severely criticised the general arguments for the planning of science but had based that critique on a political attack on the Soviet Union. The state of genetics in the Soviet Union was used as the paradigm case of the consequences of the state planning of science.[20]

The political influence of the scientific Left within the Association was also evident in their critical appraisal of the Labour Government's reforms of the state's organisation of scientific advice. The limitations of the Labour Government's general perspective on science had been signalled at the BA conference in December 1945. Herbert Morrison, Lord President of the Council and as such responsible for general strategy for scientific research, had stressed the Government's commitment 'to pursue knowledge for its own sake' and had emphasised the autonomy of science. Morrison's stress on scientific autonomy echoed the message of the supporters of the SFS.[21]

In the setting up of the Tizard Committees (the ACSP and the DRPC) the Labour Government had established a national focus for the central organisation of scientific research. The Association had given a qualified welcome to these innovations. In his farewell

presidential address to the AScW Annual Council meeting in May 1947 Blackett welcomed as 'belated' the setting up of the ACSP.[22] Blackett felt that the setting up of central machinery for science was decisive evidence of the failure of a counter-offensive by the administrative civil service to roll back the wartime involvement of scientists in government. Similarly he welcomed the recommendations of the Barlow Report which for the first time meant that university education in Britain was being 'planned ahead for many years on the basis of the estimated real needs of the community'. This was in line with the arguments presented by the Association's pamphlet 'Science and the Universities' (1944).

Blackett was, however, more critical of the Labour Government's failure to create an adequate scientific and technical staff at the Ministry of Fuel and Power. Blackett commented:

> The failure in relation to Fuel and Power must not be repeated in the field of general economic planning and of the drive for higher production efficiency.[23]

The AScW's arguments for the planning of scientific and technological research in the fuel and power industries had been presented as a paradigm case of planning based on a comprehensive assessment of national needs in the context of nationalisation.[24] Its Fuel and Power Committee had produced plans for the setting up of a Scientific and Technical Service for the whole of the fuel and power industries which would have been able to coordinate and administer national policy for scientific research. This was in contrast to the situation where several separate and largely independent groups of agencies were concerned in the promotion of

technical progress such as the technical section of the Ministry, Government research establishments, university research departments, research organisations financed jointly by Government and industry and organisations supported wholly by various fuel industries, including appliance manufacturers and some large fuel consumers. Blackett endorsed the Keep Left manifesto issued by a group of Labour politicians including Richard Crossman, Ian Mikardo and Michael Foot. This group was also concerned to maintain the socialist direction of government policy and was critical of the moves to cement Britain's relations with 'capitalist' America and the growing hostility to the Soviet Union.[25]

The conference 'Science and the Real Freedoms' convened by the AScW in March 1947[26] had been intended to provide a platform to reply to the critics of the planning of science by contrasting the negative approach of the SFS ('freedom from') with the positive approach of the planners ('freedom to'). The Association was also increasingly concerned to maintain pressure for the effective and planned use of science in economic problems facing the Labour Government. In his opening address to the conference Sir Robert Watson Watt welcomed the establishment of the Tizard Committees, the recently created scientific organisation within the National Coal Board and the provisions of the Industrial Organisation Bill. However, he referred to a number of limitations on the development and use of science. These included restrictions on the free flow of scientific information in both military and civil fields:

> For a long time sections of industry have imposed limitations on the development and inter-change of new ideas and techniques, occupied research workers on circumventing the patents of others, and used blocking patents of their own to ward off the necessity of making new capital investment.[27]

Secrecy was perceived as deeply symptomatic of the frustration of scientific and technological development by the social relations of a capitalist economy. And this theme was pursued in a campaign by the Association which involved both pressure for action by the TUC and by government.

Bernal in replying to the critics of planning attempted to define the 'freedom of science' in a positive sense. He argued:

> The real freedom of science not only include freedom from crippling restriction, but freedom to give of one's best in the service of the community. Such freedom is more than individual freedom. It is a collective freedom implying organisation of scientists by scientists in relation to all aspects of national activity.[28]

Bernal saw the economic crisis which had overtaken the Labour Government as a long term consequence of a national failure to use effectively the country's scientific resources. In particular he argued that the fact that about one half of governmental expenditure on research was allocated to the military sector had a detrimental effect on the country's economic performance. Bernal called for 'energetic planning' geared to organising scientific effort to solve the short- and long-term problems of British industry. He proposed that:

> We need a similar organisation and status to that of the operational research teams during the War. This is essential both in those Ministries responsible for our industries, and within the national development councils envisaged under the Industrial Organisation Act. In addition, men of science are needed at Cabinet Office level working in co-operation with the Joint Planning Staff. The existence of the Tizard Committees provides the nucleus for such a scientific general staff.[29]

2.2. Science and the Economic Crisis of 1947-1948

Under Bernal's presidency (1947-1949) the AScW was to launch an extensive campaign to mobilise pressure on the government to accept the priority of the planning of science and scientific planning. This campaign which was conceived around the theme of 'science and the economic crisis' brought the Association into fierce opposition to the Labour Government. At the same time the politics of the Association's leadership, as the Cold War deepened, were increasingly associated with those of the Communist Party. Bernal's initial plan was to mount a campaign which would draw upon a broad range of personal and organisational contacts. These were to have included the Tizard Committees, the TUC, the British Association and parliamentary channels.[30]

The Association's Executive Committee issued a statement in August 1947 pointing out that the role of science and technology had been virtually ignored in the political debate surrounding the crisis. The statement went on to call for a mobilisation of scientific effort through a significant shift of resources from military to civil research.

> We are spending £60 million a year on war research, more than four times what is spent on Government civil research. Whether this assessment of priorities could be justified in any circumstances may be argued, but it is impossible to justify it when the safety of the country depends on the rehabilitation of our industrial economy.[31]

The Association was critical of the scale of both public and private investment in civil research. However, this was rooted in a more fundamental critique of the continued capitalist base of the British economy in spite of the recent nationalisations. The inefficiency of industrial research framed within capitalist social relations, it was argued, lay in the fact that the 'greater part of industrial research is now carried out by numerous competing firms causing much overlapping and a great waste of time on secret processes and patents'.[32] This point was made even more strongly in the subsequent statement by the Communist Party on science and the crisis which followed closely the thrust of the Association's statement.[33]

The Association proposed that the direction of mobilisation of the national scientific resources should be through joint economic and scientific planning. The ACSP could provide an effective nucleus for such central direction and planning if it was to be given executive powers. At Cabinet level the Advisory Planning Board should be enlarged by the addition of three scientific and three technical members. At least one third of scientific manpower, laboratories and equipment of the defence services should be diverted to civil production work. The pooling of research and development in essential industries was called for along the lines

developed during wartime. And to emphasise the role of scientific and technical workers it called for their representation on existing and future joint production committees.

Bernal stressed the need for organised scientific workers to strengthen their links with the broader trade union movement:

> An attempt to escape the crisis by the methods - somewhat camouflaged - that were used in 1931 that is, by simple restricted and sweated labour, will not put any calls on science, and indeed, would make science largely superfluous. We can guard against such a situation, disastrous alike to national recovery and the future of science, only by allying ourselves with those forces in the nation that have similar interests to ourselves and, in particular, with the Trades Union movement.[34]

Bernal elaborated on the planning of science in the context of broader economic planning which he claimed only existed in 'faint outline'. He proposed a phased plan for national recovery beginning with a reorganisation of the economy on its existing technical base leading eventually to requipment with new techniques such as the automatisation of production using systems of electronic control. Bernal's ideas were later to centre upon the notion of a 'second industrial revolution' underpinned by qualitative changes brought about by science and technology in production processes.

A sub-committee of the AScW's Executive Committee was established to coordinate the campaign on 'science and the economic crisis'. By early 1948 a set of speaker's notes had been produced to promote the campaign at local level - developing activities with Trades Councils; generating pressure for representation on joint production committees; and to promote the idea of regionally based

'research councils'.[35] At the national level two resolutions were moved at the 1947 TUC conference on 'science and the economic crisis' and 'secrecy in science'.[36]

At Bernal's instigation the British Association (meeting in Dundee in 1947) established a committee which included Tizard to consider how science might assist in the crisis.[37] However, the Association were unable to get direct representation on the BA's committee. The rifts in the perceptions of the social relations of science, deepening in the conditions of the Cold War, were reflected in Crowther's attack on Sir Henry Dale's presidential address to the BA of the same year. Crowther described Dale's address as a 'plea for a return under the banner of freedom to the good old times of private enterprise in scientific research'.[38]

In addition important differences in perspective between the AScW and the Labour Party were marked by the publication of a report, New Deal for Science, produced by the Labour Party's own science policy committee.[39] Early in 1948 the Party's National Executive Committee had asked 'a number of scientists, trade unionists and managers to advise on the Party's policy for science'. The report avoided any strong commitment to planning or intervention (particularly in the private sector) and concentrated on a justification of the Government's existing reforms of the organisation of scientific advisory structures. The report stated that the reforms undertaken by the Government had laid the foundation for 'that full utilisation of our scientific and technical resources which is essential for our own prosperity'.[40] The writers argued that the setting up of the Advisory Council on Scientific Policy,

the Defence Research Policy Committee and the Committee on Industrial Productivity (all under the chairmanship of Sir Henry Tizard) constituted a 'Scientific General Staff' capable of coordinating the country's scientific development.

The research council system (the DSIR, the MRC and the ARC) was held to be the most satisfactory means for the administration of the government's scientific activity. The writers, however, shared the view of the AScW that an additional research council, a Social Science Research Council, was required. But the report had little further to offer by way of strengthening of the central mechanisms for scientific advice and direction along the lines favoured by the AScW.

On the question of science and industry the report urged that the Labour Movement should give a lead in overcoming the prejudices on the part of managements and labour with regard to scientific and technological innovation. It argued that:

> The nationalised industries, now responsible for a very important part of our total industrial capacity, will be in an excellent position to set an example of efficiency to private enterprise. For private industries Development Councils should encourage research and its application in every possible way. The aim is that every part of industry should in the next few years utilise the resources of science and technology to the full.[41]

But the document was explicit in its rejection of 'coercive measures' to stimulate industrial research. It suggested that what was needed was a Scientific Information Office which would 'direct intensive propaganda at backward sections of industry, and should at the same time give full assistance to progressive managements'.[42]

The lynch-pin of policy for industrial research was the encouragement of cooperative research through the research associations. It was proposed that the Government might use its powers under the Industrial Organisation and Development Act (1947) to make private firms join appropriate research associations although this idea was never taken up. The Labour Movement was encouraged to play a greater role in the activities of the research associations and the representation of trade unions on their governing bodies was advocated. This proposal was taken up by the TUC's Scientific Advisory Committee to significant effect.

Labour's New Deal for Science was discussed by the AScW's Science Policy Committee and Roy Innes gave the report a qualified welcome as a basis for discussion but noted a number of weaknesses.[43] He pointed out that it failed to specify any measures to ensure the more efficient use of science and technology by private industry. Similarly the relationship between economic policy and the rate of re-equipment of industry and the actual use of the results of scientific research was neglected. In contrast the Tizard Committee on Industrial Productivity had emphasised in their first annual report that re-equipment was the main means to achieving substantial increases in output.

Innes pointed out that the fact that a large proportion of Britain's total scientific resources was committed to military research was only mentioned in passing and the repercussions of this on the spread of secrecy among scientists was not commented upon. The report had considered the problem of secrecy in the context of private industrial research but had rejected the legislative measures

(advocated by the AScW) which would enforce the publication of research results. Innes commented ironically that:

> Scientific workers will be surprised to read, however, that one hopeful approach to a solution to this problem would be for scientists themselves to create a professional code according to which they would be free to publish the results of research done for a private firm unless there were the strongest reasons to the contrary.[44]

Such a proposal reflected a limited understanding of the real relationship between the industrial scientific workers and powerful private employers.

Innes identified further omissions from the report including its failure to address the need for the strategic planning of scientific manpower. Similarly it had not recognised the need for a significant increase in the numbers of scientists in the civil service.

Innes's assessment of the Labour Party report was endorsed by the AScW's Science Policy Committee and despatched to the Secretary of the Party. However, no reply to the AScW's criticisms and comments was made.[45]

In this section I have attempted to bring out the divergent views which began to emerge between the AScW and the Labour Party on science through the contrast between the former's position on 'science and the economic crisis' and the latter's New Deal for Science. However, the failure of the AScW's campaign reflected broader political divergencies and in the next three sections I examine the wider political ramifications for the scientific Left arising from the onset of the Cold War.

3. The Cold War and the Politics of the Scientists' Movement.

3.1. The AScW and the Labour Movement.

The apparent retreat of the Labour Government from a full-blooded commitment to socialist goals and its increasing allignment with the United States against the former alliance with the Soviet Union evoked outright opposition from the communist left. Bernal used his position as president of the AScW to launch a wide ranging attack on Government policy. Writing in the Scientific Worker he was deeply critical of the trend in the Government's domestic policy revealed in its White Paper Economic Survey of 1948:

> The Government's policy of deflation and dependence on outside aid is only possible because the people have not demanded a more active independent policy. It is here that scientific workers have a double responsibility, as scientists to protest against a stupid situation which throws away one of the most effective weapons of recovery - the mass knowledge and intelligence of the scientific workers of the country - and as workers to point out to their fellow-workers in the Trade Union Movement that their sacrifices will be in vain if they do not join together in an effective demand for a new position and independent policy for Britain.[46]

Bernal was strongly critical of the Government's adoption of a form of 'indicative' planning revealed in the White Paper instead of effective central planning.

Bernal used the occasion of the AScW's Council meeting in May 1948 to mount a further sustained attack on the direction of the Government's foreign and domestic policies emphasising their implications for science. The Daily Worker gave front page coverage to the meeting which was attended by some 200 delegates.[47]

In his presidential address Bernal argued that:

> The whole of this economic policy is integrally linked with the foreign policy based on the Marshall Plan, the Truman doctrine, and what is called Cold War on the Soviet Union. On what other grounds can our interests require us to maintain large expensive forces abroad and to devote over 10% of our productive efforts and over 50% of our scientific effort to preparations for war.[48]

Bernal cited a number of consequences which flowed from this. The emergence of science-based industries of chemicals, engineering and electronics would be held back by the mis-application of resources. In the public sector reconstruction plans for universities and research laboratories would likewise suffer. The increasing scale of military research, the concomitant growth of secrecy surrounding research and the evidence of political discrimination against left-wing scientists were cited by Bernal as features inimical to the traditions of science.[49]

The conference, reflecting the issues raised by Bernal, adopted a number of resolutions at odds with the prevailing trend of Government (and TUC) policy. Roy Innes, the Association's General Secretary, moved a resolution advocating the redeployment of scientists from military to civil research:

> Council maintains that ... too high a proportion of the country's scientific resources is devoted to military ends and argues that there should be redeployment including where possible the allocation of research establishments of the defence ministries of problems of vital importance to civil industry.[50]

Growing divisions within the Association itself were revealed

by an amendment which sought to negate the Council's disapproval of the large expenditure on military research and speakers urged that only the Government could judge the needs in this field. However, the motion was carried and subsequently a study group of the AScW's Science Policy Committee was established to collect and analyse the data on the disparity on the resources devoted to military as opposed to civil research.[51]

The AScW's stance of opposition to 'the militarisation of science' was reflected also in a keen debate which was aimed at clarifying its policy on the crucial issue of atomic energy. One resolution - which in the event was not put - called explicitly for the Government to renounce atomic weapons.[52] The Council adopted the Executive Committee's statement on atomic energy which, while not making an explicit call for the abandonment of atomic weapons, placed the emphasis on the need for Britain to direct its energies to the peaceful, industrial exploitation of atomic energy rather than its military application. The statement argued that the shortage of fissile material implied that at some stage a direct choice would need to be made:

> ... we do not feel this country could survive a full scale atomic war, and the use of atomic weapons by this country would invoke retaliation in kind. When it is remembered that by producing atomic weapons we are denying ourselves the benefits of atomic power for a long time to come, the case for concentrating on the industrial, as opposed to the military aspect of atomic energy in this country is a very strong one, even failing international agreement on the question.[53]

The statement also strongly attacked the shroud of secrecy surrounding atomic research.

> ... we feel it necessary to take a positive stand against all encroachments on the right of open publication of all matters connected with fundamental scientific research. We take this view believing that such developments should be made freely available for the benefit of all mankind. In consequence, we are not satisfied with the official attitude to questions of secrecy in this country.[54]

Thus the AScW's policy statements increasingly reflected the dissatisfaction with the direction of Government policy.

The influence of the scientific Left was likewise evident in resolutions condemning the launching of a 'witch-hunt' in the civil service and the attack by the prominent Labour politician, Morgan Phillips, on communist influence in the trade union movement. A resolution repudiated the idea that communists were gaining undue influence:

> This Council ... believes in the ability of members of the Association to elect or reject on their own judgement those who are willing to stand for branch, area or national office.[55]

However, the AScW was inevitably caught up in the wider campaign to repress the communist presence in the movement.

The success of the left-wing within the AScW during wartime and the immediate post-war period had reflected a broader pattern of influence of the Communist Party. This was rooted in the wartime alliance with the Soviet Union but also a political strategy which stressed the prime importance of the unity of the labour and trade union movement. Pelling has pointed out that the Party's critical support for the Labour Party between 1941-1947 'brought most profitable advantage, especially inside the trade

union movement'. In February 1947 the political resolution at the Communist Party Congress had identified 'the reactionary trends in the Labour Government's policy' and 'its failure to break through the vested interests that are holding up the improvement in lives of the working people'. However, open opposition did not emerge until after the meeting of nine Communist Parties in Poland in September 1947. This meeting in response to the new international situation adopted Zhdanov's 'two camps' thesis splitting the world into the socialist and imperialist blocs. The British Government became identified as 'an active partner in the imperialist camp'.[56]

These developments brought about changes in the policies of the British Communist Party. Its industrial influence through trade unions was used to undermine support for the Government's continued drive for increased production and exports and a campaign of opposition to the European Recovery Programme was mounted. The Party was also in opposition to the joint Government and TUC policy for wage restraint.[57]

In October 1948 the TUC's General Council issued a statement denouncing the communist objective of 'sabotage of the European Recovery Programme'. This was followed up by the circulation to all affiliated unions of a fuller statement Defend Democracy which urged them to act to prevent communists from holding key union posts and from acting as union delegates.[58] The AScW's General Secretary, Roy Innes, was a member of the Communist Party, as were a number of its full-time officers. In addition the Party was strongly represented amongst the national members of the Executive Committee. The Association's delegates to the annual conference

of the TUC tended to be communists.[59]

Bernal's criticisms of the Labour Government's approach to science policy in particular and its domestic and foreign policies in general only served to pit the Association against the official policies of the TUC. Similarly AScW's alignment with other unions with a strong communist influence to oppose crucial aspects of the Government's economic policy such as wage restraint further exposed it to TUC pressure. And the links between its general positions on economic policy detracted from its ability to get the TUC to adopt a sympathetic approach to its representation of scientific issues.[60]

The mounting external hostility to communism also provided the opportunity for the right-wing within the Association to assert its claims. Pressure mounted for the Executive Committee to make an open disassociation of communist influence. The secretary of the North West area, for example, sent in a resolution for the 1949 Council meeting which demanded that area committees should not sponsor any action on behalf of the Association which would give intentional support to the Communist Party.[61] The Executive's position was further undermined by the financial and organisational crisis of the union created by a substantial loss in membership.[62]

In response the Executive Committee issued a supplementary report for the Council meeting in May 1949 which asserted the party political neutrality of the Association and disclaimed any links between its policies and those of the Communist Party. It defined the appropriate political activities of the Association as those

strictly in accordance with its aims of promoting the interests of scientific workers which could involve approaching or seeking the support of Members of Parliament, Ministers of the Crown, H.M. Government and organisations such as the Parliamentary and Scientific Committee. The report went on to state that:

> There have been statements in the press that the E.C. is committed to Communist Party policy. This is untrue. The TUC memorandum entitled Defend Democracy in which the General Council examines and warns against Communist activities in the trade unions, was sent to all branches and in this matter, as in all others, the E.C. has scrupulously adhered to Council decisions.[63]

The report condemned the increasing tendency in the press to label anything which it disagreed with as 'communist' and stated that this should not dissuade the AScW from pursuing its aims.

However, it went on to warn all those who made public pronouncements on the Association's behalf to 'exercise a full sense of responsibility'. The AScW should not 'indulge in activities or make pronouncements on political matters which would have the effect of narrowing its appeal and of rendering it less able to represent the wide range of views to be found in its ranks at present'.[64] The search for a more moderate and broader appeal was perhaps reflected in the subsequent election of Lord Boyd Orr to succeed J.D. Bernal as President of the Association.[65]

3.2. Scientists, Secrets and the State.

The steps taken within the Labour Movement to neutralise the influence of the communist Left were matched by similar moves by the state. National security provided the grounds for a purge.

The uncovering of the Canadian spy ring in 1945 which had implicated the British scientist, Dr. Alan Nunn May, had signalled the beginning of this process.[66]

The Association had been deeply involved in the case of Dr. Alan Nunn May, British member of the Anglo-Canadian wartime atomic project, who had been arrested and convicted of spying in 1946. Nunn May had been an active member of the AScW before the war and had served on the editorial board of its journal, the Scientific Worker. Indeed shortly before his arrest Nunn May had attended meetings of the newly formed Atomic Sciences Committee of the Association which had in its membership many eminent atomic physicists who had been involved with project to build the atom bomb.[67]

Nunn May had received 10 years penal servitude for passing information to the Soviet Union during his work on the Canadian project. The Association had vigorously taken up the defence of Nunn May protesting against the harshness of the sentence. The Executive Committee issued a public statement expressing their view that:

> Dr. May was acting from high motives and that in keeping secret from the USSR the facts about atomic research development our own Government and that of the USA have behaved in a wrong manner and had there been proper contact between the Allies the case would never have arisen. In fact we believe it was the political policy followed by the British and American Governments that was prejudicial to the best interests of this country, rather than the action of Dr. May.[68]

The Association sought to get a reduction in Nunn May's sentence

through a campaign which was to involve organisations such as the National Council for Civil Liberties, the Atomic Scientists Association and the London Trades Council.[69] In the House of Commons W.J. Brown an independent member (former Labour MP) asked the Home Secretary, Mr. Chuter Ede to review the sentence - but without success.[70]

On 1st August 1947 a deputation led by Prof.Harold Laski met the Home Secretary again to press for either the release of Nunn May or a significant reduction in the sentence. The meeting had been requested by a letter sent in July under the signatures of Laski, J.B.Priestley, Blackett and Watson Watt. The deputation, in addition to Laski, Blackett and Watson Watt, included Prof. S. Chapman (Professor of Natural Philosophy, Oxford), Dr. C.E.M. Joad (Head of the Department of Philosophy and Psychology, Birkbeck College), Dr. N. Kemmer (a former colleague of Nunn May and a fellow of Trinity College, Cambridge), Prof. R.E. Peierls (Professor of Applied Mathematics, University of Birmingham). W.A. Wooster, Roy Innes and Neil Lawson represented the Association.[71]

The deputation argued that the sentence was out of proportion to the seriousness of the offence and compared unfavourably with sentences imposed in related cases connected with the Canadian spy trials. No account had been taken at the trial of Nunn May's otherwise exemplary work on the project. In addition it was argued that May's motives arose from political idealism rather than the prospect of personal gain. It was also argued by Kemmer, who had been information officer for the atomic energy project in Montreal, that the information passed by Nunn May would have added little to

the progress of the Soviet research. However, the Home Secretary remained unmoved by these representations. A further letter on behalf of the AScW and signed by Roy Innes was sent to the Home Secretary reiterating the arguments for leniency and restating the Association's resolve to continue to press for Nunn May's early release.[72] He was, however, destined to serve his full sentence.

E.H.S.Burhop, another former member of the British team who had worked on the atomic bomb had raised the general issue of the implications of secrecy for science at the conference on Science and the Real Freedoms in the context of the Nunn May case. He had argued that:

> Such men (of science) have advanced fundamental knowledge in the past because there has been free exchange of information and collaboration across frontiers and between workers in different branches of science. Now secrecy has split them in camps, and the ominous delay in ending it is a symptom of the preparation of another world war.[73]

Burhop linked the general case for scientists collective action on the issue of secrecy to that of the specific treatment meted out to Nunn May. He also cited the recently enacted Atomic Energy Act (1946) under which scientific workers had no well defined rights of access to scientific information connected in any way with atomic energy.

The breadth of support for the case for the mitigation of Nunn May's sentence is a further indicator of the degree of influence which the scientific Left could command even in 1947. The composition, for example, of the delegation to the Home Secretary displayed a broadly based intellectual and political support on an issue which is very sensitive in its connections with questions of loyalty and

national security. But Rebecca West a contemporary observer of these events provided an altogether different assessment of the campaign. She has written that:

> The real motivation of this campaign was two-fold. A large number of those who took part in it were animated by a feeling, for which psychiatrists have a name, that they formed an elect class which should be allowed to do as they liked... The claim that because scientists had invented the atomic bomb they should be given the right to decide what should be done with it, and the claim that because Dr. Nunn May was a scientist he should be allowed to break the law without paying the penalty, rest on the assumption ... that because a man has scientific gifts he is likely to be superior to his fellows in all intellectual respects, including the kind of general far-seeing ability, tender towards the future of the individual and the race, which we call wisdom. This assumption is based on no evidence whatsoever.[74]

Having thus questioned the privileged position accorded the scientist in Nunn May's defence she goes on to suggest more sinister forces were at work.

> Few of the scientists concerned with it in its more dignified manifestations were Communists, and few of the well-known Communist scientists took a prominent part in organizing it in any way that would take the eye. But there was often a sense of Communist influence guiding a hand which without doubt thought itself writing of its own and innocent free will.[75]

Thus the claim was that the AScW's campaign for Nunn May was controlled and inspired by the Communist Party. She wrote that:

> The same spectacle of enthusiasm for a friend and for science being exploited as political propaganda was manifest in the demand of various branches of a certain association (sic) that Dr. Nunn May should be released on grounds as wide of the mark as the claim that 'the information divulged was of a purely scientific character, unconnected with the manufacture of the atom bomb or other form of weapon'.[76]

The tone of Rebecca West's account accurately portrays the mood of anti-communism generated by the Cold War. She adduces no evidence to support the imputation of communist conspiracy and far from the AScW's defence of Nunn May producing benefits in terms of political propaganda it served merely to expose the Association to further criticism.

There was increasing pressure from the state to enforce the political neutrality of scientists in the civil service. This was reflected in the emergency resolution to AScW's 1947 Annual Council which stated that:

> This council views with concern the reports of M.I.5 activities, resulting in disadvantage to Civil Servants whose individual efficiency and conduct have not been questioned and instructs the E.C. in any case where scientific staff are concerned to take vigorous action in consultation with IPCS, NCCL and any other interested organisation to obtain a right of appeal.[77]

A secret report from the Chiefs of Staff, dated 13 March 1947 and signed by Lord Montgomery of Alamein, Chief of the Imperial General Staff and Lord Tedder, Chief of the Air Staff, had warned ministers that a 'large number' of communist scientists had been recruited into government research and development establishments during the Second World War. The report, which had been drawn up for the Cabinet's defence committee, stated that:

> Many communists are known to have volunteered to the Communist Party Headquarters information about British war production, projects and weapons with the intention that this information should be passed on to the Russians. In addition certain members of the Communist Party are known to have carried out espionage activities, the products of which were almost certainly destined for the Russians.[78]

By the spring of 1947 a number of cases had come to the attention of both AScW and IPCS where action had been taken against their members on security grounds. IPCS had made representations to Sir Edward Bridges, head of the civil service, protesting against discrimination on the grounds of political views or affiliation.[79]

These moves had received official sanction from Attlee when on 15th March 1947 he had made a statement to the effect that a member of the Communist Party or a person 'associated with it in such a way as to raise legitimate doubts about his or her reliability should no longer be employed on works vital to the security of the state'.[80] Attlee's statement effectively unleashed a purge of the civil service and particularly the scientific civil service.

AScW's Executive Committee protested against the dismissal or transfer of civil servants on political grounds but without negotiating rights was relatively powerless to intervene directly. An emergency resolution at the 1948 Annual Council meeting again gave the membership's backing to the Executive's stand. The resolution maintained that such measures 'infringe the liberty of conscience and speech which are essential to the progress of science'.[81] However, the principal organisation to oppose political discrimination was IPCS which at its annual conference in 1948 passed a lengthy resolution on political discrimination in the civil service. It further instructed its Executive Committee:

> to take all steps within its powers to induce the Government to reverse its policy of political discrimination.[82]

The resolution suggested that the possibility of transferring 'suspects' to non-secret work would in the professional, scientific

and technical fields prove to be illusory.

IPCS took the initiative in the formation of a joint co-ordinating committee known as the Civil Service Political Freedom Committee which in addition to IPCS had the support of AScW, the Civil Service Clerical Association, the Society of Civil Servants, and the Civil Service Union. The aim of the committee was to provide a centre for collecting information on action taken by government, to prepare material for publicity purposes against the purge and to watch for any further developments in government policy.[83]

Burhop, in an article for the Atomic Scientists News, reported in the spring of 1949 that 30 people had been purged from the civil service - 17 of whom were scientists or technicians. These included 1 from Harewell Atomic Research Station; 6 from the Telecommunications Research Station, Malvern; 4 from the Royal Aircraft Establishment, Farnborough; 4 from the Woolwich Arsenal; 1 from the Post Office and 1 other unspecified. Burhop also suggested that political discrimination was spreading from the public to the private sector. AScW failed to get reinstatement of one of its members allegedly dismissed for political reasons from the Research Department of Telegraph Construction and Mainbeams Company, Greenwich.[85]

The government had, by the spring of 1950 removed 48 civil servants from their jobs on the grounds of Communist Party membership (and 1 on the grounds of membership of a fascist organisation). Twenty five other civil servants had been moved on the grounds of

association with the Communist Party.[86]

While the numbers involved were relatively small they nevertheless were symptomatic of the deteriorating political climate which was to isolate the scientific Left. Blackett's position on the Advisory Committee on Atomic Energy was ended in 1947 with the dissolution of the committee after differences of view with government policy on atomic weapons.[87] Haldane, one of the most prominent of the communist scientists, was asked to resign from a Medical Research Council sub-committee in 1950 following pressure from the Admiralty.[88]

3.3. The Politics of Science and the Lysenko Controversy.

The pressures arising from the labour movement and the state to contrain the scientific Left were also evident in relation to the broader scientific community. The most dramatic evidence of this was provided by the majority decision of the Council of the BA not to re-elect Bernal to membership.[89] The move against Bernal had arisen from a speech which he had made as a representative of the World Federation of Scientific Workers at a conference of the Soviet Partisans for Peace in Moscow. Bernal had contrasted 'the perversion of science for war' in Britain and the USA with the role of science for peace in the Soviet Union under the leadership of Stalin:

> 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.[90]

Bernal refused to withdraw his remarks when given the opportunity to do so by the Council of the BA but replied by suggesting that their actions were politically motivated. Bernal's defence was that his remarks about the direction of science in capitalist countries referred not to the administrators of science but to politicians and businessmen.

Despite many letters of support from other members of the BA (such as Kathleen Lonsdale, Dorothy and Joseph Needham, W.A. Wooster, V. Gordon Childe, J.B.S. Haldane, L.S. Penrose, F. Yates and N.W. Pirie), Bernal was not re-elected. The AScW was once again prominent in mobilising support to oppose the decision of the BA's Council.[91] In March 1950 a statement signed by 244 scientists working in university and industrial laboratories was sent to the BA deploring the action taken against Bernal. The signatories declared that although many of them disagreed with the political attitudes expressed by Bernal they nevertheless opposed the action taken by the BA on the grounds that 'The aim of the British Association is the advancement of science. To the furtherance of this aim Professor Bernal has made a signal contribution'.[92]

A motion to the AScW Council meeting of 1950 expressed the feelings of many left-wing scientists as to the implications of the BA's action against Bernal:

> ...Council condemns the action of the British Association in suspending Professor Bernal as the result of his remarks concerning the direction of science in this country, considering that such action may lead to the suppression of criticism of the national policy for science.[93]

Such fears must also be understood against the background of the debate amongst British scientists about the implications of the Soviet state's endorsement of the theories of Lysenko. The SFS were able to exploit this endorsement as a means of discrediting those who supported the planning of science and a Marxist view of the social relations of science.[94]

Within the AScW the Lysenko controversy added a further dimension to the difficulties of the Left created by anti-communist drive within the labour movement. In the early stages of the controversy N.W. Pirie and A. Bateman had published sympathetic reviews of the Lysenkoist literature in the Scientific Worker. These reviews had provoked a series of 12 letters to the Scientific Worker between January 1949 and March 1950 all but one of which had condemned the overriding by ideological considerations of the basic scientific principle of the appeal to fact. This condemnation came, however, both from the political left as well as from the right.[95]

Several resolutions were submitted to the Council meeting of 1949 on the Lysenko issue.[96] Ultimately a compound motion was formulated which simply required the Executive Committee to obtain information on the controversy in an attempt to avoid divisive arguments within the Association. A sub-committee was consequently set up by the Executive Committee which was to submit a report in time for the next Council meeting. Dr. P.W. Brian was appointed to chair the committee but its work was delayed for a further year because of disagreement as to whether the report should publish a conclusion which supported one side or the other

in the controversy.[97]

Brian reported to the Science Policy Committee that the Lysenko Committee in April 1951 had agreed that the final form of its report would not attempt a partisan conclusion.[98] The approach finally adopted was to present both sides of the scientific argument relating to Lysenko's claims and allow the readers to come to their own conclusions. The committee would not publish its own view and the Association would not appear to be committed to a particular view. Nevertheless the report implicitly, if not explicitly, refuted the Lysenkoist position but without commenting on the political implications. Summarising the scientific argument the report stated:

> (1) The facts elucidated by Mendelian genetics are unchallenged.
>
> (2) The theoretical structure attributed to Mendelism by the Michurinists is outmoded, modern Mendelism being free from the defects pointed out by the Michurinists.
>
> (3) Some Mendelians were certainly responsible for idealistic interpretations of their results but these they repudiated.
>
> (4) Mendelianism had been and would continue to be of value in practice.
>
> (5) The results obtained by the Michurinists could be explained in terms of Mendelian concepts or extensions of them.
>
> (6) The attributing of heredity properties to material particles - the genes - could not be considered idealist.[99]

The report commented also on the intrusion of politics into the scientific debate in the Soviet Union and that this represented a departure from the usual form of such debates. It pointed out that the use of words such as 'scholastic' and 'reactionary' in

the controversy would be rejected by most non-Soviet scientists. A further departure from the norms of scientific argument was the involvement of 'non-specialists from farmers to philosophers' in the controversy.

On the recommendation of the Science Policy Committee the report was published by the Association's publicity department. The Scientific Worker described the report as 'the first really objective statement published in this country and is indispensible for an understanding of the scientific issues involved'.[100] However, by the time of its publication, as Greta Jones has pointed out, 'the report of the Association of Scientific Workers on Lysenko came too late to affect the process of depoliticisation it helped to create among scientists'.[101] Of the 3,000 copies of the report produced only 1,500 were sold within the first year.

A more significant source of continuing division within the Association was its affiliation to the World Federation of Scientific Workers. Similarly its connection with the WFScW, (which had been labelled as a 'communist dominated' organisation), provided a source of further conflict with the TUC. I shall, however, return to this in another chapter.[102]

4. Trade Union Strategy and Science Policy

In the previous section I have outlined the nature of the increasingly hostile political environment within the labour movement and the scientific community which faced the scientific Left. These problems were reinforced by the AScW's experience of the transition from wartime to peacetime conditions. In this section

I go on to examine the decline in membership of the AScW, the tensions between trade union strategy and science policy work of the AScW and the residual effects of the Cold War on its attempts to reformulate its position on science policy in the early 1950s.

4.1. AScW's Decline in Membership and Trade Union Strategy

The dramatic growth in membership which the Association had experienced in wartime was not sustained in the immediate post-war period. In December 1947 the AScW had a registered membership of 17,048. However, by the close of 1948 this figure had fallen to 15,521 establishing a trend in which recruitment for much of the 1950s failed to match membership losses. The decline in membership and the consequent loss of income entailed a constant pressure on the organisation's ability to sustain a wide range of activities.

This took place against a relatively favourable set of circumstances in which increased private and public sector investment in scientific and technical research was generating an expanding market for trained manpower.[103] Some of the AScW's initial loss of membership could be accounted for by the transition from the artificial circumstances created by the war to peacetime conditions. For example, the demobilisation of scientists who had been working in large Government and private research establishments which were subsequently disbanded. The impact of this was that many AScW groups went out of existence or lost a majority of their members. Similarly temporary civil servants organised by the Association were either made redundant after 1946 or were assimilated into permanent posts catered for by the IPCS.[104]

Many of the favourable factors which had encouraged the growth of trade unions in wartime came to an end. The Essential Works order was lifted and workers were free to move away to unorganised employment. Many of those who had been active in group and branch affairs moved to posts in smaller firms where they found it difficult to get the idea of trade unions for staff workers accepted. In addition the effective participation of the TUC in wartime government had encouraged acceptance of trade unionism generally and white-collar unionism in particular.[105] However, this was replaced by a less co-operative attitude by employers towards collective bargaining for their staff workers.

The period of wage restraint from 1947-1950 based on an agreement between the TUC and the Labour Government may also have contributed to 'dampening enthusiasm'. However, the AScW had allied itself with other left-wing unions who had consistently opposed wage restraint. In January 1950 the General Council of the TUC summoned a special conference of trade union executive committees to consider the recommendation that unions should frame their wages policies giving regard to the economic situation in general. The conference - one of the largest ever held by the British trade union movement - was attended by 1,542 representatives of affiliated organisations.[106] The representatives of the Association's Executive Committee had been mandated to oppose the General Council's recommendations.[107] The Association's view was that a restraint on wages could not be effective in solving the economic crisis or averting a slump. The TUC's proposals had failed to advance adequate proposals for applying a policy of restraint to profits and dividends. Most importantly it was

argued that scientific workers, having suffered a decline in their standards, could not be expected to refrain from making demands for increased salaries calculated to at least the pre-war level.

In the event the General Council's recommendations were narrowly adopted. (The voting was 4,263,000 million votes in favour of the General Council with 3,606,000 against.) This position was reversed by a narrow vote at the TUC's September conference of the following year - representing a significant victory for the Left.[108]

AScW's arguments against wage restraint had been deployed in a Supplementary Report to the Association's Annual Council of 1949, 'The Economic Position of the Scientific Worker'.[109] The report had plotted salary trends of qualified scientific workers in industry from 1930/1 to 1948/9. Salaries in private firms, on the basis of AScW's evidence had fallen well below those in other and comparable spheres of employment.

In the context of the debate over wage restraint it was argued that scientific workers suffered particular disadvantage compared with other groups of workers with established collective agreements and salary structures. The industrial sectors in which AScW had strong interests in included engineering, chemicals and metallurgy. The report revealed that while the existing policy of the Association of seeking to establish minimum salary scales for qualified scientists had made some progress (particularly in the case of University Staffs and the civil service) this was not the case for scientific and technical workers in industry and the research associations. Characteristically private industry failed to offer scientific

workers a clearly defined career and salary structure.

While the public sector was dominated by, for example, the AUT and IPCS both organising scientific and technical staff, the greatest scope for recruiting members lay in private industry. Thus there was considerable pressure from within the Association to concentrate on this issue through the launching of a national salary campaign. The 1951 Annual Council decided to press for general and substantial improvements to salaries. A resolution instructed the Executive Committee

> ...to organise a national campaign for action to be taken in all spheres of employment. The success of the campaign largely depends on the ability of the branches to organise the support of all scientists and technicians for such salary demands.[110]

An alternative response to problems of declining membership and the failure to recruit was the proposal to amalgamate with the technicians union ASSET. The Association's Executive Committee had initiated discussions with ASSET in 1950 at the height of the Association's financial crisis. The matter was subsequently put before the Annual Council of 1951. Although a report of the Executive's discussions with ASSET was put before Council and accepted, an emergency resolution instructed them to prepare a fuller report on amalgamation for 31st December 1951 to give the membership adequate time to discuss its recommendations before the Council meeting in May 1952.[111]

The Executive established a sub-committee to draft a report which came to the conclusion that:

> the Executive Committee considers that the advantages accruing to the membership of both present organisations outweight the disadvantages which could result from such an amalgamation.[112]

The report noted the general trend in the trade union movement towards fewer and larger unions and went on to outline a number of specific advantages offered by amalgamation. A merging of the two unions would effectively double the size of the union giving greater strength, prestige and authority. It would then be in a position to offer more efficient and better services to the membership. In addition recruitment might be enhanced given larger groups of members in individual firms and providing greater possibilities for recognition. Technical advances in industry meant also that supervisory staff (organised by ASSET) would increasingly need a technical background. This feature would lead to a greater (objective) community of interests between the two organisations.

However, what was essentially at stake was AScW's distinctive role within the trade union movement and its distinctive approach to science policy. The Executive Committee's report noted a number of disadvantages. A specific practical problem was raised by differing procedural agreements existing in the engineering industry (AScW had signed a procedural agreement with the Engineering Employers Federation in 1944). A more significant problem was that the merger was unlikely to appeal to the professionally qualified section of the Association's membership as opposed to the technicians' section. The professional scientists would be in a minority in the larger union leading to

perhaps a poorer service and also making the merged union less attractive to as yet unorganised professional scientists.

The key argument advanced against amalgamation was that ASSET did not share the broader perspective on the social relations of science and technology which had been of primary importance to the Association's work. This perspective was closely linked to the professional interests of its more qualified scientist members. The support in the Executive Committee for the amalgamation indicated a significant shift in the perception of the role of the Association towards a preoccupation with organising in private industry and organising non-professional technical groups.

However, in spite of the immediate practical advantages that amalgamation seemed to offer the idea of a merger was rejected by a ballot of the membership. This endorsement of the existing character of the Association did not produce any upsurge in support for active campaigning on science policy issues. Reinet Fremlin wrote in 1952 that:

> although activity has not abated it is clear on looking back over the last five years that the Association is not continuing to receive the support from scientific workers that it needs. It is certain that saturation has not yet been reached - there must be at least 200,000 eligible for membership. It is probable that though the problems of our present economy are every whit as pressing as those of wartime, they do not have the same appeal to the imagination and do not engender the same single-minded attack.[113]

The 1953 Annual Council again debated the central issue of the Association's industrial policy with a motion which noted that in spite of the intent and actions in 1951 with the initiation of the

national salary campaign the salaries of the majority of scientific workers had failed to keep abreast of the rise in the cost of living. The motion instructed the Executive Committee to pursue a campaign to secure substantial increases in salary for all members including the more senior scientists. The union's effectiveness in securing such advances was perceived as vital to raising the level of recruitment.[114]

The Association was involved on a wide front of national negotiations across a range of private industry and public services which included engineering, the health service, the National Coal Board and the Post Office. One of the AScW's strongest areas of representation was in the engineering industry where it had had national recognition from the Engineering Employers Federation since the mid-1940s. In this industry the AScW had been pressing the 'Engineers Charter' of minimum salary scales as well as percentage increases to compensate for cost of living increases (rather than flat rate increases).[115]

The Association also organised scientific workers in the chemical industry where, for example, in 1953 it was pressing ICI for a 5% increase for qualified scientists. AScW also had organised in the area of medical research. When in April 1949 the Medical Research Council had increased salaries of medically qualified research staff but not those without medical degrees the Association had intervened to press the MRC to remove the disparity. This intervention had the effect of encouraging rapid recruitment to the Association and the matter was taken to arbitration. The principal opposition to the Association's case came from

the Treasury which, however, was obliged to concede payment of some salary increases to medical and non-medical staff but only from October 1950 and still not on the basis of parity. The case was then taken by the Association to an industrial court on 30th March 1951 where the case was conceded in full.

A similar struggle over parity had been fought by the Association in the area of agricultural research where it had campaigned for parity between its members of the National Institute of Agricultural Botany and scientists employed by the National Agricultural Advisory Service. This case was won in 1952.

In the National Health Service AScW membership included biochemists, physicists and ophthalmic opticians and had representation on the principal negotiating body, the Whitley Council. In the university sector an arrangement had been made for the holding of dual membership of the AScW and AUT although the AUT was the principal union for the negotiation of salaries and conditions.[116] The Association argued that the two unions had complementary roles with the AScW representing scientists on a professional basis across institutional and disciplinary boundaries whilst the AUT had a role of representing members in all faculties on matters of common interest not specifically related to scientists. In a similar way a close relationship developed between the AScW and IPCS with the Institution representing AScW members in the civil service negotiating machinery.[117]

Thus although the Association had some success in establishing credibility as an effective force in collective bargaining (particularly in regard to technicians) its abiding problems

remained of a relatively thinly spread membership in diverse disciplines and institutional settings where larger organisations were available such as the IPCS and the AUT to represent the interests of scientific workers. The Executive Committee established a Recruitment Sub-Committee to coordinate membership drives but was repeatedly criticised at Council meetings for the lack of progress in extending salary negotiations and membership.[118] However, by 1956 it was able to report that for the first time since 1951 the Association had registered a net increase both in total and effective membership. The Executive Committee considered that it had:

> met the wishes of the membership by continuing to concentrate on negotiations designed to improve the salary and status of the profession, by paying detailed attention to organisation and by somewhat reshaping its work on scientific policy.[119]

4.2. The Role of the AScW's Science Policy Committee.

The combination of political pressure and the need to concentrate attention on the basic trade union aspects of the AScW's work caused the science policy objectives of the Association to assume a much lower priority. There were conflicting views within the union as to the extent to which its science policy work was organically linked to the conditions of its growth.

The reorganisation of the Association in response to its financial crisis of 1949 had led to the reduction in the number of its full time staff and the replacement of Roy Innes by T. Ainley as General Secretary.[120] Innes had been deeply involved in the formulation of the AScW's broader scientific and political

policies whilst Ainley's experience was in its trade union aspects. The replacement of Innes as General Secretary provoked criticism at the 1949 Council meeting. It was argued that his removal would leave the science policy work of the Association increasingly in the hands of volunteers. A resolution argued that the declining fortunes of the Association were:

> ...in part due to a falling membership of workers with high scientific qualifications, in turn due to the failure of the Association to maintain a vigorous level of activity on matters of science policy.[121]

The AScW's Science Policy Committee had the responsibility to readdress the problems of the social relations of science in the light of the new conditions created by the Cold War. A similar resolution to the 1950 Annual Council again registered the impact felt by some within the Association of the process of 'depoliticisation'. This stated that:

> ... Council regrets the inadequate expression of the science policy of the Association and instructs the Executive Committee to take steps to ensure the speedy formulation of a comprehensive statement of science policy.[122]

The motion was referred back to the Executive Committee and resulted in the reformulation of the terms of reference under which the Science Policy Committee had been operating since 1945.

The 1950 terms of reference were:

> (a) the professional advancement of AScW members and of scientists generally;
> (b) scientific and technical education;
> (c) Government policy in regard to the development and utilisation of the country's scientific resources;
> (d) the application of science toward the solution of the world food problem and to such problems as productivity, health and housing and to general consumer needs;

(e) the international control of atomic energy and the use of atomic energy for peaceful purposes;
(f) the dissemination of scientific knowledge among trade unionists and the general public;
(g) the supply and quality of materials (including apparatus and books) used by scientists.[123]

The initial goals of the committee were more sharply focused on the idea of planning and the establishment of a 'National Research and Development Council' and on 'to collaboration with the trade union and progressive movement'.[124]

The strong counter current to the continued work of the committee had been expressed in a resolution to the 1950 Annual Council. This had used the serious financial position of the Association as the reason for a substantial reduction in science policy work in favour of its day to day trade union work.

However, in spite of continuing criticism over the political orientation of the Association (over, for example, its affiliation to the World Federation of Scientific Workers) the Science Policy Committee and its related committees such as the Atomic Sciences Committee and the Fuel and Power Committee, endeavoured to stimulate activity in this area. A key initiative mounted by the committee around the notion of 'the constructive use of science' reflected a central post-war concern with the militarisation of science and the need to shift the balance of state support for science and technology from the military to civil sector.[125]

The growing evidence of the shortage of scientific and technological manpower again provided scope for AScW intervention both by the Science Policy Committee and the Association's University

Advisory Committee. The question of the supply of scientific manpower was related to the Association's fundamental model of the relationship between scientific inputs, planning and economic and social outputs but also to its organisational goals as representing the professional and trade union aspirations of its membership.[126]

The Association mounted two major conferences in 1950 and 1951 around broad themes of the social responsibility of science; on the world food problem[127] and on the ethical problems of the scientific worker. The Atomic Sciences Committee,[128] although much reduced in support from professional atomic physicists as a result of the formation of the Atomic Scientists Association, provided advice to the Executive Committee on public statements on developments in atomic energy policy. For example, the Association's pamphlet Atomic Attack: Can Britain be Defended? (1950) mounted a sustained criticism of the notion of the possibility of effective civil defence in the face of atomic attack.[129]

The Science Policy Committee was also responsible for efforts to develop the representation of scientific interests in the parliamentary sphere and within the TUC. Contacts were maintained with the Parliamentary and Scientific Committee through J.D. Bernal in the early 1950s. However, the Association sought to use the parliamentary forum in a more focused way through the setting up of the Joint Parliamentary and Scientific Advisory Committee in co-operation with a number of other scientific trade unions and sympathetic (mainly Labour MPs).[130]

Although the Association had been instrumental in the

reconstitution of the TUC's Scientific Advisory Committee it was unable to develop a close working relationship with the committee. For example, due to the confidentiality of the SAC's proceedings the Association was unable to obtain copies of its minutes.[131] Prof.D.M. Newitt (one of the original scientist members of the TUC's SAC) met the Science Policy Committee in 1952. Newitt agreed that there was a greater need for the trade union movement to be adequately advised on scientific and technical matters and that the SAC was not being used as fully as it might.[132] Newitt was to become the president of the Association in 1955 and was subsequently involved in the reformation in 1956 of the Association's Science Policy Committee into the Science Policy Planning Committee in an attempt to raise the profile of the Association's science policy work.

4.2.1. Neo-Malthusianism and the Ethical Dilemmas of Science

A notable feature of the Association's activities especially during the war years had been the organisation of public conferences on the central issues of the social relations of science. In 1950 and 1951 the AScW attempted to maintain this tradition with conferences on 'the World's Food and Britain's Needs' and on 'the Ethical Problems of the Scientific Worker'. Another proposed conference to publicise the Association's campaign for a national body to be responsible for consumer research was abandoned due to the pressure of work needed to mount the conference on food.[133] The Association was also responsible for a number of scientific exhibitions at the Festival of Britain.[134]

A resolution to the Annual Council of 1949 had called upon the Executive Committee to take up the issue of food production in its international context through the WFScW and to publicise the problem amongst the membership and more generally.[135] The issue was conceived as the exploration of the contribution of science and technology to the creation of an internationally planned and expanding economy. The appointment of Lord Boyd Orr, one of Britain's leading experts on nutrition, as President of the Association in 1949 gave further impetus to the organisation of the conference. The SPC was largely responsible for the conference arrangements.[136] In the event Boyd Orr was unable to attend the conference which was held in London, March 4th-5th 1950, under the title of The World's Food and Britain's Needs.

Boyd Orr's paper, 'World resources and the distribution of the world's food', was read in his absence by Dr. D. McLean of the Lister Institute (and a vice-president of the AScW). Other speakers on the first day included Julian Huxley on 'Population problems' and Le Gros Clark on 'the World's food problems'. The second day was devoted to improving food production in Britain with Sir George Stapledon on 'Britain's needs and possibilities', Dr. G.A. Reay on 'Fish utilisation', S.A. Barnett on 'Prevention of food losses' and Ritchie Calder on 'Food from waste materials'. Maurice Goldsmith attended as a delegate of the United Nations Educational, Scientific and Cultural Organisation.[137]

The conference proved more successful than the SPC had

anticipated. Follow up meetings were planned for the regions and the publishing firm of Watts showed interest in publishing a full report of the meeting.[138] This, however, came to nothing and the Association's own Publicity department was left to produce a short pamphlet Britain's Place in the Food Queue (1950).[139]

The conference on food had tended to concentrate on the possible technical solutions to linking growing world population to the improvement of food production. Political obstacles to development were not prominently discussed apart from an appeal from Boyd Orr for scientific and technical co-operation on these issues as a means of overcoming ideological differences.[140] Increasingly there was a shift from the discussion of the social dimension of science and technology in political terms to discussion in ethical terms.[141] Science and the Nation (1947) had declared that:

> One conclusion emerges perhaps more clearly than any other from a survey of the technical potentialities: the state of knowledge today is such that there are no technical obstacles to worldwide social advance. The reasons for any failure to advance should be sought not in the laboratories and libraries of science but in the structure of society itself and in the means by which it orders its affairs.

The proper use of science in the circumstances of the early 1950s was presented by leading members of the scientific community not as a social and political problem whose solution lay in political action but as an 'ethical dilemma' confronting the individual scientist.

This trend was signalled, for example, by the conference Ethical Problems of the Scientific Worker, July 28th-29th 1951, organised by the Cambridge Branch of the AScW and held in the Department of Physical Chemistry, Cambridge. The principal speakers included the Association's President, Lord Haden-Guest, Dr. John Hammond, Prof. C.A. Coulson and Prof. N.F. Mott.[143]

Lord Haden-Guest in his opening address suggested that the medical profession's Hippocratic Oath might serve as an applicable model to other professions such as that of the scientist. The issue of chemical and biological warfare which had become an area of bitter controversy after the alleged use of chemical and biological weapons by the anti-communist forces in the Korean War was raised in discussion. Haden-Guest's response was to argue that:

> ... no form of warfare is humane and we must work to outlaw war. While the scientific profession can contribute to this, he thought that the responsibility of men of science is no greater than that of other people.[144]

Dr. John Hammond, in the second session of the conference, took up the theme of the earlier AScW meeting on the world's food problems. He suggested that the ethic of the agricultural scientist should be 'based on what is good for people and not confined to what is good for science'.

Prof. C.A. Coulson's address on the second day of the conference sought to found the idea of a scientific ethic on a religious basis. Coulson's view was disputed in the

subsequent discussion in which, although it was agreed that a moral code for scientific workers must be based on something more than solicitude for the advancement of science, the idea that religion was the only source of ethical concepts was denied. Historically the language of religion in science had often been used out of convention or for fear of censure. Dr. G. Barnard agreed that the questions raised by the conference were of a political rather than an ethical nature.

Prof. N.F. Mott in the final session of the conference attempted to define the special social responsibility of scientists. He argued that:

> It is a dual responsibility: they have a duty to science itself and a duty to society to ensure that science is directed and used in a good way. The rest of society which uses science and feels its effects should participate in the control of science: but it is the men of science themselves who know what science is and what its effects can be, who should have the largest share in the control. What we mean by 'good' is influenced by our education and religion so ethical ideas will vary.[145]

Alluding to the recent case of Dr. E.H.S. Burhop, a nuclear physicist whose passport had been withheld, Mott said that this was the 'first time that such drastic action had been taken in peace-time against a person not accused of any crime'. The action had been taken in the aftermath of Fuchs and Pontecorvo spying revelations. Mott felt that the action had been taken by the Government in response to public opinion rather than fear of espionage and there should be protests at this.

In discussion Dr. E.V. Rowsell argued that it was the responsibility of scientific workers to make public the potential consequences of their discoveries before putting them in the hands of the state:

> if the public had fully realised the implications of the use of the atomic bomb, they would not have permitted it to be used, even to end the war with Japan.[146]

Mott agreed that the scientist's special responsibility lay in disseminating the consequences of scientific progress. The conference ended on an almost mystical note with Coulson urging the search for some kind of basis of agreement between religion and marxism whilst also suggesting that 'true' science was a religious activity and that religion and science were facets of something greater than either!

The trend of the discussions at this meeting were embodied in a resolution to the 1952 Annual Council of the AScW moved by the Cambridge Senior branch which stated:

> That Council, encouraged by the age-long influence for good exercised by the Hippocratic Oath on the medical profession, calls on the Executive Committee to prepare a report by next Council on which could be based the formulation of a similar oath for scientific workers.[147]

The idea of a Hippocratic Oath was extensively debated in the pages of the Scientific Worker.[148]

Prof. A.V. Hill's presidential address to the British Association, meeting in Belfast in September 1952, developed a neo-Malthusian theme suggesting that scientific progress

adversely affected the relationship between population growth and available food resources. He argued that:

> The dilemma is this. All the impulses of decent humanity insist that suffering should be relieved, curable disease cured, preventable disease prevented...But...in many parts of the world...the fight against disease, the lowering of infantile death rates, and a prolongation of the span of life have led to a vast increase in population.[149]

Hill's 'ethical dilemma of science' questioned whether scientists were justified in doing good when the foreseeable consequences were evil.

Bernal's response to Hill's puzzlement was damning, describing his position as 'the abdication of science'. Bernal included in his condemnation Russell's The Impact of Science on Society (1952) and Sir Charles Darwin's The Next Million Years (1952) which he saw linked by the common thread of 'the dismal doctrine of parson Malthus'. Bernal wrote that:

> Four short years ago the British Association had as its theme the turning of swords into ploughshares. At that time there was some evidence of at least the beginning of an attempt to examine what the forces of science could do if released from the service of war. That was not to be; the years of rearmament have followed, the pace of militarisation of science has speeded and the hopes of its beneficient use postponed indefinitely in the 'free' world. The situation has now reached a point when the most loyal and orthodox scientists are confused and alarmed.[150]

Bernal invoked Engels' much earlier refutation of Malthus and went on to describe Hill's dilemma as 'the dilemma of capitalism not the dilemma of science'. He suggested that Hill had reached this position because:

> ...with his eyes cast in one direction the alternatives never appear to him at all, or if they appear are instantly and indignantly rejected. The application of science - in the present capitalist system - leads to an insoluble ethical dilemma. Therefore we must abandon science or ethics or both. The minor premise, the economic system, is never taken into account.[151]

The solution to Hill's dilemma, Bernal argued, would not be found until the material and scientific resources wasted on military preparations were spent on constructive agriculture and until the rapacious land and commodity production system of the 'free' world were swept away. Bernal went on to attack the anti-Soviet stance of Russell's book and to describe Darwin's as 'a petition of bankruptcy of an age and a class'.[152]

Bernal's response was taken up by Roy Innes, the former general secretary of the AScW and a principal member of its Science Policy Committee. In Science and our Future (1954) he repeated Bernal's criticism of Hill but argued that the British Association had gone one step further with Sir Edward Appleton's address of 1953. Appleton had spoken on 'Science for its Own Sake' which, to Innes, indicated that the struggle to consider the social relations of science had been abandoned. Innes argued that such attitudes were political in origin in the sense that they were 'the confession of bankruptcy on the part of those who neither want nor are able to do away with social ills'.[152]

The response of the scientific Left was to stress the progressive and constructive role of science in the face of 'reactionary' criticism and the militarisation of science.

4.2.2. The Constructive Use of Science

At the Annual Council meeting of 1952 which saw the resolution proposing a 'Hippocratic Oath' for scientists also saw the introduction of a resolution which called on the Executive Committee to initiate a national campaign 'to explain to the nation what could be achieved by the utilisation of existing knowledge for peaceful ends'.[154] The Executive was urged to use the Trades Union Congress and the Parliamentary and Scientific Committee to pursue this objective. And in the light of previous criticism of the level of science policy work the Executive Committee and the Science Policy Committee decided to give priority to a campaign around the theme of the constructive use of science. The Science Policy Committee had already held discussions on the possibility of revising and producing a new edition of Science and the Nation.[155] It was decided that this revision could be the basis of the campaign. At the same time many of the subsidiary issues which the committee was involved with (such as the future of British Abstracts) would be wound up. The main areas of the Committee's work would be around the revision of Science and the Nation, the civil rights of scientists given the continuing evidence of political discrimination and specific professional concerns such as higher degrees and publication rights. The Committee would also continue to gather evidence on the impact of military research.[156]

Discussions on the form and content of the revision of Science and the Nation, to be entitled 'the Constructive Use of Science' pre-occupied the Committee throughout 1953. Its principal members included R.G. Forrester (chairman), M. Goldsmith, J. High, Mrs. E.A. Hunt, Roy Innes, Dr. R.C. Murray, Dr. N.F. Sarsfield, H. Rose and J.K. Dutton. A draft statement was circulated to branches in order to stimulate debate and contributions.[157] Similarly at the May Council Meeting 1953 the Science Policy Committee proposed a resolution on science policy work which outlined how branches and areas might contribute to the campaign. This called for discussions amongst branch members:

> as to how far their discoveries are being properly exploited for the needs of the people and what, if anything, obstructs their application.[158]

It called on branches to enlist groups or individuals to study, criticise and where necessary to expand material issued by the Executive Committee in connection with the campaign. In addition the resolution expressed the hope that other trade unions and organisations would be drawn in. It was also suggested that a conference might be held to deal with the whole range of contemporary issues in science policy; the training, use and distribution of scientific manpower; the use of science in raising agricultural productivity; the potential impact of atomic energy in raising standards of living; the balanced development of the scientific and economic potential of the 'backward countries of the Empire'; the maintenance of the progressive and independent development

of British industry and technology and at the same time free interchange between scientists of all nations.

However, the appeal for active involvement at branch level evoked little response. Conspicuous exception to this was the Central London Branch and the UCL Branch. The former organised a series of meetings on science policy whilst the latter produced its own science policy statement. These were branches which contained some of the most prominent and politically committed of the AScW's members.[159]

A sub-committee including Innes, Dutton, Sarsfield and Rose was appointed to co-ordinate the work of revision. This would involve describing the historical background to Science and the Nation and the subsequent developments in the pattern of British science. The document was to indicate that 'the application of science is completely dependent upon the assessment that society has placed upon the fundamental needs of the community'.[160] There would also be a discussion of the general problems of the organisation of British science followed by discussions of specific sectors. A number of prominent members of the Association were to be approached to write on particular subjects - N.W. Pirie on agriculture, Bronowski on industry, Dr. D'Arcy Hart on health, Bunting on the colonies, Blackett and Lord Brabazon on Britain as a world power and Kathleen Lonsdale on the responsibilities of the scientist. Others approached included Max Born, C.F. Powell, Le Gros Clark and A.V. Hill.[161] However, the Committee had little success in getting commitments to

contribute, for example, from Bronowski and Blackett. Bernal however, agreed to make a contribution on industry.

In addition to the problem of getting a sufficient number of contributors to give the project a comprehensive coverage the Science Policy Committee was under pressure from the Executive Committee to confine content to members' more immediate interests. The draft of the proposed first section of 'the constructive use of science' prepared by Roy Innes dealing with the general historical and political problems of the organisation of science had been criticised by the Executive Committee. The emphasis of the document should be to underline the positive aspects of how science should be used on a narrow range of issues such as improving housing, the health service and roads.[162]

By August 1953 the original intention of producing a book modelled on Science and the Nation had been abandoned in favour of producing a shorter pamphlet. This was to consist of a number of signed articles with a forward explaining how the pamphlet came to be written and a short conclusion putting the AScW policy and proposals for further action. Meanwhile the Committee had received 'very little information' about how the campaign on the constructive use of science was developing outside of London.[163] By October and in view of the continuing problems the Committee agreed that:

> what is needed is a 'short polemical statement' of the problems facing us in the next few months in getting the Government and other interests to allocate more money for research into the more pressing problems.[164]

In the event this pamphlet was produced by the AScW's Publicity department as The Constructive Use of Science in a print run of 3,000 copies which appeared in 1954. This was drafted by Dr. Sarsfield and stressed the need for the Government to reallocate resources from military to civil research.[165] Other material which had been already received for inclusion was published separately in the Scientific Worker. This included Lord Brabazon on 'Britain as a world power', Kathleen Lonsdale on 'Moral responsibility', D.M. Newitt on 'Science and fuel', and N.W. Pirie on 'Food or frivolities'.[166] A set of Speakers' Notes had been produced in an effort to help develop awareness of science policy issues at branch level.

In addition to a certain indifference to questions of science policy by a section of the membership there was also active opposition on political grounds. A resolution from the Derby branch of the Association moved at the 1953 Annual Council stated that:

> Council deplores the Science Policy of the Association as carried out by the Executive Committee, inasmuch as the development of science in all its aspects is not being promoted and the honour and interest of the scientific profession, instead of being upheld is being distorted by political bias.[167]

Although this resolution was defeated in favour of that of the Science Policy Committee, it nevertheless illustrates yet again the divided views co-existing within the Association and inhibiting the fuller development of policy.

5. Conclusion

In this chapter I have attempted to elaborate the many pressures which came to bedevil the activities of the AScW in the period 1947-1956. They were evident in the AScW's relationship to the labour movement, the state and the wider scientific community.

The financial, organisational and political problems which then beset the AScW effectively constrained its growth and constrained its ability to act as a vehicle for a politically and socially responsible science. Following the dramatic decline in membership in the late 1940s the AScW's membership remained at a level of around 12,000 throughout the 1950s.

As a consequence the science policy aspects of the Association's activities assumed a lower status in the union's hierarchy of priorities as its leadership attempted to reverse its decline by concentrating its efforts on more orthodox trade union work. The needs of the war effort had stimulated an interplay between the experience of industrial scientists and technicians and the broader questions of the control and direction of science which was lacking in the subsequent period.

Science policy work became more narrowly supported and was not perceived by many in the union to be organically linked to the necessary conditions of growth of the Association. Thus after an initial period of success the strategy of the scientific Left of mobilising scientists on a trade union basis had encountered major obstacles. These problems led to the attempt to develop alternative organisational forms for the expression of the politics of

science. These were embodied in the Engels Society and subsequently the organisation Science for Peace and will be discussed in detail in chapter 4.

In chapter 3 I examine the international efforts to link scientists' social responsibility to their professional and trade union interests in the form of the World Federation of Scientific Workers. Meanwhile in the next chapter I go on to explore in more detail the fate of the scientific Left in the context of the problematic relationship of the AScW to the TUC and the evolution of its approach to the social relations of science.

Chapter 1.

1. D.S. Horner, 'The Association of Scientific Workers and the Social relations of science' (M.Sc.dissertation, Aston University, 1981).

2. J.D. Bernal, The Social Function of Science, (London : George Routledge, 1939).

3. Association of Scientific Workers, Science and the Nation (Harmondsworth, Middlesex : Penguin, 1947).

4. Horner,'The Association of Scientific Workers', pp.35-37.

5. Ibid., pp.59-61.

6. Ibid., pp.66-67.

7. W. Dick and I.B.N. Evans, editors, Science and Human Welfare : Proceedings of a Conference held in London on 15th-17th February, 1946 (London : Temple Fortune Press, 1946).

8. D.S. Horner, 'British scientists, trade unions and atomic weapons :The post-war debate', paper presented to the Second Conference on Science, Society and Education, Risk and Participation , Leusden, Holland, 17-20 August, 1982.

9. William McGucken, Scientists, Society and State (Columbus: Ohio State University Press, 1983), pp.352-356.

10. 'Scientific Research and Industrial Planning', Nature, 157 (5 January 1946), pp.8-11.

11. Ibid., p.8.

12. Ibid., p.11.

13. M. Polanyi to J.D. Bernal, 8 January 1946, Bernal Papers, Cambridge University Library, Box 86, Folder J.

14. J.D. Bernal to M. Polanyi, 30 January 1946, Bernal Papers, Folder J.

15. Association of Scientific Workers, Science and the Nation, p.30.

16. McGucken, Scientists, Society and State, p.354. A.H. Bunting, an executive committee member, had proposed that the AScW should co-operate with the SFS on the question of secrecy in nuclear. However, Bunting, now Professor of Agriculture at the University of Reading, has only faint memories of the AScW's Science policy interests. Professor A.H. Bunting to the author, 9 December 1983.

17. J.K. Baker and A.G. Tansley, 'The Cause of the Controversy on Freedom in Science', Nature 158 (26 October 1946), pp.574-76.

18. Evidence for the shift in Nature's position from one of support for the planning of Science movement to tacit sympathy for the Society for Freedom in Science is presented in William McGucken, 'On Freedom and Planning in Science : the Society for Freedom in Science, 1940-46', Minerva 16 (1978), pp.42-72.

19. 'Freedom and Organisation in Science', 8 April 1947, p.2, Bernal Papers, Box 77, I.F.1.

20. The paper further referred to the successful expansion of wartime planning and supports the Soviet system of state planning. It further observed that : 'Papers on formal genetics, which is often alleged to have been suppressed in the Soviet Union, appear with greater frequency than they do in this country'. Ibid., p.3.

21. Nature 157 (5 January 1946), p.9.

22. Typescript summary of Blackett's presidential address to the Council of the AScW, 24 May 1947, Blackett papers, The Royal Society Library, E22.

23. Ibid., p.5.

24. See the memorandum prepared by the Fuel and Power Advisory Committee of AScW, 'A Scientific and Technical Service for the Fuel and Power Industries', in Association of Scientific Workers, Science and Government (London: AScW, 1946), pp.4-22,
and M. Ruhemann, 'British Fuel Problems', Scientific Worker 3 (August 1948), pp.10-14.

25. Roger Eatwell, The 1945-51 Labour Governments (London : Batsford Academic, 1979), pp.89-90.

26. 'Science and the Real Freedoms', Nature 159 (12 April 1947), pp.511-12.

27. Ibid., p.511.

28. Ibid., p.512.

29. Ibid.

30. 'Crisis : Plan of Campaign', August 1947, (Typescript), Bernal Papers, I.F.2.

31. Executive Committee of the Association of Scientific Workers, 'Science and the Economic Crisis', Scientific Worker 2 (August 1947), p.28.

32. Ibid.

33. John Gollan, 'C.P. Draft Statement on Science and the Crisis', 6 April 1948, (Mimeographed), Bernal Papers, I.16.1.

34. J.D. Bernal, 'The Association and the Crisis', Scientific Worker 2 (October 1947), p.5.

35. 'Speakers Notes on Science and the Economic Crisis', 5 January 1948, (Mimeographed), Bernal Papers, I.16.1.

36. For a detailed discussion of this matter see chapter 2, sections 3.5., 3.5.1. below.

37. 'Scientists to advise nation in crisis', Daily Worker (September 4 1947), p.6.

38. J.G. Crowther, 'The British Association Meeting : Dundee 1947', Scientific Worker 2 (October 1947), p.11.

39. The Labour Party, New Deal for Science (London : the Labour Party, 1949).

40. Ibid., p.5.

41. Ibid., p.9.

42. Ibid.

43. R. Innes, 'New Deal for Science?', Scientific Worker 4 (June 1949), pp.13-15.

44. Ibid., p.14.

45. Association of Scientific Workers, Science Policy Committee minutes, M.92/49, 16 June 1949, AScW Archives. Modern Records Centre, University of Warwick, ASW/1/4/1/1-64.

46. J.D. Bernal, 'Britain's economic future - recovery or collapse?', Scientific Worker 3 (April 1948), p.10.

47. Sam Russell, 'Atoms for War or Peace - we must choose - say scientists', Daily Worker (10 May 1948), p.1.

48. Mimeographed summary of J.D. Bernal's presidential address to the Council of AScW, 8 May 1948, p.4., Blackett Papers, E3.

49. A correspondent for Nature commented that Bernal's attacks on the Marshall Plan and the Government's policy of moving communists from key position in defence research ignored 'the totalitarian threat to freedom of science in Soviet Russia and the question of loyalties which has compelled the Government's action in Britain against communists'. See 'World Co-operation in Science', Nature 161 (29 May 1948), p.840.

50. 'Annual Council Meeting', Scientific Worker 3 (June 1948), p.15.

51. 'Civil and Military Research', Scientific Worker 3 (August 1948), pp.20-23.

52. 'Annual Council Meeting', Scientific Worker 3 (June 1948), p.12.

53. Executive Committee of the Association of Scientific Workers, 'Atomic Energy : Proposals for a National Policy', Scientific Worker 3 (February 1948), p.29.

54. Ibid., p.30.

55. Daily Worker (10 May 1948), p.1.

56. Henry Pelling, The British Communist Party : A Historical Profile (London : Adam and Charles Black, 1958 reissued 1975), pp.40-42.
This meeting established the Communist Information Bureau (Cominform)

57. Thomas H. Hardy, 'British Communist Party Propaganda on Domestic Affairs : 1944-50' (Ph.D thesis, University of Texas, 1979).

58. Henry Pelling, A History of British Trade Unionism (Harmondsworth, Middlesex : Penguin, 1969), p.228.

59. The delegations were T. Ainley, J.D. Bernal, Dr. N. Levy, B. Smith (1948); T. Ainley, Dr.N. Levy, B. Smith (1949); T. Ainley, Dr. P.W. Brian, B. Smith, (1950); D.M. Cassidy, Dr. N. Levy, B. Smith (1951); B. Smith, Dr. P.W. Brian, J.K. Dutton (1952); B. Smith, F.B. Cope, J.K. Dutton (1953); B. Smith, J.K. Dutton, C.F. Powell (1954); J.K. Dutton, E.H.S. Burhop (1955).

60. For a detailed discussion of this matter see Chaper 2.

61. D. Mclean, Scientific Worker 4 (February 1949), p.24.

62. In December 1947 the AScW had a registered membership of 17,048 but by the close of 1948 this had fallen to 15,521.

63. 'Supplementary Report of the Executive Committee - No.1 : The AScW and Politics', Scientific Worker 4 (June 1949), p.21.

64. Ibid.

65. Daily Worker (30 May 1947), p.1.
In contrast to its previous extensive reporting of AScW Council meetings the Daily Worker carried only a simple accouncement of Boyd Orr's election, pointing out that he had just retired from the Director-Generalship of the United Nations Food and Agricultural Organisation.

66. A number of accounts have been published dealing with these spying activities including Rebecca West, The Meaning of Treason (London : Macmillan, 1949; rev and enl.ed.,Virago, 1982); Alan Moorehead, The Double Life of Fuchs, Pontecorvo and Nunn May (London : Hamish Hamilton, 1952); and H. Montgomery Hyde, The Atom Bomb Spies (London : Hamish Hamilton, 1980).

67. Association of Scientific Workers Atomic Sciences Committee Minutes, (19 January 1946) AScW Archives, ASW/3/3/2. Those present at the meeting included Dr. Arrol, Prof. Blackett, Dr. Burhop, Prof. Massey, Dr. A.N. May, J. Moore, Prof. Mott, Dr. Rowlands, Dr. Skinner and R. Innes.

68. Association of Scientific Workers, On the case of Dr. Alan Nunn May (1946), AScW Archives, ASW/4/3/5/iv.

And an emergency resolution passed at the Council meeting of 1946 had strongly supported the action of the Executive Committee in protesting against the harshness of the sentence. 'Report of Annual Council : Dr. Nunn May', Scientific Worker 1 (June 1946), p.6.

69. 'Dr. Alan Nunn May', Scientific Worker 1 (December 1946), p.29.

70. Moorehead, The Double Life, pp.46-47.

71. 'Dr. Alan Nunn May', Scientific Worker 2 (October 1947), pp.16-17.

72. Ibid.

73. 'Science and the Real Freedoms', Nature 159 (April 1947), p.511.

74. Rebecca West, The Meaning of Treason (London : Virago 1982), p.88.

75. Ibid., p.189.

76. Ibid.

77. 'Council Resolutions : Emergency Motion 1', Scientific Worker, 2 (June 1947), p.20.

78. Report from the Chiefs of Staff, 13 March 1947, Public Record Office, file CAB 21/2554, quoted in 'War report reveals spy fears', Times (20 June 1983), p.2.

79. James Mortimer and Valerie Ellis, A Professional Union : The Evolution of the Institute of Professional Civil Servants (London : George Allen and Unwin, 1980), p.169.

80. Ibid.

81. 'Council 1948 : Emergency Resolution 3', Scientific Worker 3 (June 1948), p.18 and Daily Worker (10 May 1948), p.1.

82. 'Civil Service Political Discrimination', Scientific Worker 3 (August 1948), p.19.

83. Mortimer and Ellis, A Professional Union, p.173.

84. Atomic Scientists News 2 (28 April 1949), p.137, and Daily Worker (7 May 1949), p.1. Burhop was himself the subject of state pressure. He was prevented from attending a WFScW meeting by the withdrawal of his passport. Interview with Dr. Bill Williams at the Second International Conference on Science, Society and Education, Leusden, Holland, 19 August 1982. Dr. Williams was a fellow activist in the Atomic Scientists' Association.

85. 'Reports from the Regions : London - Discrimination', Scientific Worker 4 (April 1949), p.15.

86. Mortimer and Ellis, A Professional Union, p.174-175.

87. Bernard Lovell, P.M.S. Blackett : A Biographical Memoir (London : The Royal Society, 1976).

88. Ronald Clark, J.B.S. : The Life and Work of J.B.S. Haldane (London : Hodder and Stoughton, 1968).

89. Maurice Goldsmith, Sage : A Life of J.D. Bernal (London : Hutchinson, 1980), pp.182-189.

90. Ibid., p.183.

91. 'Editorial', Scientific Worker 5 (January 1950), pp.3-4.

92. Goldsmith, Sage : A Life of J.D. Bernal, pp.188-189.

93. Association of Scientific Workers, 'Agenda, Motions and Amendments, 33rd Annual Council, 1950', p.13, AScW Archives, ASW/1/1/22. In the event due to pressure of other business the motion was not put at the Council Meeting.

94. Greta Jones, 'British scientists, Lysenko and the Cold War', Economy and Society 8 (February 1979), pp.26-57.

95. Ibid., pp.47-48.

96. Innes had reported to AScW's Science Policy Committee that he had discussed the question of Soviet Genetics with the First Secretary at the Soviet Embassy who had promised to try and find out exactly what changes had taken place in positions of people immediately concerned. It was suggested that the Embassy should be asked to make a on the career of Vavilov and that the material collected should be written up as an article for Scientific Worker. See Science Policy Committee minutes, M.209/48, 16 December 1948, AScW Archives, ASW/1/4/1-3.

97. Association of Scientific Workers, 'Report of the Executive Committee to Council, 1949', AScW Archives, ASW/1/1/22.

98. Association of Scientific Workers, Science Policy Committee minutes, M.56/51, 28 April 1951, AScW Archives, ASW/1/4/2/13.

99. Association of Scientific Workers, Report on the Lyzenko Controversy (London : AScW, 1951), p.9. See also Greta Jones, 'British Scientists, Lysenko and the Cold War', p.49.

100. 'AScW Report on the Lysenko Controversy', Scientific Worker 6 (July 1951), p.2.

101. Greta Jones, 'British Scientists, Lysenko and the Cold War, p.49.

102. For a detailed discussion of the matter see chapter 3 section 3.2. below.

103. B.C. Roberts, Ray Loveridge and John Gennard, Reluctant Militants : A Study of Industrial Technicians (London : Heinemann, 1972), p.95.

104. W.A. Wooster, 'The AScW grew in war : scientists are realizing the need for it in peace', AScW Journal 2 (May 1956), p.5.

105. George Sayers Bain, The Growth of White-Collar Unionism (Oxford : Oxford University Press, 1972).

106. J.E. Mortimer, A History of the Association of Engineering and Shipbuilding Draughtsmen (London : AESD, 1960), p.303.

107. Association of Scientific Workers, 'Report of the Executive Committee to Annual Council, 1950', p.4, AScW Archives, ASW/1/1/22/1.

108. J.E. Mortimer, A History of the Association of Engineering and Shipbuilding Draughtsmen,p.305.

109. Association of Scientific Workers, The Economic Position of the Scientific Worker', (London: AScW, 1950).

110. Association of Scientific Workers, 'Agenda, Motions and Amendments, 34th Annual Council, 1951', Appendix p.2, AScW Archives, ASW/1/1/22.

111. Association of Scientific Workers, 'Supplementary Report of the Executive Committee to Council, 1952' in 'Report of the Executive Committee to Annual Council, 1952', pp.23-26, AScW Archive, ASW/1/1/22.

112, Ibid., p.23.

113. Reinet Fremlin, 'The Socientist and the Trade Union Movement', AScW Journal 1 (May 1952), pp.15-17.

114. Association of Scientific Workers, 'Agenda, Motions and Amendments 36th Annual Council, 1953', Appendix p.1., AScW Archives ASW/1/1/22.

115. Association of Scientific Workers, 'Scientists need a professional organisation', (London : AScW, n.d.).

116. Association of Scientific Workers, The University Scientist and his Salary. A Memorandum prepared by the University Committee of the AScW, (London : AScW, 1953).

117. Mortimer and Ellis, A Professional Union, p.293.

118. Association of Scientific Worker, 'Report of the National Executive Committee , 38th Annual Council, 1955', AScW Archives ASW/1/1/22.

119. W.A. Wooster, 'AScW grew in war', p.5.

120. Association of Scientific Workers, 'Report of the Executive Committee' (1949), pp.8-10.

121. Association of Scientific Workers, 'Agenda, Motions and Amendments, 32nd Annual Council, 1949', p.4., AScW Archives ASW/1/1/22.

122. Association of Scientific Workers, 'Agenda, Motions and Amendments 33rd Annual Council, 1950', p.5, AScW Archives, ASW/1/1/22.

123. Association of Scientific Workers, Science Policy Committee minutes, 'Terms of Reference', 28 July 1950, AScW Archives ASW/1/3/1/1. The composition of the AScW's Science Policy Committee in 1950 included Dr. P.W. Brian, Prof.V.G. Childe, C. Dixon, J. High, E.M. Holt, R. Innes, N.W. Pirie, H. Rose, Dr. N.F. Sarsfield, Major W.F. Vernon, T. Ainley, D.G. Arnott, H.G.L. Bevan, Dr. R.C. Murray, P. Spiro, H.D. Ursell.

124. Association of Scientific Workers, 'Report of the Sub-Committee on the Future Work of the S.R.C. (Social Relation Committee)', G015/45 (1 June 1945) 'Science Policy Committee minutes, AScW Archives, ASW/1/4/1/2.

125. For a detailed discussion of this matter see section 4.2.2. below.

126. The views of the AScW on this issue were embodied in Association of Scientific Workers, National Universities Committee, Science in the Universities. A memorandum. (London : AScW, 1951) and A Policy for Technological Education (London : AScW, 1953).

127. For a detailed discussion of these conferences see

128. Key members of the Atomic Sciences Committee were D.G. Arnott and E.H.S. Burhop. The latter, an Australian, had worked at the Cavendish Laboratory in the 1930s and returning to Australia during the Second World War had played a key role in the Australian AScW.

129. Association of Scientific Workers, Atomic Attack - Can Britain be Defended? (London : AScW, 1950). The foreward was written by Blackett.

130. Association of Scientific Workers, 'Report of the National Executive Committee, 39th Annual Council, 1956', pp.22-24, AScW Archives, ASW/1/1/22.

131. Association of Scientific Workers, Science Policy Committee minutes. M58/52 20 June 1952, AScW Archives, ASW/1/4/2/24.

132. Association of Scientific Workers, Science Policy Committee minutes. M91/52 23 October 1952, AScW Archives, ASW/1/4/2/27. The committee agreed that it 'should bear constantly in mind the possibility of gently pressing the TUC to refer matters to the Scientific Advisory Committee'.

133. The AScW was a strong advocate of the setting up a state sponsored Consumer Research Council. See Science and the Nation, pp.138-141.

134. Association of Scientific Workers, Science Policy Committee minutes, M66/50, 19 April 1950, AScW Archives, ASW/1/4/2/4.

135. Association of Scientific Workers, 'Agenda, Motion and Amendments - 32nd Annual Council, 1949', p.7. AScW Archives, ASW/1/22.

136. Association of Scientific Workers, Science Policy Committee minutes, M25/50, 15 February 1950, AScW Archives, ASW/1/4/2/2.

137. A.M. Bassadone, 'The World's Food and Britain's Needs', Nature 165 (1 April 1950), pp.517-18.

138. Association of Scientific Workers, Science Policy Committee minutes. M46/50 11 March 1950, AScW Archives ASW/1/4/2/3.

139. Association of Scientific Workers, Britain's Place in the Food Queue , (London : AScW, 1950). 2,500 copies were produced.

140. Bassadone, 'The World's Food and Britain's Needs', p.517.

141. This shift in the terms of debate in response to the Cold War from the political to the ethical, was also evident, for example, in the Dutch Association of Scientific Research Workers (VWO). See A. Rip and E. Boeker 'Scientists and Social Responsibility in the Netherlands'. Social Studies of Science 5 (1975), pp.462-463.

142. Association of Scientific Workers, Science and the Nation, p.17.

143. A.F. Brown and A.R. Trim, 'Ethical Problems of the Scientific Worker', Nature 168, (29 December 1951), pp.1112-1114.

144. Ibid., p.1113.

145. Ibid.

146. Ibid., p.1114.

147. Association of Scientific Workers, 'Agenda, Motions and Amendments 35th Annual Council, 1952', p.12, AScW Archives, ASW/1/1/22. The motion was not discussed but referred to the Executive Committee.

148. F.le Gros Clark, 'Science and Moral Dilemma', Scientific Worker 8 (January, 1953), pp.3-5, 'An Hippocratic Oath is not enough', Scientific Worker 8 (January 1953), p.25, 'Science and Moral Dilemma', Scientific Worker 8 (March 1953), pp.7-8, and Kathleen Lonsdale, 'Moral Responsibility', Scientific Worker, 9 (May 1954), pp.4-7.

148 (continued)

A more recent criticism of the idea of the Hippocratic Oath and its inadequancy in the face of the lack of control by scientists on the unintended application of research, especially in a capitalist society, is to be found in J. Kuczynski, Die vertauschte Eule der Minerva ; Der Wissenschaftler in der kapitalistischen Gesellschaft (Berlin: Akademie Verlog, 1974).

149. A.V. Hill, 'The Ethical Dilemma in Science', quoted in Bernard Katz, 'A.V. Hill', Biographical Memoirs of the Royal Society 24 (1978), p.129.

150. J.D. Bernal, 'The Abdication of Science', Modern Quarterly 8 (Winter 1952-1953), p.44.

151. Ibid., pp.45-46.

152. Ibid.

153. Roy Innes, Science and our Future, (London : Lawrence and Wishart, 1954).

154. Association of Scientific Workers, 'Agenda, Motions and Amendments 35th Annual Council 1952', 'Constructive use of Science, Appendix

155. Association of Scientific Workers, Science Policy Committee minutes, M58/52 20 June 1952, AScW Archives ASW/1/4/2/24.

156. Association of Scientific Workers, Science Policy Committee minutes, M91/52 23 October 1952, AScW Archives, ASW/1/4/2/27.

157. Association of Scientific Workers, Science Policy Committee minutes, M16/53 23 February 1953, AScW Archives, ASW/1/4/2/21/

158. Association of Scientific Workers, 'Motions and Amendments 36th Annual Council, 1953', Appendix p.2.

159. Association of Scientific Workers, Science Policy Committee minutes, M78/53 5 October 1953, AScW Archives, ASW/1/4/2/37.

160. Association of Scientific Workers, Science Policy Committee minutes, M108/52, 29 December 1952, AScW Archives, ASW/1/4/2/29.

161. Association of Scientific Workers, Science Policy Committee minutes, M24/53 23 March 1953, AScW Archives, ASW/1/4/2/32.

162. Association of Scientific Workers, Science Policy Committee minutes, M39/53 27 April 1953, AScW Archives, ASW/1/4/2/33.

163. Association of Scientific Workers, Science Policy Committee minutes, M66/53 24 August 1953, AScW Archives, ASW/1/4/2/36.

164. Association of Scientific Workers, Science Policy Committee minutes, M85/53 20 October 1953, AScW Archives, ASW/1/4/2/38.

165. Association of Scientific Workers, The Constructive Use of Science (London : AScW, 1954).

166. Lord Brabazon of Tara, 'Britain as a World Power' Scientific Worker 9 (January 1954), pp.4-5; 'Vieax Colon', 'The Scientist and the Colonies', Scientific Worker 9 (March 1954), pp.6-10; Kathleen Lonsdale, 'Moral Responsibility', Scientific Worker 9 (May 1954), pp.4-7; D.M. Newitt, 'Science and Fuel', Scientific Worker 9 (July 1954), pp.18-20; N.W. Pirie, 'Food or Frivolities', Scientific Worker 9 (September 1954), pp.8-10.

167. Association of Scientific Workers, 'Motions and Amendments 36th Annual Council 1953', p.11.

CHAPTER 2

THE TRADES UNION CONGRESS AND THE SOCIAL RELATIONS OF SCIENCE

1. Introduction

The affiliation of the Association of Scientific Workers (AScW) to the Trades Union Congress (TUC) brought a novel dimension to the policy debates of Congress. As an editorial in the AScW Journal subsequently recalled:

> The record of the AScW at the annual meeting of the Trades Union Congress since we first affiliated in 1942 is one of which we can be proud. The nature of our delegation is one of the manifestations of the social revolution that began after the first world war and was so immensely stimulated by the second: on six occasions one of our delegates has been a University Professor and a Fellow of the Royal Society. Professor Blackett was the pioneer, and attended four Congresses; Professor Bernal and Professor Powell one each. To every Congress we have sent at least one well qualified and one senior scientist and thus established a unique (if minor) place in the traditions of Congress.[1]

And through the AScW the scientific Left was able to raise questions of the social relations of science within the 'peak' organisation of British trades unionism. The AScW was instrumental in promoting the TUC's Scientific Advisory Committee (SAC) as a focus for such discussions.

However, as I shall show in the present chapter, the origins of the TUC's encounter with science lay in the pre-war period. The impetus to establish the SAC arose from a desire to equip the

TUC with its own source of scientific and technical expertise and also to enhance the social legitimacy of the trade union movement.

The TUC leadership was able to enlist the informal support of the British Association for the Advancement of Science (BAAS) in assembling a panel of sympathetic scientists. Thus in spite of the emerging commitment of the scientific Left to an alliance of science and labour the initial moves came from the middle ground of the politics of science.

This was transformed by the experience of the war years. Following its founding in 1939 the SAC remained dormant. On the other hand the newly affiliated AScW under its left-wing leadership was particularly active in pressing its professional claims and its policies on the planning of science at Congress. As a result immediately following the Second World War the AScW was able to promote the re-establishment of the SAC on terms favourable to itself.

However, as I sought to show in the previous chapter, the initial success of the AScW as a left-wing scientists' trade union was quickly tempered by the pressures of the Cold War. I now examine the impact of these pressures on its subsequent relationship with the TUC and its SAC.

I discuss a number of policy issues debated by the TUC which exhibit the nature of the TUC's perspective on science policy and which distanced it from the AScW. These include science and the economic crisis, atomic energy, secrecy in science, national fuel and power policy and industrial research associations.

Although in the case of fuel and power policy and research associations there was a degree of agreement on objectives.

The use of the AScW as a platform for communist policies resulted in the declining influence of the Association at the TUC. The professional and advisory aspects of the AScW's relationship to the TUC were overshadowed by political considerations.

2. The Pre-History of the TUC's Scientific Advisory Committee

2.1. Origins

The encounter between the social relations of science and the trade union movement in the late 1930s occurred under the auspices of the British Association for the Advancement of Science (BAAS).[2] The BAAS, as Collins has pointed out, 'treated of science as a system of cultural values and as a body of useful knowledge: as such, science was said to reinforce accepted social and moral ideals and to provide many practical benefits'.[3] This perspective appeared to be more congenial to the leadership of the TUC under Citrine than that of the scientific Left with its commitment to political and social transformation. Nevertheless the proposal to establish a Scientific Advisory Committee within the TUC involving sympathetic outside scientists expressed a novel attempt to cement an alliance of science and labour arising from the experience of the profound social crises of the 1930s. The BAAS meeting of 1938 which accepted proposals for the foundation of the new Division for the Social and International Relations of Science also heard a report of the evolving informal cooperation with the TUC.[4]

The TUC's impulse to form links with the scientific community arose against the background of the devastating failure of the General Strike, the impact of the economic depression and the Labour Party's crushing election defeat of 1931. The TUC's own official account states that:

> The concern of the General Council of the TUC for the adequacy of its case, no matter what the subject in hand might be, and its consequential concern for a public hearing and for influence on the country's affairs, is perhaps most clearly to be discerned in the methods that were used for the purpose of co-operating with the medical profession and the nation's scientists.[5]

For the leadership of the TUC, notably Citrine and Bevin, links with representative organisations of the scientific community were a means of achieving social legitimacy for the trade union movement and gaining recognition of its right to be heard. The political sensitivity which still surrounded trade unionism was reflected in the circumspection shown by the BAAS in its response to the overtures of the TUC's General Council.[6]

In contrast for the scientific Left the formation of organic links with the labour movement flowed as a natural consequence from their conception of the social function of science and the nature of social change. Bernal wrote that:

> As an individual he (the scientist) has no less but no greater influence than any other citizen; only by combination among scientists can the social importance of science make itself felt. But mere combination in itself is not enough. The technical importance of science, great as it is, is not sufficient to give even united scientists any serious political influence, as long as they stand alone. This can only be achieved if scientists, through their organisations can combine with other groups having the same goal of social progress.[7]

However, the scientific Left's ability to influence the TUC in scientific matters was to arise only with the ascendancy of the AScW as an affiliated union of the TUC during and after the Second World War. In the meantime the Left was preempted by the initiative of the 'reformers' or 'scientific rationalists' such as Sir Richard Gregory and H.G. Wells who 'held that social progress depended on the greater use of reason and identified reason with scientific method'.[8] They wanted to see the replacement of the traditional and inefficient means of government by the application of science to social and political affairs.

H.G. Wells had startled the large audience at a meeting in 1937 of the BAAS Section I (Education) by proposing that 'the section should get into touch with the TUC in order to co-ordinate their research'. This suggestion arose in the context of a discussion concerning integrated curricula for adult education which would link scientific research with social problems. Wells wanted to introduce the clarity of 'scientific method' into the murky world of political action.

> There is a great danger on this side - and also in this section - danger of propaganda of the very narrow doctrinaire type masquerading as scientific research. The TUC is bound to suffer a great deal from this... It may be this section might use certain influences in pulling that research in the direction of real scientific research, and away from rather hasty political actions.[9]

Sir Richard Gregory, the editor of Nature and a close friend of Wells, gave assiduous support. In a letter to the Times Gregory wrote:

> As citizens men of science have a duty towards the community in endeavouring to promote the use of methods of impartial scientific enquiry 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.[10]

As early as 1924 the British Science Guild with Gregory's urging had organised a conference on 'Science and Labour'.[11] He had been concerned to 'convert labour to a belief in science rather than political action'. To counter the labour movements disillusionment with science he had urged scientists to enter into social movements as 'citizens whose motives are above suspicion and whose knowledge is at the service of the community for the promotion of the greatest good'. At the same time, but with little success, Gregory had sought the participation of the labour movement in the development of science and technology:

> The machinery of trade unionism...is capable of much more extended use than that to which it has hitherto been put, and when it is concerned not only with securing 'for producers by hand or by brain the full fruits of their industry', but also with the creation of new plantations by its own efforts, no one will be able to doubt its fitness to exercise a controlling influence upon modern industry.[12]

The resurgence of the idea of the social responsibility of science and the search of the TUC leadership for avenues of consultation created the conditions under which some form of alliance was on the agenda.[13]

Whilst Wells had been startling the BAAS with his suggestion of co-operation with the TUC, Bevin in his presidential address, in September 1937, to the 69th Annual Trades Union Congress, meeting in Norwich, had announced that the General Council had decided to

form a Scientific Advisory Council:

> The General Council believe that men of science can make a great contribution to progress by assisting such a Movement as ours with their counsel and knowledge...We are convinced that their prevision and research will be of incalculable value not only to our Movement but to the community.[14]

Bevin had been stimulated to seek co-operation with some section of the scientific community by the success of the establishment of a joint committee of the General Council and the British Medical Association early in 1937 which had brought together trade unionists and a number of doctors interested in industrial and social medicine.[15] Bevin's conception of a TUC Scientific Advisory Council was that of a group of leading scientists who would provide the General Council with a source of expert knowledge but would have no direct influence on policy formation ('scientists on tap, not on top'). He further felt that it would be to the mutual advantage of both science and the labour movement if Congress was represented on research boards and in the Research Associations.[16] His principal concern was that of increasing trade union influence on technological innovation to 'minimise the degrading results of some of their past applications' rather than in the broader questions of science policy or the social relations of science.

Armytage writes that:

> Gregory knew of his proposal and mentioned it when Wells impulsively brought forward his own suggestion at Nottingham. Gregory also hinted that he knew a little more about the probable composition of such a scientific committee than he cared to reveal. This was not surprising, since three months earlier, on 7th June 1937, he had taken the chair when the Rt.Hon. Arthur Greenwood addressed the Engineers' Study Group in Economics on 'Labour's Ten-Point Programme'.[17]

As a result of informal discussions in Gregory's circle and Bevin's proposal, a formal approach by Sir Walter Citrine, the General Secretary of the TUC, was made to Gregory on 19th October 1937. (Ritchie Calder seems to have had some kind of mediating role between the two sides). There followed a series of meetings between various eminent scientists and representatives of the TUC's General Council in which the overall conception and composition of the TUC's Scientific Advisory Committee gradually emerged.

2.2. Constitution

An initial informal meeting took place at the Marsham Restaurant on 22nd October 1937 between Citrine, Bevin and H.H. Elvin for the TUC and Gregory and Prof. P.G.H. Boswell (treasurer of the BAAS, 1935-43). A second and enlarged meeting took place late in the autumn of 1937. The scientists present at this later meeting included a cross-section of the 'scientific rationalists', the more orthodox members of the BA and the scientific Left: Sir Richard Gregory, Sir John Boyd-Orr, Professors J.B.S. Haldane, P.M.S. Blackett, G. Barker, Lancelot Hogben, A.C.G. Egerton, Sir Frederick Hopkins, Dr. J.D. Bernal, Prof. P.G.H. Boswell, Sir Daniel Hall, Prof. F.G. Donnan. The TUC's delegation was composed of the members of the Finance and General Purposes Committee headed by Bevin. The burden of the TUC's case was that they were in need of expert scientific and technical advice as the labour movement was generally unaware of the industrial changes which were likely to come about as a result of scientific innovation. In addition policies for industrial planning on a national scale required an input of technical information. A small provisional committee

was established under Sir Richard Gregory which, meeting in February 1938, recommended that the BA should be asked to nominate the scientist members of the Advisory Committee.[18]

Collins has written that:

> Resisting several moves to appoint a self-selected (and therefore too left-wing) group, the TUC leaders with Boswell's active help, turned to the British Association for a list of nominations for the scientific half of the committee. The Council, however, against the advice of its general officers, would not co-operate openly with such a political body as the TUC.[19]

Accordingly the BA authorised its general officers to nominate suitable members for the Scientific Advisory Committee (SAC) only informally. The nominated scientists were Sir Daniel Hall, Sir John Boyd Orr, Prof. Allan Ferguson, Prof. P.M.S. Blackett, Prof. F.G. Donnan, Prof. A.C.G. Egerton, Prof. Winifred Cullis, Prof. L. Hogben, Prof. J.D. Bernal, Prof. P.G.H. Boswell and Mr. J.S. Wilson. By September of 1938 the TUC had appointed its representatives: J. Hallsworth (Chairman of the General Council), E. Bevin, J. Brown, C. Dukes, H.H. Elvin, G. Gibson, W. Holmes, W. Lawther, G.W. Thomson and Sir Walter Citrine. Sir Richard Gregory was to be the chairman. He convened an 'inner cabinet' meeting for the 13th June 1939 consisting of Boswell, Ferguson, Bevin, Elvin and Citrine which had a document before it, prepared by the TUC, which set out the terms of reference of the SAC.[20]

The document made an explicit connection between the new committee and the BA's recently established Division for the Social and International Relations of Science suggesting that the SAC might

provide the new Division 'with a valuable contact with the workers' side of industry'. The TUC memorandum sought to define the nature of the SAC and its appropriate methods of work in the light of the previous informal discussions. The TUC saw its role as initiating and formulating the areas for discussion. However, the stated terms of reference were surprisingly wide and not limited to a narrowly economistic perspective and contrast favourable with the course the committee was to take in post-war years.

The terms of reference:

> (1) to supply the TUC with the necessary factual information of a scientific or technical nature which is required to assist the TUC in formulating a policy with regard to planning and re-organisation of industry;
> (2) to keep the TUC informed of new developments in processes, research and inventions, so that the social effects of such developments may be foreseen, and technical progress be achieved without detriment to the welfare of the workers;
> (3) to advise on, and to direct the undertaking of research with a view to the solution of any specific technical problem with which the TUC may be confronted;
> (4) to assist with the preparation of scientific or technical evidence which the TUC may wish to incorporate in submissions to Government Departments or Royal Commissions of Enquiry;
> (5) through its influence to facilitate TUC representation on national research bodies, and to exercise a general vigilance on the conduct of State-aided research.[21]

Subjects which the SAC would be consulted upon embraced both issues bearing directly upon labour and the wider impact of science and technology on social conditions:

> (a) Present position of research in relation to industrial and occupational diseases with a view to prevention rather than cure.
> (b) Researches in industrial fatigue and nerve strain, including systems of labour measurement, in relation to shorter working hours, holidays and minimum periods of rest and recreation.

(c) Standards of nutrition and scientific criteria in respect of different food stuffs.
(d) Distribution and redistribution of the industrial population.
(e) The effects of new industries, new materials and new processes upon the distribution, displacement and character of labour.
(f) The problem of slump prevention.
(g) Nationalisation of mines and minerals.
(h) New uses for coal.
(i) Electricity distribution.[22]

To some extent the choice of topics reflected the specialities and interests of the scientist members of the committee. The 'inner cabinet' suggested some revision of the topics proposed in particular 'the problem of slump prevention' was considered to be an economic and political problem. It was suggested that the initial task of the committee might be to investigate the effects of new processes and materials on workers, particularly, for example, the introduction of plastics upon textile workers.[23] (The implication being that the committee would in fact be exploring the interaction between technical and economic questions.)

The first formal meeting of the Scientific Advisory Committee took place on the 20th July 1939, with Sir Walter Citrine in the chair, although some of its key figures were absent including Bevin, Bernal, Blackett and Hogben. The meeting reviewed the TUC memorandum together with the minutes of the June meeting.[24] The terms of reference were broadly accepted as laid out in the original document. However, it was suggested that the range of information services which the SAC would be able to provide (see above, point 2) would be much more limited due to lack of resources than at first anticipated. It was not considered practical to consider the maintenance of a continuous and exhaustive survey of science and

technology as it related to the interests of the TUC. With regard to the question of TUC representation in the field of government policy for research and development, it was pointed out that Congress had not as yet even been invited to nominate representatives to the Council of the DSIR or similar official research bodies. Sir Daniel Hall observed that:

> the place of scientific workers in the machinery of government was today a very important question deserving of study.[25]

The list of topics to be covered by the committee was modified and narrowed down, the more overtly political aspects being attenuated. For example, 'the problem of slump prevention' was dropped completely while 'the nationalisation of mines and minerals' was transformed into 'the organisation, use and distribution of power'. It was decided that the substantive work of the committee should be organised on the basis of specialist sub-committees. Three such were established. The first sub-committee consisting of Prof. Winifred Cullis, Prof. P.G.H. Boswell, Mr. J. Brown and Mr. G. Gibson was to cover the area of industrial and occupational disease, industrial fatigue etc. A second sub-committee consisting of Sir Daniel Hall, Sir John Boyd Orr and Mr. J. Hallsworth would deal with the general area of nutrition and it was proposed to link its work with that of the BMA, the League of Nations Nutrition Committee and other interested bodies. It would be concerned with the collection of data and information which would be used in the preparation of policy, showing the relation between nutrition and public health, food policy, agriculture, trade and finance. The effects of new industries, new materials, new uses and new processes

upon the distribution displacement and character of labour was to be the responsibility of a third sub-committee consisting of Prof. J.D. Bernal, Prof. F.G. Donnan, Prof. A.C.G. Egerton and Mr. G.W. Thomson.

However, before the Scientific Advisory Committee could begin its work it was overtaken by the outbreak of the Second World War. By May 1940, as W.A. Wooster reported to the Executive Committee of the AScW, the committee 'appeared to be moribund'.[26]

Although by the beginning of the war the TUC had established the machinery for producing a wide ranging coverage of the implications of science and technology for the labour movement, it was never activated. The length of time taken to set up the committee reflected a lack of urgency on these issues and the fear of a political take-over by the left. In addition the orientation of the committee appeared to be heavily academic and bureaucratic. Bernal in The Social Function of Science (1939) had seen the attempt to establish the SAC as an aspect of 'popular participation in science', bringing a new interest group to bear on the problems of the social relations of science, and as potentially offering an opportunity to overcome the traditional division between mental and manual labour.[27] The outbreak of war effectively brought an end to this prospect.

However, the experience of the war years radically transformed both the social position and influence of the trades union movement and of science and scientists and created the conditions for the re-constitution of the SAC in 1947 under the auspices of a scientists' trade union affiliated to the TUC.

2.3. The TUC and The War

Citrine at the TUC Annual Congress in 1939 had declared that the trade union movement must emerge from the war with more power than ever before. The movement should no longer be content to be consulted by Government; they should insist on sharing with it responsibility for policy-making in economic and social matters. The war years for the TUC were characterised by an increasingly close involvement with the machinery of the state.[28] Trade unions became involved with nearly every facet of the war effort. The structure of this wartime involvement to some extent defined a pattern of participation which extended into efforts of peacetime planning.[29]

The appointment of Ernest Bevin as Minister of Labour in May 1940 led to the elaboration and strengthening of the consultative machinery which had been established at the outbreak of war. The National Joint Advisory Committee (NJAC) had been established in 1939 as a tripartite advisory body consisting of government, employers and unions. Bevin sought to strengthen the union presence with the setting up of the Joint Consultative Committee (as an off-shoot of the NJAC) which was active on a day-to-day basis. The Joint Consultative Committee enabled trade unions to exert a considerable influence on further war measures, notably those concerning the Government's policy on direction of labour and conditions in the nation's workshops.[30] Similarly the TUC was represented on the Central Production Advisory Committee which in 1942 became the National Production Advisory Committee. Trade unions were also represented on Regional Boards for industry and

on the local joint Production Committees. To match the governmental regional initiative trade union organisation in the regions was strengthened by the creation of the TUC's own regional structure of advisory committees.[31]

In addition to the mechanisms of consultation which bore directly on issues of labour and production, the trade union movement was drawn into wider issues of social policy. For example, the TUC Advisory Committee to the Ministry of Food. Similarly the Central Price Regulation Committee of the Board of Trade discussed regulations governing the rationing of food and clothes which were gradually extended following pressure from the trade union representatives.

In this context it might have been expected given the recent establishment of the TUC's Scientific Advisory Committee and Bevin's initial enthusiasm for the project that there would have been some cogent input from the TUC on issues relating to the mobilisation of science for the war effort. However, the activities of the SAC were abruptly suspended at the beginning of the war. The failure to pursue the work of the SAC may have arisen from the departure of Bevin from Transport House to Whitehall. An additional factor was the lack of availability of many of its scientist members due to their mobilisation for the war effort.

The key events for the continued engagement of the trade union movement with the social relations of science were the re-registration of the AScW as a trade union in 1941 and its subsequent affiliation to the TUC in 1942. For the scientific Left,

which had increasingly come to dominate the policy of the Association, its affiliation to the TUC provided an added platform to their existing campaign for the planning of science and its effective application to the war effort. In January 1942 the AScW had convened a successful conference, Science and the War Effort, which had criticised the Government's handling of science and had promoted the idea of a Central Scientific and Technical Planning Board. It was partly in response to such pressure that the Government was to make some concessions to the centralisation and coordination of scientific advice.[32]

AScW saw itself as having a special role as a scientists' trade union both to government and to the trade union movement:

> Not only have we to make central approaches to effect the better utilisation of science but we have to organise it throughout the vast machinery of society. On the side of the progress of science we have to win the 6,000,000 strong trade union movement, the education section of the 9,000,000 strong co-operative movement, and other organisations which can exercise considerable collective pressure. It is the AScW's ability to work at the roots and at the summit which constitutes a major innovation in science politics.[33]

The AScW argued the need for the centralised planning of science as an integrated element of the war effort and used the evidence of its membership to fuel its criticisms. It attacked the apparent lack of coordination of government and industrial research, the lack of coordination between government departments and the lack of centralised scientific advice at cabinet level.

The AScW, though relatively small, moved rapidly to assert itself within Congress on scientific matters. The Association

promoted a resolution at the Blackpool Congress of 1942 demanding the setting up of a Central Planning Board for science:

> Congress, appreciating the importance of the scientific and technical aspects of modern warfare, considers that the existing machinery does not fully utilise the scientific and technical resources of the country. This is due chiefly to the advisory character of the present bodies and lack of contact with working scientists of all grades. Congress therefore demands that a Central Planning Board shall be set up which will survey scientific and technical resources and problems, assess the relative priorities of these problems, and allocate the resources to deal with them. Such a Board must have executive authority and be composed of full-time members with direct access to Ministers and to working scientists and technicians in industry and government service. The Board shall set up advisory panels composed of working scientists to deal with specialised problems in their own fields.[34]

The General Council responded to the passing of the motion by placing the matter on the agenda of the National Production Advisory Council (NPAC). The AScW was invited to submit a more detailed memorandum outlining their case which was subsequently forwarded to the Ministry of Production.

The Minister of Production replied that the War Cabinet had divided the memorandum into three main sections: (i) the alleged lack of coordination between Government Departments and private firms on scientific and technical questions; (ii) the lack of coordination on such matters between Government Departments; (iii) the unnecessary duplication of inspection procedures to be remedied by a single Government Inspection Department under the Ministry of Production. On the first part the Minister stated that this was already under investigation by the scientific advisors to the Ministry. On the second point the Government representatives

on the NPAC drew attention to the inter-departmental bodies which were already responsible for coordination. And on the third point, although the criticism of the existing structure of inspection was accepted, no new body was proposed. The General Council accepted the views of the representatives of the Ministry of Production rather than continuing to press AScW's case.[35]

This episode tends to illustrate the extent to which the TUC came to play a 'powerful intermediary role' between its constituent unions and the state; the General Council was successful in monopolising and formalising the key channels of communication between the government and trade unions such as the AScW. Consultation came to mean consultation via the leadership as Martin has pointed out;

> Informal, confidential and really small scale (down to one to one) exchanges began to figure at all significantly at the ministerial level, and became frequent at the departmental level only during the 1930s. They emerged as a major feature of the TUCs relations with government from the time of the Second World War. From this time, too, those relations embodied an element of serious negotiation much more commonly than ever before.[36]

The AScW viewed the TUC as having a significant role in influencing national policy:

> It is a 'parliament' of the trade unions where general trade union policy is laid down and through the medium of which the Trade Union Movement acts as an entity in representation to the Government and before the public.[37]

The Association's leadership, however, underestimated the extent to which that medium was a distorting medium in which its goals were subordinate to those of the TUC itself.

P.M.S. Blackett, the President of the AScW from 1944-1945, played a vital role in building the Association's links and influence within the TUC.[38] He ensured that the views of the union were heard in the vital debate of the 1944 Congress on the labour movement's plans for post-war reconstruction. The AScW's delegation at the Congress consisted of Blackett, Dr. N. Levy and T. Ainley. Blackett wrote that:

> My dominant impression of the Blackpool Congress was of a deep mood of seriousness and a consciousness that the great problems of the reconstruction period demand a united and disciplined working class movement, ready to reach agreement on major issues rather than advertise disagreements on minor ones.[39]

The TUC's Interim Report on Post-War Reconstruction was conceived as a strategy for full-employment and the raising of living standards which was intended to break with economic and social conditions of the 1930s. It called for the nationalisation of the fuel and power group of industries; public control over the main industries with trade union participation at national and workshop levels; control of prices and protection of living standards; and the public control of banks and capital investment. The final paragraph of the report, perhaps reflecting the impact of the AScW within Congress, called for 'the maximum application of science under social control to raising the standards of all work people.'[40]

Blackett, in a speech of support for the Interim Report, emphasised the role of science and scientists' organisations. He argued that the rise of the AScW itself reflected a growing awareness among scientists that 'the frustration of science' was 'the product of a particular social organisation which made impossible

the full utilisation of scientific and technical progress' and that, as a consequence scientists had a responsibility to bring about social change:

> The way they can best help in changing it is to throw in their lot with the organised working class, for it is they who, in the long run, stand to gain most from the widest possible application of science.[41]

Nationalisation of key industrial sectors was the necessary condition for the rational application of the latest scientific advances as the means of raising the productivity of those vital industries.

The significance which science had assumed in the popular consciousness in general through the war years and in particular the growing influence of AScW within the trade union movement was reflected in the 1945 Annual Congress. According to an account of the Congress published by the Association:

> The application of science to the problems of reconstruction and human welfare dominated many of the issues before Congress and delegates showed that they were far from attributing the major ills of our day to science, recognising instead that, liberated from vested interests, science could be a formidable weapon for removing the obstacles to human happiness.[42]

AScW's prominence at Congress seemed disproportionate both to its size (approx. 16,000 members) and its recent affiliation. In addition to moving a resolution calling for the re-constitution of the Scientific Advisory Committee, AScW moved resolutions dealing with Consumer Research and Government Factories.

The Association had also supported a resolution from the

Chemical Workers Union (CWU) which had called on the General Council to press for:

> (a) Establishment of a National Research and Development Council with powers to direct and subsidise approved research and control patents.
>
> (b) Expansion and direction of Scientific Research pure and applied through or in association with the Department of Scientific and Industrial Research.
>
> (c) Increased Scientific and Technical Education within schools, colleges and universities.
>
> (d) Extension of powers of the Board of Trade to control and direct production in State and private factories.[43]

Dr. N. Levy, in supporting this resolution on behalf of the Association, said that:

> In referring to the final clause of the resolution I wish to make it clear that my Executive desires to read into this and into the appropriate part of the first clause the desire of Congress to give every support and encouragement to the policy of the Labour Government at this time. My union wishes to place on record its gratitude to the organised workers of this country for relieving them of a restrictive Government and for paving the way to the liberation of yet a new frontier, that of science.[44]

Levy thus indicated that the leadership of the Association linked the future of science and technology to the political success of a left-wing Labour Government.

Blackett in his presidential address to the AScW in May 1945 had spoken of the potential role of the Association as a 'Scientific Advisory Council' to the trade union movement. The Executive Committee believed that the Association had a special duty to 'draw into its ranks the ablest of the scientific and technical experts

in the country to study the technical and scientific problems confronting the labour movement'. This was of particular importance in relation to the 'technical organisation inherent in the nationalisation programme of the T.U. Movement and the Labour Party'.[45]

Even before Congress unofficial contact had taken place between the Association and the TUC on the question of post-war policy. As early as mid-1944 the TUC had invited AScW to send members of its Social Relations Committee (the precursor of the Science Policy Committee) to meet Sir Walter Citrine and representatives of the Research Department. P.M.S. Blackett, the President of the Association, together with two members of the Committee met Citrine to discuss the relation of science to TUC policy and successfully opened the way to the re-establishment of the dormant Scientific Advisory Committee.[46]

2.4. The Reconstitution of the Scientific Advisory Committee

In contrast to Bevin's pre-war initiative the post-war establishment of the SAC arose from the pressure of an affiliated trade union rather than from the TUC's leadership. At the 1945 Blackpool Congress P.M.S. Blackett as an AScW delegate moved a resolution which called upon the General Council to set up a Scientific Committee to advise it on problems of relevance to the trade union movement:

> Congress recognises the vital part that the application of science and technique must play in obtaining the high productivity of industry which is required in order that the progressive social policy necessary at the present time to raise the standards of life and health of the working people may be carried out.

> Congress realises further that it is necessary for the Trade Union Movement itself to have available authoritative advice and assistance on scientific and technical matters, and therefore calls upon the General Council to take steps to establish a Scientific Advisory Committee of the TUC. This committee should include members of affiliated unions which organise scientific and technical workers, and be available to assist the General Council and affiliated unions with information and advice on scientific problems.[47]

Blackett in his proposing speech argued that the time was ripe for the re-establishment of the SAC for two principal reasons. Firstly, there was the crucial role which science and technology had been seen to play in the war:

> We have learned during the war the remarkable achievements that can be obtained by the combination of open scientific research in the universities and research institutes and the planned conscious co-operation of this knowledge to social ends.[48]

Blackett illustrated his argument by specific reference to penicillin, DDT and atomic energy. Atomic energy exemplified both the 'threat and promise' of scientific discovery and he saw a key problem in the translation of the military application of atomic energy to peace time uses in the context of a 'unified nationally-owned fuel and power system'. (The issue of atomic energy was indeed to dominate the discussions of the SAC in its early years). Blackett argued for a specific role for the Trade Union Movement in infusing a democratic element into the formulation of science and technology policy:

> It has been found in the course of the war that scientific work can be done not only in the laboratory but elsewhere, and that scientific direction cannot only be done from the top, that is to say, the Government downwards. It has been found essential that the experience of the men on the spot, in the laboratory and in the workshop can in fact be used and is extremely valuable in formulating scientific and technical policy.[49]

He described as an illusion the view that, even with a Labour Government, policy formation could be left simply in the hands of the state. There was a need for the Trade Union Movement to have its own source of 'first-class scientific advice' to enable it to negotiate on relatively equal terms both with government departments and with industrial employers. This was particularly the case in view of the growing collaboration between the TUC and government.

Secondly, Blackett ascribed the failure of the pre-war SAC to establish itself to 'the difficulty of meeting in wartime, and other pre-occupations'. But...

> many scientists who in 1938 were content to work in their laboratory have been thrown in the wider world of scientific and social experience.[50]

The war seemed to have generated a revolution in the social consciousness of scientific workers which could be harnessed to the broader interests of trade unionism. The fact that scientists themselves were organised in substantial numbers (AScW's membership had risen from 2,000 to 16,000 over the period of the war) as a trade union with links with other affiliated trade unions provided the basis for the successful re-launch of the SAC.

AScW's resolution was seconded by a delegate from the NUM who argued that:

> there can be no real progress in post-war re-construction unless there is rapid advance in scientific and technical matters.[51]

The legacy of private enterprise in many major industries was science directed purely for the interests of capital. However, the nationalisation of some major industries implied a new role and

responsibilities for trade unions. Trade unions could play a significant part in re-direction of scientific effort (e.g. towards health and safety in the mining industry). A pre-condition for this kind of role would be the ability of the TUC to draw upon its own sources of technical advice especially when in negotiation with government. The emphasis in both contributions on the need for the SAC, understandably in the context of the needs of re-construction, was on the economic role of science as a 'force of production' and its potential for raising the level of industrial productivity as part of a broad strategy of national recovery. (This economistic model of the social function of science dominated the discussions of the SAC in the fifties and sixties).

The favourable political context for the TUC's initiative was emphasised at the AScW conference, Science and Human Welfare, in February 1946. Herbert Morrison, the Lord President of the Council in the Labour Government, indicated his commitment to the increased incorporation of science in state administration:

> In Britain today we are attempting to re-organise our affairs and to do so in a planned, tidy and scientific way...We are taking a progressive step in coordinating the work of all kinds of scientists - the economists, the medical men, the dieticians, as well as the physicists and the chemists - and harnessing their thought and effort to the machinery of government.[52]

However, the Government appeared to be less than clear in its commitment to the planning of science as opposed to simply harnessing scientific skills and seemed implicitly committed to a notion of the abstract autonomy of science.

G.W. Thomson of the TUC's General Council outlined the recent steps taken to revive the SAC. He believed that these symbolised the emergence of a new alliance between science and labour. Addressing the predominantly scientific audience of the conference he said that:

> I want you to feel that we in the Labour Movement generally and the Trades Union Congress wish to see you as part of the great democratic movement which alone can bring about the salvation and progress of the world.[53]

Although the resolution was passed without opposition the first meeting of the re-constituted committee did not take place until March 1947. As was the case with the pre-war SAC there appeared to be a lack of urgency, particularly on the part of the TUC. At the time the TUC was principally pre-occupied with the immediate issues surrounding its relationship with the Labour government. The actual formation of the committee arose out of negotiations between AScW and the TUC subsequent to the passing of the Congress resolution. In contrast to the pre-war situation the impact of AScW was to secure a firmer trade union orientation; the resolution specified that the scientist members of the committee should be drawn from affiliated unions organising scientific and technical workers. The proposal was that the SAC should be composed of three scientist members and three members of the General Council. AScW's Science Policy Committee liaised with the TUC's Finance and General Purposes Committee to arrive at a suitable membership. AScW submitted eleven nominations for membership - the eight not actually accepted as members of the SAC were to form a panel for consultation on specific subjects. (This consultative procedure was never in

fact operated.)[54] The scientist members of the SAC were Prof.D.M. Newitt, Dr. R. Schilling and Prof. P.M.S. Blackett.[55] The influence of AScW in the appointment of the members in contrast to BAAS's pre-war participation may be taken as a significant leftward shift promising perhaps the prospect of a more radical intervention in policy formation. As Werskey puts it:

> yet another hopeful sign for everyone on the scientific left that the long awaited marriage between science and British socialism had at last been consumated.[56]

However, as subsequent developments were to show, the SAC would not fulfil this early promise.

3. The SAC, AScW and the Emergence of TUC Policies for Science and Technology: 1947-1956.

3.1. The Political Context

Henry Pelling writes that:

> So far as the unions were concerned, the domestic political situation could not have turned out better than it did at the 1945 general election. The Labour Party, whose policy had been carefully co-ordinated with that of the TUC by the interlocking membership on drafting committees won a complete victory at the polls, securing a total of 393 MPs in the new House.[57]

However, by the time of the reconstitution of the TUC's Scientific Advisory Committee in 1947 the initial optimism generated by the election victory was overshadowed by a deteriorating domestic economic situation and increasing international tensions. The nationalisation of the mines and transport was plunged into crisis by the severe winter of 1947-1948 which brought a paralysing fuel

crisis. The foreign exchange crisis of the following summer brought an agreement from the TUC for a policy of wage restraint. This brought in its train the renewal of historic tensions between the divergent wings of the labour movement.

The TUC's response to these circumstances was one of maintaining its close cooperation with the Labour Government in order to secure its continued participation in the formation of Government policy. However, as Pelling points out, the policy of wage restraint:

> ...threatened to drive a wedge between union officials and their members, just at a time when there was increasing suspicion of their leaders who took or wanted to take posts on the boards of nationalised industries.[58]

The struggle over policies of wage restraint dominated economic debate within the TUC into the 1950s with the Communist Party at the head of the opposition. The emphasis of the General Council was on the need for sustained growth in production, particularly for exports, to sustain the Government's social and economic policies. Thus a political precondition of the TUC's successful cooperation with the Labour Government was the defeat of the communist opposition and its influence among many affiliated unions.

As I sought to show in chapter 1 the changing domestic and international situation of the post-war period brought pressure to bear on the left-wing leadership of the AScW. The attempt by the Communist Party to use its influence in unions such as the AScW to provide a vehicle for its policies only reinforced this pressure. The AScW's policies (both on the specific questions

of science policy and on the more general economic front) fell into the pattern of communist politics - especially following the formation of the Cominform. This entailed, for example, opposition to the Labour Government's commitment to the Marshall Plan and opposition to the programme of rearmament (for example in its campaign for a substantial shift from investment in military to civil research).

From a position of critical support for the Labour Government, between 1945 and 1947, the British Communist Party had then moved into a phase of open hostility. The Government's policies were seen as registering a decisive shift to the maintenance of the capitalist system in spite of its programme of nationalisation and social welfare measures. By October 1948 the Party's hope of playing a significant role in the leadership of labour movement unity was effectively ended.[59] The General Council of the TUC took the first steps to eliminate communist influence on the grounds that it had received evidence that communists were deliberately seeking to undermine the Government's economic policy which had been endorsed by the Margate Congress of 1948:

> The Communist Parties, under the direction of the Cominform, have been specifically ordered to oppose the Marshall Plan. Statements made officially by spokesmen of the Communist Party in Britain prove beyond question that sabotage of the European Recovery Programme is its present aim. Communist influences are everywhere at work to frame industrial demands for purposes of political agitation; to magnify industrial grievances; and to bring about stoppages in industry.[60]

At the international level the developing politics of the Cold War led to a decisive split in the international trade union movement. The World Federation of Trade Unions (WFTU) had been partly

established on the initiative of the TUC at the close of the Second World War. WFTU had embraced both communist and non-communist trade unions. However, by 1949 this unity had been fractured by the withdrawal of the non-communist union movements and the subsequent formation of the International Confederation of Free Trade Unions (ICFTU).[61] Similar tensions were reflected in the newly created international organisation of scientific and technical workers, the World Federation of Scientific Workers (WFScW), with the withdrawal of a number of affiliated organisations on the grounds of communist domination.[62] The continued affiliation of the British AScW and its commitment to the WFScW was an added factor in the deterioration in its relationship with the TUC. It is against this background that we must understand the subsequent failure of the AScW to capitalise on its successful initiative in getting the reconstitution of the TUC's Scientific Advisory Committee.

The marginalisation of the scientific Left by the politics of the Cold War contained the attempt to found a new relationship between scientific and technical experts and the labour movement. Indicative of this process of marginalisation was the fact that when the AScW put forward J.D. Bernal as a possible candidate for the SAC he was rejected by the TUC's General Council. The SAC's complement of scientist members was, however, enlarged to include Sir Robert Watson-Watt (a past president of the AScW), Winifred Raphael (a Fellow of the British Psychological Society) and L.H.C. Tippett (Head of the Mechanical Processing Division of the British Cotton Industries R.A.).[63]

The SAC itself suffered from a number of organisational

limitations which circumscribed its ability to intervene in policy formation by the TUC. The committee lacked any precisely defined terms of reference. In general its role was strictly advisory - for example - giving advice and assistance in the preparation of technical evidence for TUC submissions to Government Departments and Royal Commissions. It would have little authority to initiate action. This was in contrast to the more wide ranging brief given to the SAC as it was conceived in 1939. A later review of its work was to comment that:

> ...no specific functions were outlined, although several subjects suitable for the committee were suggested including: technical developments in particular industries such as plastics in engineering and prefabrication in building; and scientific or technical information relating to nationalisation proposals.[64]

The General Council's own view of its functions were reflected in its report to Congress in 1947:

> Its function is to advise on scientific matters that affect the work of the TUC. The Committee does not attempt to formulate policy, but where questions of policy arise it endeavours to lay before the General Council, for their decision, the scientific implications of the issues.[65]

The issues which the Committee was called upon to consider arose from a number of sources - motions remitted to it from the annual Congresses, topics suggested by members of the Committee and issues referred to it by the General Council.

The AScW was particularly active as a source of policy proposals. From its affiliation to the TUC in 1942 to 1956 the resolutions submitted to Congress by the AScW followed three main streams. The first theme loosely concerned the links between the

organisation of science and technology and economic issues: Use of Scientific and Technical Resources (1942), Atomic Energy (1946), Science and the Economic Crisis (1947) and Industrial Research (1953). In 1947 the Association also drew attention to the harmful effects of secrecy in science. A second theme concerned scientific and technological education with resolutions in 1943, 1948 and 1955. And a third theme concerned the military applications of science and particularly weapons of mass destruction. Resolutions in 1950 and 1955 called for initiatives to control atomic and nuclear weapons. Similarly in 1951 the AScW promoted a resolution advocating a new international agreement to prohibit the use of biological weapons.[66]

However, as I shall subsequently show, some of the proposals advocated by the AScW again reflected the pattern of communist politics in this period. And this created tension and conflict between the Association and the TUC.

In contrast there was a substantial area of agreement between the Association and the TUC, for example, on the need for a comprehensive and coordinated national policy for the fuel and power industries. There was a degree of cooperation between the SAC and the AScW's Science Policy Committee on this issue although with little effect in terms of influencing Government policy. Other issues raised within the SAC included scientific research and colonial development, the reform of the patent laws and various aspects of industrial research. Particular importance was attached by the General Council to increasing trade union representation on the governing bodies of the research associations. This was also a policy which had been advocated by the AScW.

But the General Council came to see science and technology policy as an addendum to industrial policy. The SAC eschewed any serious discussion of the AScW's proposals for a centralised national framework for directing scientific and technical research. To some extent the Association's advocacy of the planning of science had been compromised by its politics.

In the following sections I examine in more detail some of the science policy issues raised within the TUC and relate these again to the broader political context and the goals of the trade union movement.

3.2. Science and the Economic Crisis

An initial attempt to get the SAC and the TUC to address broad questions of policy can be seen in AScW's approach to the issue of the planning of science in the context of the economic crisis of 1947 and 1948. The AScW intended to mobilise a broadly based campaign - a key element of which was the attempt to win the support of the trade union movement through the TUC.[67] As I have shown above the policy response of the Association to the crisis was closely linked to that of the Communist Party with Bernal as the central linking figure.

The AScW resolution to the 1947 Congress, moved by Dr. N. Levy, stated:

> Congress asks the General Council to urge upon the Government to strengthen the organisation of Government science, to establish a Technical Planning Board with comparable status to the Economic Planning Board, and to release a proportion of the scientists at present employed on military research for work on the above problems.[68]

AScW argued that insufficient attention was being given to the organisation and planning of scientific work and a number of key problems ought to have priority. These included (i) increasing the efficiency of fuel utilisation; (ii) raising the technical efficiency of industry; (iii) coordination of industry to eliminate wastage of materials; (iv) development of new industrial techniques and materials. The continuance of a laissez-faire economic system was cited as a cause of the crisis and as an obstacle to its solution.[69]

The resolution was carried by Congress and subsequently referred by the General Council to the SAC. The Committee discussed the motion in January 1948 and again in May and November without taking any positive action. Further elaboration was requested from the Association which then submitted a memorandum on the wastage of materials.[70]

The SAC dismembered the motion into discrete components ignoring the general argument for giving some mechanism for the overall planning of science of equivalent status to economic planning. Equally the argument for substantially altering the balance between the resources devoted to military as opposed to civil research and development was by-passed. The Committee argued that various government measures already undertaken addressed the substantive problems of efficiency and the development of new techniques raised by the efficiency and the development of new techniques raised by the motion.[71] For example, the nationalisation programme, the passing of the Industrial Organisation and Development Act (1947) and the establishment of the Tizard Committee on Industrial Productivity, were cited. Similarly the need for a Technical Planning Board

having the same status as the Economic Planning Board was rejected as superfluous in the context of the establishment of the Advisory Council on Scientific Policy (ACSP). The setting up of the ACSP was deemed to have settled the debate about the government machinery for civil science policy.

The issue of the coordination of the fuel and power industries and the need to increase the efficiency of fuel utilisation was considered to be a topic more appropriately dealt with by the TUC's Fuel and Power Advisory Committee. A national policy for the fuel and power industries had been raised by Prof. D.M. Newitt at the first meeting of the SAC in March 1947 in which he had elaborated on some of the work already done by the AScW.[72] This had led to liaison with the Fuel and Power Advisory Committee and the production of a policy document, 'Notes on a National Fuel Policy', which had subsequently been submitted to the Minister of Fuel and Power, Emmanuel Shinwell.[73]

The AScW's failure to obtain determined action on proposals even when they had been endorsed by the Congress as a whole illustrated the buffering effect of the SAC on politically suspect policies. In the wake of the Margate Congress of 1948 Roy Innes, the General Secretary of the AScW, wrote to the SAC to ask what action had been taken on the section of the resolution which had urged the release to industry of a proportion of scientists engaged on military research.[74] A sub-committee of the AScW's Science Policy Committee had been actively studying the means of converting military to civil research. They had formulated some proposals stating that:

> There are three ways of transferring research from military to civil ends which might be effective: (a) The handing over of problems of civil interest to military research establishments; (b) The transfer, either temporary or permanent, of research personnel to civil research departments; (c) The winding up of a number of large development contracts given to industrial firms so as to release the research and development facilities of these firms for civil purposes.[75]

As a particular concrete example they suggested that:

> Chemical warfare sections might work on insecticides and fertilizers. It would be possible at Porton to find work on industrial microbiology for those who have been engaged for bacterial warfare and work on control of pests for those who have been concerned with the spreading of smokes and gases.[76]

However, the view of the SAC on the relative balance between civil and military research was that:

> ...this was only one aspect of the allocation of scarce resources and that in the present circumstances the most urgent need was for more scientists for all purposes, including civilian research.[77]

A similar frustration of the development of sharper policies was also evident in the evolving debate on atomic energy - an issue which dominated much of the discussions of the SAC in its early years.

3.3. Atomic Energy.

The debate around the national direction of atomic research and development, whether for civil or military purposes, reflected the attempt by AScW and a number of other left-wing unions [including the Chemical Workers Union (CWU) and the Electrical Trades Union (ETU)] to develop a more critical approach to Government policy by the TUC.[78] In view of the immediate post-war fuel crisis the need to achieve the peaceful exploitation of atomic energy was seen as of key importance to the national economy. The very first meeting of the newly reconstituted SAC was plunged into a discussion of atomic energy. This was partly inspired by resolution at the 1946 Congress promoted by AScW and the CWU. But it also reflected wider concerns within the public at large and the scientific community.[79] It had been one of the themes which had dominated the conference, Science and Human Welfare, in February 1946. The dropping of the atomic bombs in 1945 cast a long shadow over the socially progressive image of science.

The space for intervention on the question of atomic energy appeared to be wide. The Labour Government had made no formal statements of policy which indicated its direction. P.M.S. Blackett emerged again as a key figure occupying, as he did, a potentially influential role in the trade union movement and in the government's scientific advisory system.[80] He was a member of the TUC's SAC and the Labour Government's Advisory Committee on Atomic Energy (ACAE). In a memorandum written for the ACAE he had argued that Britain should announce its intention not to manufacture atomic bombs but to push ahead as rapidly as possible

with the necessary research and development towards the industrial use of atomic energy. This was a position which had strong support within the AScW and particularly within its Atomic Sciences Committee. Blackett argued that the shortage of fissile material and the shortage of qualified scientific manpower precluded the simultaneous development of civil and military applications.[81] Blackett's commitment to this policy and his advocacy of a policy of economic and political independence from the United States led to his exclusion from state advisory positions until the 1950s.

Blackett supported the CWU resolution at the 1946 Congress which sought to give priority to the civil use of atomic energy as vital to Britain's industrial future. The resolution urged the Government to renounce the use of atomic weapons and ensure that its civil application was the monopoly of the state. It aimed to establish the principle of the free exchange, internationally, of scientific information on atomic energy. The General Council was urged to examine the implications of the development of atomic energy for industrial development, for trade union organisation and for potential hazards to workers in the emergent atomic energy industry. The resolution also proposed the establishment of a permanent committee within the structure of the WFTU to determine the effects of the use of atomic energy on world industrial production.[82]

The resolution was remitted to the General Council which passed it over to the SAC for more detailed consideration before the TUC could adopt a definite policy. However, in the following year the CWU under Bob Edwards again returned to the issue with

a resolution which attacked the Government's attitude of secrecy. Edwards argued that secrecy would inevitably create problems for the representation of workers' interests. It might also prove an obstacle to scientists entering the atomic energy industry because of the restrictions on the normal patterns of publication of scientific information. This resolution was again remitted to the General Council for further consideration by the SAC.[83]

As the discussions within the SAC proceeded the Labour Government's policy also began to emerge in a fragmentary fashion. Three major areas of domestic concern emerged: (a) Government organisation for the control of atomic developments; (b) Priority for research into the industrial uses of atomic energy; (c) Impact on the health and safety of workers involved in the industry.

The international dimension was considered to be the preserve of the TUC's long established International Committee in spite of the obvious technical basis. This move, to some extent, circumscribed the ability of the SAC to examine the wider political implications. For example, a policy conference of the ETU passed a motion which protested against the attempt to monopolise the secrets of manufacture and development of atomic weapons in the interests of 'power politics'.[84] The motion was submitted to the General Council with a request that it should be forwarded to the WFTU. It was, however, side tracked into the International Committee where it was rejected.

3.3.1. Government Control

The passing of the Atomic Energy Act (1946) was the immediate focus of the SAC's discussions of the state

direction of research and development in atomic energy.[85] The Government's stated intention in the Act was not only to control development by the restriction of private research, manufacture and use of atomic energy, but also to encourage development in government research establishments by the provision of adequate funds and resources. The major structural change involved was the transfer of responsibility from the Department of Scientific and Industrial Research (DSIR) to the Ministry of Supply. The AScW and the CWU were at the forefront of criticisms of this emerging Government policy. The Act was criticised on four grounds:

(i) The Act did not provide sufficient government control as, for example, would be obtained through direct nationalisation.

(ii) The emphasis of the Act was permissive rather than obligatory.

(iii) The so called 'secrecy clause' (Clause IX) ran counter to the norms of the free flow of information in science.

(iv) The Act did not prescribe priority to the civil use of atomic energy.[86]

However, within the SAC, Blackett was not particularly critical of the Government's proposed arrangements:

> The Committee were advised by Professor Blackett that the Government's organisation for the promotion and control of atomic energy was generally satisfactory. The programme of development was limited by the acute shortage of scientists, and this would not be overcome in the near future.[87]

Blackett's general tone of approval proved influential in the SAC's response to the criticisms produced by the AScW and CWU. On the question of nationalisation the SAC's view was that the unions had overstated the weaknesses of the Act and had ignored the inevitability in the current circumstances of sub-contracting

to private firms.[88]

On the permissive character of the legislation the Committee argued that:

> To require the Minister to obtain information about all the materials, plant or processes which might be used for the manufacture, directly or indirectly of nuclear fuels, would be to burden him with an administrative task almost impossible to fulfil.[89]

The secrecy clause in the Act had empowered the Minister of Supply:

> ...to restrict the disclosure to unauthorised persons of information relating to plant, methods of operating or processes used in the production and disposal of atomic energy.[90]

Here the SAC evinced some sympathy with the critics of the Act and expressed reservations about the effect of such restriction of information on effective discussion of, for example, the economic impact of atomic energy. The secrecy clause was seen as a potential threat to the lines of communication between workers in the industry and their trade unions.

The SAC's position was that:

> ...work people should not be prevented from informing their union of any adverse effects on their health nor should the union, in protecting those work people be prevented from securing such information as may be relevant to their purpose.[91]

However, the most fundamental and politically sensitive criticism was that of the failure of the Labour Government to make an outright commitment to the civil application of

atomic energy in preference to the development of Britain's own atomic bomb.

3.3.2. Atomic Research Priorities

A means of strengthening the state's commitment to develop the civil use of atomic energy was considered to be by increased representation of the trade union movement at the advisory level. The SAC considered the composition and functions of the ACAE and argued that it would be desirable if the composition were reviewed by the Labour Government with a view to making provision for the inclusion of members representative of the fuel and power industries and the trade union movement itself. It was felt that such representation would tip the balance in favour of the industrial development of atomic energy. The early demise of the ACAE was a blow to this particular option and made access to decision making about atomic energy more difficult.[92]

The CWU and AScW resolutions had argued for a TUC policy which was committed to the priority of civil research and development. Blackett, from a largely technical point of view, had urged that such a decision concerning priority was unavoidable:

> ...atomic research and development for industrial purposes were, up to a certain stage, parallel, but after reaching this stage they diverged considerably, and the decision would have to be taken as to which should have priority.[93]

In the event the SAC's position on what TUC policy should be remained equivocal as political considerations increasingly

overshadowed its discussions. Bensted, for example, a General Council member, felt that he could not commit himself to urge priority for industrial applications since he saw that as a function of some international agreement within the framework of the United Nations. Jack Tanner, another General Council member with a left-wing background, felt that the British trade union movement should give a lead within the WFTU in pressing for the industrial development of atomic energy throughout the world. Prof. Newitt stated that the strengthening of the country's economic position through the civil development of atomic energy was an important military consideration in itself.[94]

A joint meeting in June 1947 was arranged between the SAC and the International Committee which had been looking at those aspects of the resolutions which related to the WFTU.[95] At this meeting Deakin, the right-wing head of the TGWU, effectively laid down the line which the TUC was to take. He argued that the General Council could not commit themselves at this stage due to the lack of information. And in the context of continuing international discussions on atomic weapons the Government could not be expected to take unilateral action. In view of the increasing sensitivity to the political character of the WFTU he argued it was not the time to set up a committee on atomic matters within that body.[96] Deakin was supported by Blackett who argued that no government could be expected to state in advance its full intentions on atomic developments either for military or

industrial uses. Similarly, he felt that the TUC should not be expected to assert itself decisively at this stage on the issue of research priorities.[97]

The outcome of the meeting was a report to the General Council that it was not appropriate to pronounce on the issue of research priorities at this stage. To resolve the issue it was decided to press the Government to receive a TUC deputation.

3.3.3. Hazards to Workers

Whilst it might have been expected that the potential hazards of radiation to workers in the atomic industry would have attracted the attention of the SAC, this was not the case. The issue had again been raised by both the AScW and the CWU. In letters to the Committee the unions had claimed that certain of their members engaged in the processing of atomic materials had suffered from a 'mysterious illness'. In addition secrecy regulations surrounding work on atomic energy was hindering the ability of the unions to effectively represent and protect their members' interests.[98] The AScW forwarded a draft of its pamphlet The Protection of Workers in Atomic Energy Plants, which had been prepared by their Atomic Sciences Committee, to the SAC.[99]

However, the SAC agreed to recommend to the General Council that the subject of the health of workers engaged in atomic energy projects would be more appropriately dealt with

by the Workman's Compensation and Factories Committee.[100] This points up again the problem of the fragmentation of scientific issues in the face of the existing bureaucratic structure of the TUC. The subject of hazards was, nevertheless, raised by the deputation which met the Prime Minister, Clement Attlee, in December 1947.[101]

3.3.4. The Meeting with the Prime Minister.

Attlee had agreed to meet a deputation on 22 December 1947 consisting of members of the General Council and the Scientific Advisory Committee. Attlee was accompanied by the Minister of Supply, George Strauss. The TUC had placed on the agenda atomic research priorities, the framework of government control (especially the composition and role of the ACAE) and the potential hazards to health in the atomic energy industry. The TUC delegation stressed the importance of civil development but conceded that the Government could not be expected to take unilateral action at a time when the control of atomic energy remained subject to discussions at the international level.[102]

Attlee gave assurances as to the Government's commitment to the civil application of atomic power. This was despite the fact that he had already taken the decision (in January 1947) that construction and production programmes were to be primarily directed to the requirements of developing Britain's own atomic bomb.[103] Similarly, he gave no intimation of the intention to abolish the ACAE.. The SAC was only informed

of this in January 1948.[104]

Attlee gave further assurances that there would be no interference with the 'legitimate' functions of trade unions in safeguarding the health of atomic energy workers.

Attlee's assurances in conjunction with the close relationship between the Labour Government and the TUC defused the pressure for any continuing critical appraisal of Government policy. Even with the dissolution of the ACEA in January 1948 on the dubious grounds that its role could now be assumed by the ACSP there was only mild concern from the TUC.[105]

The subsequent course of discussions within the SAC increasingly reflected an increasingly uncritical acceptance of the Government's policy. In response to the 1947 CWU resolution which had raised the issue of secrecy it noted that:

> The Committee could not accept the view that scientists and workers had been discouraged from accepting employment in atomic energy because of the 'concealment and secrecy which characterises the Government's attitude towards atomic research'....[106]

The charge of secrecy, particularly in the case of the major decision to go for Britain's own atomic bomb, has in retrospect been proven to have been correct.

The SAC were also of the view that:

> ...they would not be justified in pressing the Government, as requested by the resolution, for an immediate inquiry into the administration of atomic laboratories and factories and into the working conditions and health safeguards for work people employed on atomic energy projects.[107]

Similarly, the proposal to establish a committee within the framework of the WFTU was rejected in the context of the political divisions emerging within the international trade union movement. The meeting with Attlee had effectively defused the subject of atomic energy in relation to its domestic industrial utilisation.

But the Left was to raise the matter of atomic weapons and their international political implications as aspect of their opposition to the Western powers policy of rearmament.[108]

3.4. Weapons of Mass Destruction

A principal aspect of the pattern of communist politics inspired by the Cominform was the propagation of the idea of 'peace' in opposition to 'military preparations for war against the Soviet Union'.[109] Bernal, for example, whilst President of the AScW, had played a prominent role in the formation of the British Cultural Committee for Peace in 1948. This organisation was subsequently renamed the British Peace Committee in 1949.[110] In opposition to this trend the General Council at the Congress of 1950 denounced the British Peace Committee as a cynical fraud:

> The 'Peace Campaign' in demanding the banning of atomic bombs deliberately ignores the action of the Soviet Union in blocking proposals formulated on behalf of the U.N. to place under international control the raw materials, research and production equipment required for the peacful use of atomic energy and for adequate inspection to prevent the secret production of atomic weapons, along with the assurance of America's readiness to surrender the atom bomb to a world authority.111

In response the ETU had moved reference back of those sections of the General Council's report which had attacked the British Peace Committee and which had also expressed support for international action against 'communist aggression' in Korea:

> Our movement has learned from grim, sordid and painful experience that the root cause of war is capitalism, the 'dog eat dog' fight for markets, the profit motive, the exploitation of the many for the benefit of the few.[112]

This reference back, moved by W.C. Stevens of the ETU, was decisively rejected.

In these circumstances it is not surprising that the composite motion on atomic weapons moved by the National Union of Shop, Distributive and Allied Workers (USDAW) and the AScW should become the focus of a further clash between the left-wing and the General Council. The resolution called upon the General Council to press the Government to undertake a fresh initiative within the framework of the United Nations to re-open 'the question of international control and supervision of atomic energy production, the banning of atomic weapons and the destruction of all atom bomb stocks'.

Dr. P.W. Brian in supporting the resolution for the AScW attempted to present the issue in an apolitical way by concen-

trating on the technical aspects of the international control of atomic energy and weapons production and by describing the effects of the atomic bombs on the populations of Hiroshima and Nagasaki.[113] This approach was also evident in the AScW's recent pamphlet, Atomic Attack: Can Britain be defended?, which had claimed to be an attempt to provide an:

> ...objective analysis of the probable role of atomic weapons, an analysis which should be based solely on the considerable accumulation of scientific fact and military experience which are now available.[114]

The implication was that the Government had failed to provide such an analysis and the pamphlet went on to describe the character of atomic warfare and to debunk the notion of the possibility of effective civil defence:

> One can only conclude that the population of a small, highly industrialised country such as Britain cannot successfully be defended against an attack of such magnitude.[115]

This message was driven home by an editorial in the Scientific Worker timed to coincide with the 1950 Congress which further cast doubt on the Government's policy on civil defence.[116]

The AScW's interventions on these matters once again exposed it to the charge of providing a platform for communist propaganda. Deakin's reply to the debate for the General Council reflected the depth of anti-communist sentiment which had been generated by the Cold War:

> The General Council are satisfied that signatures to a treaty to ban the production and use of the atomic bomb will not be worth the paper on which they are written without a bona fida acceptance beforehand of an adequate system of control, supervision and inspection.[117]

He concluded his speech:

> I say you have a duty to do, to take a stand against the attempts of Red fascism to dominate and dictate, to subject the world to the foul and filthy philosophy of communism.[118]

The USDAW and AScW motion was lost by the large margin of 3,629,000 votes.

The AScW was to clash again with the General Council on the basis of politics over its resolution on bacteriological warfare moved at the 1952 Congress.

In 1950 the AScW's Science Policy Committee had received a letter from a Dr. Sevitt of Birmingham Accident Hospital urging the Association to raise the question of bacteriological warfare in parliament and with the Director of the Microbiological Research Station, Porton Down. Major Vernon, the AScW's representative on the Parliamentary and Scientific Committee, stated that the answer would be that information could not be divulged in the public interest.[119] Nevertheless, a sub-committee was established to examine the subject and approaches were made to Porton Down. The Director, Dr. Henderson, replied asking the purpose of AScW in making such a 'naive request'.[120]

In the meantime the issue of chemical and biological warfare had, through the Korean War, become an important political issue. The British Communist Party had given 'credance and wide publicity to the atrocity stories about the conduct of allied forces, and equally the charge that germ warfare had been employed by the American airforce'.[121] A resolution to the AScW's Council meeting

in May 1952 drew attention to the reports of the use of biological warfare by UN troops.[122]

In the context of this growing concern the Association submitted a resolution to the TUC's Margate conference in September 1952. The resolution stated that:

> This Congress is opposed to the use of bacteriological weapons and urges HM Government through the United Nations Organisation to secure a new international agreement prohibiting their use.[123]

Dr. P.W. Brian in moving the resolution spoke of the moral objections to the use of such weapons and also of the waste of scientific manpower involved in their production. Brian stated that 'we feel as scientists that such a thing is a negation of science and of social progress and of humanity, and we would like to see it put a stop to'.[124] Brian urged the need for an international declaration along the lines of the Geneva Protocol against the use of chemical and biological weapons organised by the League of Nations in 1925. The Association in its previous incarnation as the National Union of Scientific Workers had similarly campaigned in the 1920s against such weapons and had supported the Geneva Protocol.[125]

The response of the General Council to AScW's resolution was one of hostility. Sir Vincent Tewson, the General Secretary of the TUC, in an impassioned outburst declared:

> I say without any fear of contradiction that if there had not been a spate of propaganda on germ warfare in Korea in the last few months that resolution would not have been on the Agenda, and every delegate in this Congress knows it.[126]

Brian defended his position by referring to the fact that the AScW's concern over bacteriological warfare pre-dated the recent controversy. And in spite of the opposition from the General Council the resolution was carried by the narrow margin of 269,000 votes.

It was, therefore, a measure of the extent to which the AScW had regained some legitimacy within the TUC that its resolution on weapons of mass destruction at the 1954 Congress received the backing of the General Council. The polarisation of the Cold War period had to a degree given way to the growing national and international concern with the accelerating pace of the arms race.[127] This had been emphasised by the development of the so called 'super-bomb' - the hydrogen bomb. The Association's resolution called for the organisation of a five power conference to secure the abolition of atomic and hydrogen weapons, agreed yearly reductions in arms expenditure and the speeding up of the development of atomic energy for peaceful purposes.[128]

The resolution was moved by the distinguished physicist Prof. C.F. Powell. The resolution urged the British Government:

> ...to speed up research and investigation into the possible development of atomic energy as a source of power to meet industrial and social needs and for the purpose of the fullest utilisation of radioactive materials for industrial, medical and other social uses.[129]

Powell's presence at the Congress was indicative of the wider initiative being undertaken by the WFScW on the international control of atomic and nuclear weapons.

Powell paid particular attention to the implications of the development of the hydrogen bomb:

> An atomic bomb is roughly equivalent in destructive power to one of the thousand-bomber raids made during the last war. A hydrogen bomb is equivalent to several hundred such raids. The hydrogen bomb goes right outside conventional military thinking.[130]

The possession of such weapons by both of the major powers in sufficient numbers meant that there could be no means of defence. The proliferation of the possession of hydrogen bombs by other states would increase the difficulties of reaching a settlement and the dangers of political accidents and miscalculations. The survival of civilisation depended on agreements between the great powers to limit conventional armaments and to outlaw atomic weapons and other weapons of mass destruction under a mutually agreed system of inspection and control. He urged that Britain should take a leading role in setting up an effective system of controls.

He also stressed the drain on the world's resources of a continuing acceleration of the arms race and the positive benefits of the peaceful application of atomic energy:

> Only five such bombs would provide the energy which today costs us the labour of all the miners of this country for one year; they would allow us to bring the miners up out of the pits into the sunshine.[131]

The resolution was passed without opposition.

It was discussed at the General Council's meeting of November 1954 where it was decided to submit it to the Foreign

Secretary:

> ...stressing the unwavering support of the British Trade Union Movement for the solution of the problems dealt with in the Resolution within the framework of the United Nations and welcoming the establishment of an agency which included functions of inspection and control and which could concentrate on the development of atomic energy for peaceful purposes.[132]

Eden replied that the Government aimed to secure the abolition of the use, possession and manufacture of all weapons of mass destruction within a system which would also include provisions for simultaneous and major reductions in conventional armaments and armed forces and for the establishment of machinery for supervision and enforcement. Such proposals were currently under discussion within the United National Disarmament Commission.

However, the Defence White Paper of March 1955 announced the decision to manufacture a British hydrogen bomb. Sked and Cook have commented:

> The decision to manufacture had been taken in fact as early as 1952, but having admired the way in which Attlee had tricked parliament over the A-Bomb, the Conservatives were happy to trick it once more over the H-Bomb.[133]

3.5. Industrial Research

Of prime importance to the TUC was the impact of scientific and technological development on industry as this was felt to have the most immediate effect on its membership. The Scientific Advisory Committee, therefore, became involved in discussions on a number of topics related to industrial research. These included

the relationship of trade unions to industrial research associations, the effects of industrial secrecy on the efficiency of research and improvement of productivity. The AScW's concerns in this area related primarily to the issue of the conflict between the professional norms of science and commercial imperatives in research and development. The SAC and the AScW also made a contribution to the development of TUC policy on the fuel and power industries following nationalisation.

3.5.1. Secrecy in Science

For the scientific Left 'secrecy in science' was symptomatic of the militarisation of science and the continued dominance of capitalist economic interests in the post-war period.[134] It was argued that the maintenance of industrial secrecy in the interests of private or monopoly profits disrupted the normal flows of information necessary for scientific advance and was an important obstacle to industrial innovation. This aspect of the 'frustration of science' had been observed in the 1930s and Bernal had remarked in The Social Function of Science that:

> Two factors weigh heavily against the effectiveness of scientific research in industry. One is the general atmosphere of secrecy in which it is carried out, the other the lack of freedom of the individual research worker.[135]

The AScW in a survey of industrial research laboratories in the late 1930s and cited by Bernal had provided special examples of the effects of secrecy. The experience of the wartime pooling of information by industry had provided the

alternative model.

And thus the theme was taken up again in AScW's Science and the Nation where it was argued that:

> There is a danger that large amounts of scientific knowledge are being acquired and developed in secrecy by private industry, which makes every use of the knowledge freely published in the scientific literature and to the acquisition of which society as a whole has therefore contributed. Yet these bodies of unpublished knowledge existing in industry are owned as private property by private industry; only a small proportion of this knowledge is published... Thus one major problem which must be solved to permit the best utilisation of research in the post-war world is to break down the barriers which separate industrial science from the main body of science.[136]

In pursuit of this objective the AScW moved a resolution at the 1947 Congress which asked the General Council to campaign for:

> ...the freest publication of the results of scientific research and urge the Government to use its powers under the Industrial Organisation and Development Act, 1947.[137]

The resolution was remitted to the General Council which referred it to the SAC for its advice. The initial response of the Committee was to argue that the Act did not contain any powers for the compulsory publication of the results of scientific research.[138] The Executive Committee of the AScW replied with a memorandum, 'Secrecy in Industrial Science', which amplified the arguments for government intervention.

It argued that secrecy inhibited industrial innovation in three principal ways. Firstly, secrecy of research in competing firms led to the duplication of research effort and

hence a wastage of scientific resources. Secondly, advances in one field often provided solutions to problems in related fields and this process could be disrupted by failure to publish research. Finally, the failure to disseminate research results detracted from the general process of the cumulative advance of scientific knowledge. The AScW also continued to maintain that the Act could be used to compel firms to publish research.[139]

The SAC remained opposed to pressing the issue:

> ...any attempt by the Government to compel private firms to disclose research results would, in the first place, be impracticable since the authorities might often be unaware of scientific discoveries and would, in the second place, discourage enterprising firms from carrying on research.[140]

However, the SAC supported the general principle of making research results more available by voluntary means. And a letter to this effect was sent to the Lord President of the Council, Morrison, along with the suggestion by the AScW that income tax relief for scientific research should be made conditional on the carrying out of a policy of publication. He replied that 'little would be gained from compelling the more backward firms to disseminate the results of what little research they did'. In addition the more progressive firms already had a 'liberal policy' towards publication. He expressed his agreement with a suggestion from the SAC that:

> ...nationalised industries should, subject to the need for protection against foreign competition set a high standard in publication of research results and added that he had asked the Board of Trade to review the wartime scheme for pooling scientific information and that he would inform the committee of the inquiry.[141]

The SAC suggested to the Lord President that the Government should keep under constant review the need for increasing the general availability of the results of industrial research. The SAC's discussions were further stimulated by the Committee on Industrial Productivity's report, Publication of Results in Industrial Research. This identified a number of factors in the withholding of information including conservatism, restrictive agreements and fear of competition. But concluded that firms were generally progressive in their attitudes to publication. The SAC was critical of this conclusion and argued that there was scant evidence in the report to support it. In addition the AScW had not been consulted in its preparation.[142]

The case of the debate over secrecy in industrial research illustrates the way in which the AScW was able to use the platform of the TUC to raise issues at a governmental level. However, with the SAC mediating this process there was little prospect of the Association being able to deploy the full force of its arguments. In the end whether or not that greatly mattered in the light of the fundamentally different perspective informing the AScW's policies as distinct from that of the Labour Party, is open to question. The AScW's critique of industrial research was similar to that of the Communist Party in its emphasis on the 'frustration' of research being an inherently capitalist phenomenon.

3.5.2. National Fuel and Power Policy

This was one area where the AScW and the TUC shared similar views with the result that it provided the opportunity for a degree of cooperation in policy formation. The shared perspective arose from the general agreement within the labour and trade union movement on the need for the social ownership and control of the fuel and power industries. The nationalisation of these industries and the post-war fuel crisis provided the background against which the SAC's discussions took place. The TUC's Fuel and Power Advisory Committee was the principal forum for trade union policy on the future of the coal, gas and electricity industries. The SAC (and the AScW) had a more marginal role dealing with specifically scientific and technical issues.

The AScW's Fuel and Power Advisory Committee had produced detailed proposals for a scientific and technical service for the fuel and power industries predicated on the planning of the industries as a whole. The Committee had concluded:

> The keystone of the recommendations is the establishment of an integrated scientific and technical service for the whole of the Fuel and Power industries organised in such a manner as to provide services required by the Ministry of Fuel and Power, the National Coal Board (and similar authorities which may be established later), and the present Research and Development Units and any such future agencies.[143]

The proposals gave evidence of the AScW's dual commitment to the planning of scientific and technical innovation and to

the more widespread application of scientific methods (such as operational research) in administration.

In Blackett's opinion the Ministry of Fuel and Power had an inadequate scientific and technical staff to deal with the immense problem of coordinating the separate fuel and power industries.[144] As a result of Blackett's and Newitt's involvement the SAC submitted a memorandum, 'Notes on National Fuel Policy' to the TUC's Fuel and Power Advisory Committee. This incorporated some of the ideas advanced by the AScW on the machinery of coordination needed by the Ministry. In addition it dealt with consumer choice, restrictive legislation on the gas industry (which was still to be nationalised), smoke abatement, the regional control of the fuel and power industries and the use of fuel oil.[145]

The memorandum was submitted to the Minister of Fuel and Power, Shinwell, with a request for a meeting. While in agreement with the general thrust of the proposals, Shinwell felt that it would not be possible to implement a comprehensive national policy until the gas industry was nationalised.[146] In these circumstances he did not feel it was worthwhile having a meeting. However, as a result of the severe fuel shortages of the winter of 1947 to 1948, Shinwell was replaced as Minister by Hugh Gaitskell.[147]

Gaitskell agreed to see a TUC delegation on 22nd January 1948 which included Prof. Newitt as a representative of the SAC.[148] The case argued by the AScW and the SAC for greater

coordination particularly of scientific and technical advice was recognised to a limited degree by the appointment of Chief Scientist to the Ministry and a Scientific Advisory Council.[149] The impact of the TUC on the overall development of these industries was greatly limited by the form of nationalisation implemented by the Labour Government. As Sked and Cook have argued:

> ...nationalisation signified no new beginning for labour. No transformation of its relationship with capital occurred. In practice all that happened was that the state bought out the former owners and allowed the former management to remain. Labour was accorded no greater say in industrial decision-making, and since it shared in no profits it gained no economic benefit either.[150]

In the creation of separate boards for the Coal, Gas and Electricity industries the Labour Government eschewed the creation of a centralised mechanism for planning the industries but also lost the opportunity to provide effective trade union participation. The AScW had warned of these tendencies early in the life of the post-war Labour Government:

> A word of warning is necessary however on the form of nationalisation which is being adopted by the present Labour Government, based on a study of the first year's legislation in this field. Two major weaknesses emerge. The first is the extremely heavy compensation which is to be paid which will act as an economic burden on the nationalised industries for many years. The second is the composition of the Boards appointed to run the industries. Up to the present, they are dominated by precisely those interests whose control nationalisation is intended to supersede. The Trade Union and technical representation which could contribute best by virtue of its working knowledge of the productive side of the industry is in the small minority.[151]

These problems re-emerged in 1951 when the Minister of Fuel and Power in the new Tory Government established a Departmental Committee on National Fuel Policy under Viscount Ridley. Its terms of reference were:

> In view of the growing demands for all forms of fuel and power arising from full employment and the rearmament programme, to consider whether any further steps can be taken to promote the best use of our fuel and power resources having regard to present and prospective requirements and in the light of technical developments.[152]

The TUC made an extensive submission to the Committee in support of a comprehensive and coordinated national fuel policy but with little effect on the final outcome of the inquiry.

The TUC's Research Department had asked the AScW for help in the preparation of evidence and the Association had re-established its Fuel and Power committee after a period of dormancy. This was chaired by R.G. Forrester and had the aim of examining the TUC's existing policy and updating AScW's own policy.[153] Forrester presented the draft of a revised policy statement which noted that the Ministry of Fuel and Power Act (1945) charged the Minister with the general duty of 'securing the effective and coordinated development of coal, petroleum and other minerals and sources of fuel and power...and of promoting economy and efficiency in the supply, distribution and use and consumption of fuel and power'. The document argued that there was little evidence of coordination in the exercise of the Minister's powers and the requirement on the nationalised industries to make a profit had led to competition.

After reviewing the organisation of the industries it identified the key problems as those of coordination, of providing incentives for conservation measures and of improving efficiency. It laid stress on the need to develop atomic energy but thought it unlikely that it would make a significant contribution to power production for about thirty years.[154]

The AScW's policy document was very similar to the TUC's evidence to the Ridley Committee which had ranged over the need for a national policy, methods of expansion of supply, the better utilisation of fuel and power, fuel saving in industry and domestic fuel saving. On atomic energy the TUC had stated:

> Partly because of the general secrecy surrounding the development of atomic energy in any form and partly because of the necessarily slow progress in harnessing it, very little is known of its potential as industrial power. The Advisory Council on Scientific Policy have suggested in their Third Report (1950-51) that it will be a generation before the large scale development of atomic powered generating plant will be an economic proposition. We realise that research is being concentrated on the use of atomic energy for military purposes, but we would urge the importance of pressing on as rapidly as possible with investigation of its civilian and industrial use.[155]

In conclusion the TUC stated:

> ...we would re-emphasise that a coordinated fuel and power policy was for the TUC one of the major objectives of public ownership in this complex of industries. Nearly three years have elapsed since the gas industry passed into public ownership and five years since coal was nationalised, but there are no signs of such a coordinated policy. It may be urged that so far the nationalised industries have been concerned primarily with the problems of transition, but the way transitional problems are solved - particularly where they

> involve capital investment - will materially affect the shape of the future policy of these industries. All these factors make it imperative that their individual problems should be recognised as aspects of the wider - and more involved - problem of fuel and power as a whole.[156]

The AScW's Fuel and Power Sub-committee endorsed the TUC's policy and Bronowski (a member of the committee as well as being head of the NCB's research department) suggested that the Association should send a resolution to that effect to the 1952 Congress. The idea of a National Fuel and Power Council consisting of the heads of all the relevant nationalised industries was particularly welcomed as a step towards more effective planning. However, the Executive Committee rejected the idea of a resolution in favour of simply raising the matter on the General Council's report.[157] In the meantime, however, the Ridley Committee's report appeared which ignored the proposals of the TUC.[158] Despite this setback both the AScW and the TUC took up these issues again in the late 1950s and early 1960s in the context of the science policy debate within the Labour Party.[159]

3.5.3. Industrial Research Associations.

In the absence of any profound transformation of the relationship between the trade union movement and the process of economic decision making, the TUC continued to seek means of representation and consultation. In the field of civil research policy the TUC accepted the established framework of relationships between private industry and government.

This was evident in the TUC's support for the philosophy of cooperative research through the medium of the research associations (RAs). Whilst accepting the existing institutional framework the TUC sought to extend its influence by gaining representation on the governing bodies of RAs. However, the acceptance of existing structures entailed also an acceptance of the limitations which those structures imposed in terms of state intervention and the direction of civil research.[160]

The initiative for trade union representation in industrial research had arisen from a suggestion from the Lord President of the Council in 1948 to the TUC. Morrison suggested that the TUC might wish to review the relationship of trade unions to the governing bodies of industrial RAs.[161] The SAC had invited C.A. Spencer, who was responsible for RA affairs at the DSIR, to outline the nature of their work. Spencer had raised a number of problems for TUC affiliated unions in getting representation arising from the reluctance to co-opt and the traditional autonomy of the RAs from the DSIR.[162]

The SAC recognised the importance of trade union representation on the governing bodies of the RAs as means of gaining advanced information of changes in production technology. This would enable unions to prepare for 'necessary adjustments' and 'avoid suspicion of new methods'. In addition representation would be a means of advancing the experience and expertise of the shopfloor. The SAC's

approach involved seeking the assistance of the DSIR in influencing RAs to accede to trade union requests for representation and to stimulate interest amongst affiliated trade unions.[163]

The SAC in a series of letters to the Lord President pointed out the problems arising from the RAs' articles of association which precluded trade union affiliation.[164] At the same time a review of existing trade union representation on RA governing bodies was conducted and the views of unions were sought on the benefits of such involvement.[165] Of a total of 38 RAs in 1948, unions had some kind of representation in only 8 cases. The main method of involvement was in fact through co-option. The unions in some cases had representation on specific sub-committees. For example the Boot RA had union representatives on its Scientific Committee. No clear picture emerged, however, of the specific benefits to be derived from representation. Typical of trade union responses was that of the National Society of Pottery Workers:

> The sole function of the TU representative appears to be to give the possible reactions of workers to any new or improved method of manufacture, i.e. to indicate whether certain scientific devices would be acceptable to the workers and to suggest any modification... Any benefits comprise the prior knowledge of probable changes in the industry.[166]

Representation tended to be seen as defensive rather than as a positive channel for influencing the course of process or product innovation. The advantages to industry tended to be seen as coming from the advice and recommendations made by

trade union members in the light of their grasp of workers' attitudes to scientific and technical change.

The SAC and the General Council's view was that representation would best be achieved through individual negotiation between unions and their respective RAs. By the time of a second review of the matter in 1950 only one other RA (the British Baking Industry RA) had co-opted a trade unionist on to its governing body although two other unions were in the process of approaching RAs for representation.[167] In early 1951 the issue of trade union representation was taken on by the TUC's newly formed Production Committee which raised the subject with the DSIR again.[168] The DSIR had in fact already circulated the RAs suggesting that they consider inviting appropriate trade unions to nominate representatives to their governing bodies.

The TUC's General Council continued to consider trade union participation in this area as an important issue and the SAC was encouraged to pursue the issue again in 1954.[169] The General Council's broader objective was to smooth the path of technical change by allaying the fears of workers and avoiding potential resistance to innovation as part of a strategy of support for the modernisation of the economy in the interests of general prosperity. In a later chapter I will develop this theme of the TUC's attitude to industrial research and in particular the growth of its close relationship with the DSIR.[170]

4. Conclusion

The TUC's Scientific Advisory Committee owed its post-war revival to the growth of a left-wing scientists' movement committed to forging links between science and labour. However, under the political conditions created by the Cold War the Committee moved away from the organisation and objectives of that movement. The AScW even though a TUC affiliated union failed to integrate its particular perspective on the social relations of science with the mainstream of TUC social and economic policy. This was evident, for example, in AScW's campaign on the theme of 'science and the economic crisis'.

The political divisions within the TUC were heightened by the Cold War and AScW's identification with predominantly left-wing policies proved a major obstacle to the extension of its influence. The TUC's policies on scientific and technical issues were subordinate to its economic objectives and the policies of maintaining and developing its consultative relationship with state institutions which had been an important consequence of its involvement in the war effort. In addition in the period of the post-war Labour Government TUC policy was closely allied to that of the Government. The presence of a strong communist influence in the leadership of the AScW alienated it from the centres of power within the labour movement and circumscribed its ability to deploy its technical expertise in the interests of the movement.

I have also shown that the purely advisory nature of the SAC and its relatively small membership of practising scientists were also important limiting factors. With the increasing tensions of

the Cold War there was a corresponding decline in the activity and frequency of meetings of the SAC. The Committee met five times in 1947, four times in 1948, twice in 1949 and once only in 1950, 1951 and 1952. It failed to meet at all in 1953 which prompted a review of its work and its composition. The review noted that:

> The panel of specialists available for consultation but not on the committee has not been used and the agenda has tended to centre on the spread of interests of the scientific members of the committee, with the addition of some general questions such as secrecy in science...[171]

The review argued, however, that the Committee had done some useful work with concrete results in some instances such as on fuel and power policy. It also suggested that little use had been made of the Committee in the post-war period because:

> ...many of the problems with which it can be concerned are not of immediate urgency, because of their general long-range nature, and because when they do become questions of policy they are usually handled by other committees. Although the implications for the Trade Union Movement of scientific developments are not always obvious, there are both fundamental and immediate questions of science and technology on which the General Council needs informed advice from some quarter.[172]

Thus despite the criticisms made of the SAC the General Council supported its continued existence. The Committee should have a twofold function. Firstly, to assist the General Council in using the weight of the TUC in bringing pressure for the quicker application of scientific advances in industry. Secondly, the Committee could be useful in informing the General Council of potential developments resulting from the impact of science on

industry which would be likely to concern the trade union movement in the future. The emphasis on the relationship of science to industry was signalled by the transfer of the SAC from the remit of the TUC's Research Department to that of the Production Committee.

As the TUC's official history records:

> To the TUC 'productivity' was not such a simple matter...For them it involved an examination in depth of many questions such as investment, scientific research, supply of manpower, regional development, economic policy, wage payment systems and payment by results, the use of management techniques and productivity bargaining. The development of Production policies by the TUC was furthered by the setting up of the TUC Production Committee and Department in 1950, at a time when far-reaching changes in technology and management practice were beginning to take place.[173]

The kind of problems which the SAC should turn its attention to were indicated as the electronic control of industrial processes, the application of atomic energy to industry, the recent developments in industrial psychology and the social sciences, and air pollution in relation to the efficient use of fuel. Other subjects included productivity measurement, the amount of Government money devoted to research and higher technological education.

The scientist members of the SAC (P.M.S. Blackett, D.M. Newitt, L.H.C. Tippett and Winifred Raphael) and the General Council members agreed that the initiative in bringing questions before the SAC should in the main come from the General Council.[174] The outcome of the review thus retained the SAC in essentially the same form but with a greater emphasis on science and production. In chapter 5 I return to the subsequent role of the SAC in the TUC's development of science and technology policy.

Chapter 2

1. 'Science and the TUC', AScW Journal 2 (September 1956), p.2.

2. G. Werskey, The Visible College : A Collective Biography of British Scientists and Socialists of the 1930s (London, Allen Lane, 1978), p.244.

3. P. Collins, 'The British Association a Public Apologist for Science, 1919-1946', in R.MacLeod and P. Collins, editors, The Parliament of Science (Northwood : Science Review, 1981), p.212.

4. British Association for the Advancement of Science, Report of the Annual Meeting Cambridge (1938), pp.xx-xxi.

5. L. Birch editor, The History of the TUC 1868-1968 : A Pictorial Survey of a Social Revolution (London : TUC, 1968), p.85. The broader context of the TUC's attempt to rebuild its 'external authority' is discussed in, R.M. Martin, TUC : The Growth of a Pressure Group 1868-1976 (Oxford : Clarendon Press, 1980), pp.205-243.

6. Collins, 'The British Association a Public Apologist for Science', p.225.

7. J.D. Bernal, The Social Function of Science (London : George Routledge, p.398.

8. Collins, 'The British Association a Public Apologist for Science', p.212.

9. H.G. Wells quoted in W.H.G. Armytyge, Sir Richard Gregory His Life and Work (London : Macmillan, 1957), p.138.

10. Armytage, Sir Richard Gregory, pp.138-39.

11. T.L. Humberstone, editor, Science and Labour : Being the Principal Addresses at the Conference on Science and Labour held in London on 30 and 31 May 1924 (London : Ernest Benn, 1924).

12. Armytyge, Sir Richard Gregory, p.88

13. Gregory's father, John Gregory, had been a formative influence on the young Ernest Bevin, as an active socialist and member of the Bristol Trades Council. See Armytage, Sir Richard Gregory, pp.198-199 and also Alan Bullock, The Life and Times of Ernest Bevin, Vol.I Trade Union Leader 1881-1940 (London : Heinemann, 1960).

14. 'Trades Union Congress and Science', Nature 142 (11 September 1937), pp.457-58. See also Trades Union Congress, Annual Report, 1937, pp.69-77.

15. Bevin was a member of the Industrial Health Research Board of the Medical Research Council. See Bullock, The Life and Times of Ernest Bevin, Vol.I, pp.602-3.

16. A campaign for trade union representation on the governing bodies of industrial research associations was initiated by the Scientific Advisory Committee in the 1940s. For further details of this matter see below section 3.5.3.

17. Armytage, Sir Richard Gregory, p.141.

18. Ibid., pp.141-144.

19. Collins, 'The British Association a Public Apologist for Science, p.223.

20. Trades Union Congress, Scientific Advisory Committee minutes, 'Report of an Informal Meeting of Certain Members of the Scientific Advisory Committee, held at Transport House, Tuesday 13 June 1939'. TUC Files, Congress House.

21. Trades Union Congress. Scientific Advisory Committee minutes, 'Memorandum for Submission to the First Meeting (1938-39) of the Scientific Advisory Committee, to be held at Transport House, 20 July 1939', pp.2-3.

22. Ibid., pp.3-4.

23. Trades Union Congress, 'Report of an Informal Meeting of Certain Members of the Scientific Advisory Committee, 13 June 1939', p.2.

24. Trades Union Congress, Scientific Advisory Committee minutes, 20 July 1939.

25. Ibid., p.3.

26. Association of Scientific Workers, Executive Committee minutes, 6 June 1940. AScW Archives, Modern Records Centre, University of Warwick. ASW/1/2/1-38.

27. Bernal, The Social Function of Science, p.308.

28. 'The annual reports of the TUC General Council begin to read like the records of some special government department responsible for coordinating policy in the social and industrial spheres'. H. Pelling, A History of British Trade Unionism (Harmondsworth, Middlesex : Penguin, 1969), p.215.

29. Birch, The History of the TUC 1868-1968, pp.120-121.

30. Ibid., p.130.

31. Pelling, A History of British Trade Unionism, p.218.

32. W. McGucken, 'Central Organisations of Scientific Advice in the United Kingdom during the Second World War', Minerva XVII (1979), pp.33-69.

33. 'Perspective', Scientific Worker (July 1942), p.30.

34. Trades Union Congress, Annual Report, 1943, pp.101-2.

35. Ibid., p.102.

36. Martin, TUC : The Growth of a Pressure Group, p.336.

37. Association of Scientific Workers, Trade Union Work Today, (London : AScW, 1943), p.5.

38. Blackett subsequently wrote that 'I personally am proud to have been the first professional scientist to be a delegate to the Annual Trades Union Congress'. See 'The Development of the Association of Scientific Workers', 1948, (Typescript of a brief history of AScW and of its relationship to the Trades Union Congress), p.3, Blackett Papers, The Royal Society Library, E23.

39. P.M.S. Blackett, 'Reflections on the Trades Union Congress 1944', (Typescript), Blackett Papers, E12.

40. Trades Union Congress, 'Interim Report on Post-War Reconstruction', Annual Report, 1944, Appendix D, pp.393-444.

41. P.M.S. Blackett, N. Levy and T. Ainley, TUC 1944, (London : AScW, 1945), p.9.

42. P.M.S. Blackett, N. Levy, T. Ainley and W.G. Oliver, Trades Union Congress Blackpool September 1945. Delegates Report (London : AScW, 1945), p.6.

43. Trades Union Congress, Annual Report, 1945, p.389.

44. Ibid., p.390.

45. Manuscript draft of Blackett's presidential address to the Council of AScW, June 1945, Blackett Papers, E15.

46. Association of Scientific Workers, Social Relations Committee meeting, M123/44, 20 July 1944, AScW Archives ASW/1/4/1.

47. Trades Union Congress, Annual Report, 1945, pp.402-3.

48. Ibid., p.403.

49. Ibid.

50. Ibid., p.404.

51. Ibid.

52. Herbert Morrison,'Science and Us', in W.E. Dick and I.B.N. Evans, editors, Science and Human Welfare : The Proceedings of a Conference held in London on 15-17 February, 1946, (London : Temple Fortune Press, 1946), p.5.

53. G.W. Thomson, 'Science and the Labour Movement', in Dick and Evans, Science and Human Welfare, p.8. Thomson had been secretary of a Labour Party Scientific Advisory Committee in the 1920s.

54. Trades Union Congress, Scientific Advisory Committee minutes, 'Notes on the Composition and Work of the Scientific Advisory Committee', 3 February 1954.

55. D.M. Newitt (1894-1980) gained a Ph.D in chemical engineering, externally, from the University of London in 1924 and subsequently played an important role in the creation of chemical engineering as a scientific discipline. He was a founder member of the British Institution of Chemical Engineers and was appointed as the First Courtaulds Professor of Chemical Engineering. In addition to his membership of the TUC's Scientific Advisory Committee he was a member of a number of government advisory bodies. He was a member of the committee set up to examine the structure of the gas industry prior to its nationalisation, a member of the Scientific Advisory Committee to the Ministry of Fuel and Power and Chairman of the Water Pollution Board. He was a member of the TUC's SAC throughout its existence from 1947-1971. Schilling remained on the committee only briefly but was later involved in the establishment in the TUC's Centenary Institute for Occupational Health.

56. Werskey, The Visible College, p.276.

57. Pelling, A History of British Trade Unionism, p.221.

58. Ibid., p.225.

59. T.H. Handy, 'British Communist Party Propaganda on Domestic Affairs', (Ph.D. dissertation, University of Texas, 1979), p.278.

60. Trades Union Congress, Annual Report, 1949, p.275.

61. Birch, The History of the TUC 1868-1968, pp.128-129.

62. For further details of this issue see chapter 3 section 3.3. below.

63. Trades Union Congress, Scientific Advisory Committee minutes, 12 April 1948 and Association of Scientific Workers, 'Suggestions for scientist members of the Scientific Advisory Committee of the Trades Union Congress', G48/48 11 March 1948.
Winifred Raphael had been an active member of the Psychology Section of the AScW. She worked in the field of Industrial Psychology and was for many years on the staff of the National

63 contd. Institute of Industrial Psychology. She died in 1979. L.H.C. Tippett was accepted on to the TUC's SAC because of his pioneering work on studying production and efficiency problems in the cotton industry. He had been in close touch with the cotton unions and with the AScW.

64. Trades Union Congress, Scientific Advisory Committee minutes, 'Notes on the Composition and Work of the Scientific Advisory Committee', 3 February 1954, p.2.

65. Trades Union Congress, Annual Report, 1947, p.285.

66. 'Science and the TUC', AScW Journal 2 (September 1956), pp.2-3.

67. This matter is dealt with in more detail in chapter 1 section 2.2. above.

68. Trades Union Congress, Annual Report, 1947.

69. J.D. Bernal, 'The Association and the Crisis', Scientific Worker 2 (October 1947), pp.3-6.

70. 'Wastage of Materials. An AScW Memorandum for the TUC', Scientific Worker 3 (October 1948), pp.17-19.

71. Trades Union Congress, Scientific Advisory Committee minutes, 10 May 1948, p.17. See also Trades Union Congress, Annual Report 1948, p.284.

72. Trades Union Congress, Scientific Advisory Committee minutes, 10 March 1947, p.2.

73. Trades Union Congress, Scientific Advisory Committee minutes, 8 December 1947, p.2. Fuel and Power Policy is discussed in more detail in section 3.5.2. below.

74. Trades Union Congress, Scientific Advisory Committee minutes, 25 November 1948, p.2.

75. 'Civil and Military Research', Scientific Worker 3 (August 1948), p.22.

76. Ibid.

77. Trades Union Congress, Scientific Advisory Committee minutes, 25 November 1948, p.2.

78. D.S. Horner, 'British scientists, trade unions and atomic weapons : the post-war debate', paper presented to the Second Conference on Science, Society and Education : Risk and Participation, Leusden, Holland, 17-20 August 1982, pp.81-84.

79. The founding of the Atomic Scientists Association (ASA) in 1946, partly at the instigation of the AScW, had been one expression of their concern. However, under the impact of the Cold War the ASA retreated from the political arena and the critical appraisal of government atomic policy. See Greta Jones, 'British Scientists, Lysenko and the Cold War', Economy and Society, 8 (February 1979), pp.26-57.

80. Blackett's scientific career and political career are recalled in B. Lovell, P.M.S. Blackett : A Biographical Memoir (London : The Royal Society, 1976).

81. P.M.S. Blackett, 'Atomic Energy : An Immediate Policy for Great Britain', Reprinted in M. Gowing, Independence and Deterrence Vol.I (London : Macmillan, 1974), pp.194-206.

82. Trades Union Congress, Annual Report, 1946, pp.477-80.

83. Trades Union Congress, Annual Report, 1947, p.285.

84. Trades Union Congress, Scientific Advisory Committee minutes, 8 December 1947, p.5.

85. Trades Union Congress, Annual Report, 1947, p.287. See also 'The Atomic Energy Act', Nature 158 (7 December 1946), pp.807-8.

86. See, for example, C.G.A. Hill, 'The Atomic Energy Act', Scientific Worker 1 (December 1946), pp.25-26. and also the Statement by the Executive Committee of the AScW, 'The Atomic Energy Bill', 17 September 1946, (Mimeographed), AScW Archives, ASW/3/3/5.

87. Trades Union Congress, Scientific Advisory Committee minutes 2 June 1947, p.1.

88. Ibid., p.8.

89. Trades Union Congress, Annual Report, 1947, p.286.

90. Ibid., p.289.

91. Ibid., p.290.

92. The ACAE was disbanded in 1948 and was not replaced by any unitary body which could oversee the development of the military and civilian aspects of Atomic Energy. For further information on the ACAE and Blackett's connection with it see Blackett Papers D184-205.

93. Trades Union Congress, Scientific Advisory Committee minutes, 2 June 1947, p.8.

94. Ibid.

95. Trades Union Congress, Scientific Advisory Committee minutes, 30 June 1947, pp.12-13.

96. Ibid., p.12.

97. Ibid., p.13.

98. Trades Union Congress, Scientific Advisory Committee minutes, 2 June 1947, p.9.

99. Atomic Sciences Committee of the Association of Scientific Workers, The Protection of Workers from Radiation Hazards in Atomic Energy Plants and other Establishments using Radioactive Substances, (London : Labour Research Dept., 1948).

100. Trades Union Congress, Annual Report, 1948, pp.282-83.

101. Ibid., pp.280-82.

102. The TUC Delegation consisted of F. Hancock, A. Deakin, Dame Anne Loughlin, J. Tanner, P.M.S. Blackett and E. Fletcher.

103. Kenneth Harris, Attlee (London, Weidenfeld and Nicolson, 1987), pp.286-291.

104. Trades Union Congress, Annual Report, 1948, p.282.

105. Ibid.

106. Ibid., p.283.

107. Ibid.

108. Horner, 'British scientists, trade unions and atomic weapons : the post-war debate', pp.83-84.

109. J.D. Bernal, 'Science against War' in J.D. Bernal and M. Cornforth, Science for Peace and Socialism (London : Birch Books, c.1949), p.30.

110. H. Pelling, The British Communist Party : A Historical Profile (London : Adam and Charles Black, 1958, reissued 1975), pp.143-48.

111. Trades Union Congress, Annual Report, 1950, paragraph 217.

112. Ibid.

113. Ibid., pp.411-425. See also 'TUC Brighton 1950', Scientific Worker 5 (November 1950), pp.8-9.

114. Association of Scientific Workers, Atomic Attack - Can Britain be Defended? (London : AScW, 1950), p.1.

115. Ibid., p.14.

116. 'Atomic Warfare', Scientific Worker 5 (September 1950), pp.3-4. This editorial commented on the inadequacies of the Government's recently published Manual of Basic Training. It also attacked Sir John Anderson's criticism that AScW had 'rushed into print' with Atomic Attack and the idea that the Government had been laboriously collecting full information on the steps to be taken to defend Britain against atomic bombs. The editor commented that 'the description of these steps, now published, does not impress or console us.

117. Trades Union Congress, Annual Report, 1950, p.425.

118. Ibid.

119. Association of Scientific Workers, Science Policy Committee minutes, 11 March 1950, AScW Archives, ASW/1/4/2/3.

120. Association of Scientific Workers, Science Policy Committee minutes, 19 April 1950, ASW/1/4/2/4. A group of AScW members subsequently visited Porton Down. See Science Policy Committee minutes, 23 February 1952, ASW/1/4/2/19.

121. Pelling, The British Communist Party, p.160.

122. Association of Scientific Workers, 'Motions and Amendments 36th Annual Council, 1953', Appendix p.3.

123. Trades Union Congress, Annual Report, 1952, p.383.

124. Ibid., p.384.

125. See P.W. Brian, 'Biological Warfare', Scientific Worker 5 (March 1950), p.78.

126. Trades Union Congress, Annual Report, 1952, p.385.

127. This is dealt with in more detail in chapter 3 section 4 below.

128. Trades Union Congress, Annual Report, 1954, p.413.

129. Ibid.

130. Ibid., p.414.

131. Ibid., p.415.

132. Trades Union Congress, Annual Report, 1955, p.478.

133. A. Sked and C. Cook, Post-war Britain : A Political History (Harmondsworth, Middlesex : Penguin, 1979), p.133.

134. For an expression of this see Bernal 'Science in War', pp.38-41.

135. Bernal, The Social Function of Science, p.107.

136. Association of Scientific Workers, Science and the Nation, pp.184-185.

137. Trades Union Congress, Annual Report, 1947, p.287.

138. Trades Union Congress, Scientific Advisory Committee minutes, 10 May 1948, p.16.

139. 'Industrial Research Secrecy', Scientific Worker 4 (February 1949), pp.8-11.

140. Trades Union Congress, Scientific Advisory Committee minutes, 27 January 1949, p.13.

141. Trades Union Congress, Scientific Advisory Committee minutes, 13 June 1949, p.19.

142. Trades Union Congress, Scientific Advisory Committee minutes, 16 March 1950, pp.4-5.

143. 'A Scientific and Technical Service for the Fuel and Power Industries' in the Association of Scientific Workers, Science and Government (London : AScW, 1946), p.20. See also Association of Scientific Workers, Science and the Nation, pp.31-51.

144. Trades Union Congress, Scientific Advisory Committee minutes, 2nd June 1947, p.10.

145. Trades Union Congress, Annual Report, 1947, p.292.

146. Trades Union Congress, Scientific Advisory Committee minutes, 8 December 1947, p.2.

147. Gaitskell had joined the AScW in 1945. See 'Scientists in Government', Scientific Worker 2 (December 1947), p.27.

148. Trades Union Congress, Scientific Advisory Committee minutes, 12 January 1948, p.1.

149. Trades Union Congress, Scientific Advisory Committee minutes, 25 November 1948, p.7.

150. Sked and Cook, Post-war Britain ; A Political History, p.33.

151. Association of Scientific Workers, Science and the Nation, p.23.

152. Trades Union Congress, Scientific Advisory Committee minutes, 'Evidence in the National Fuel and Power Policy Committee', 31 January 1952, p.1.

153. Association of Scientific Workers, Science Policy Committee minutes, M15/52 29 January 1952, AScW Archives, ASW/1/4/2/18.

154. Association of Scientific Workers, Fuel and Power Sub-Committee, M38/52 25 March 1952, AScW Archives, ASW/1/4/2/20.

155. Trades Union Congress, Scientific Advisory Committee minutes, 'Evidence to the National Fuel and Power Policy Committee', p.5.

156. Ibid., p.11.

157. Association of Scientific Workers, Science Policy Committee minutes, M67/52 25 July 1952, AScW Archives, ASW/1/4/2/25.

158. Association of Scientific Workers, Science Policy Committee minutes, M78/52 26 September 1952, AScW Archives, ASW/1/4/2/26.

159. This matter is dealt with in detail in chapter 7 below.

160. While supporting the principle of cooperative research the AScW advocated a more interventionist line, with the DSIR ensuring that work undertaken in RA was in the interests of the whole of the industry and not 'biased' by any particular interests of the larger contributors. The AScW also suggested that financial support for cooperative research could be put on a similar basis by compulsory levies on industry. See Association of Scientific Workers, Science and the Nation, pp.169-172.

161. Trades Union Congress, Scientific Advisory Committee minutes, 25 November 1948, p.4.

162. Ibid., p.5.

163. Trades Union Congress, Scientific Advisory Committee minutes, 3 February 1954, p.3.

164. Trades Union Congress, Scientific Advisory Committee minutes, 13 June 1949, pp.17-19.

165. Trades Union Congress, Scientific Advisory Committee minutes, 'Trade Union Representation on Industrial Research Associations', 27 January 1949.

166. Ibid., p.3.

167. Trades Union Congress, Scientific Advisory Committee minutes, 16 March 1950, p.4.

168. Trades Union Congress, Scientific Advisory Committee minutes, 1 February 1951, p.2.

169. Trades Union Congress, Scientific Advisory Committee minutes, 3 February 1954, p.3.

170. See chapter 6 section 2 below.

171. Trades Union Congress, Scientific Advisory Committee minutes, 'Notes on the Composition and Work of the Scientific Advisory Committee, 3 February 1954, p.2.

172. Ibid.

173. Birch, The History of the TUC 1868-1968, p.135.

174. Trades Union Congress, Scientific Advisory Committee minutes, 3 February 1954, p.2.

CHAPTER 3

SCIENCE AND THE POLITICS OF INTERNATIONAL TRADES UNIONISM: THE WORLD FEDERATION OF SCIENTIFIC WORKERS

1. Introduction

The national activities of the scientific Left in the Association of Scientific Workers and the Trades Union Congress were paralleled by its efforts to create an appropriate organisation to draw together similar organisations of scientific workers in other countries. The problems of post-war resconstruction were of international dimensions and the leadership of the British AScW felt that an appropriate international expression of the professional and social responsibilities of scientists was required. Science and the Nation, their programme for the role of science and scientists in the post-war world, had argued that:

> Scientists have need to express their views independently as well as in advising the Government. The Association of Scientific Workers has attempted this task in Britian since 1918. In the last few years, particularly during the war, similar organisations have developed in a number of other countries, and the increasingly international aspect of post-war science problems has greatly increased the need for permanent liaison and cooperation. In July, 1946, in London an international conference approved final plans for the inauguration of a World Federation of Scientific Workers to promote cooperative action between the various national organisations in order to achieve the fullest utilisation of science in promoting peace and the welfare of mankind.[1]

The formation of the World Federation of Scientific Workers (WFScW) was a conspicuous success for the Association. It registered the convergence of the norms of scientific internationalism with the

objectives of the professional and trade union organisation of scientific workers. Crowther, its first general secretary, described the WFScW as '...a natural outcome of the growth of science, and of the scientific profession, in many countries'.[2]

However, the creation of the WFScW was also paralleled by the constitution of the United National Educational Scientific and Cultural Organisation (Unesco) with Julian Huxley, a past president of the AScW, as its first director. Joseph Needham, another prominent supporter of the AScW, also played an important part in the establishment of Unesco.[3] But the policies of Unesco were closely tied to the national policies of its constituent members and in these circumstances the absence of the USSR was crucial. The WFScW was conceived in a more critical spirit with the aim of giving scientists an independent international voice.

The basis for the Federation has been laid by the formation of a number of organisations in other countries and modelled on the British AScW. (But few were to be as successful as the AScW in combining professional, trade union and political goals). An American Association of Scientific Workers had been established in 1938 inspired by the British movement for social responsibility in science but much less tied to trade unionism and Marxism.[4] In the following year an Australian Association of Scientific Workers was formed with the object of 'securing the wider application of science and scientific workers for the welfare of society...to promote the interests of science...to maintain the interests of scientific workers'.[5] During wartime similar associations were

set up in New Zealand (1942), South Africa (1943) and Canada (1944).

In a second wave following the end of the Second World War associations of scientific workers were established in many other countries as preparations for an international federation went ahead. An Indian Association of Scientific Workers was founded in 1946 under the presidency of Pandit Nehru. In the same year the Verbond van Wetenschappelijke Onderzoekers, VWO (Association of Scientific Research Workers) was formed in Holland.[6] In France the Association de Travailluers Scientifiques was set up out of the resistance groups of the Front National Universitaire.[7] And in direct response to the social and political implications of the dropping of the first atomic bombs the American Federation of Atomic Scientists was formed in November 1945 to be succeeded by the more broadly based Federation of American Scientists (FAS) in April 1946.[8]

The groundwork for an international network of progressive scientists had been established by the many scientists who were refugees in Britain before and during the Second World War. The focus for many such scientists had been the Foreign Scientists' Committee of the British AScW. This committee (later renamed the International Relations Committee) played an important coordinating role.[9] International political action by scientists was also prefigured by the setting up of the Science Commission of the International Peace Campaign at its Congress in Brussels in 1936.[10]

In addition to these background organisational features an urgency in the need for an international response by scientists

was established by the development of atomic weapons. As a press statement for the British AScW released in December 1945 indicated:

> The sources of atomic energy could be used principally for bomb production in secret and also for pursuing nationalistic industrial aims. This must lead inevitably to an atom bomb race, to industrial development without any international control or direction, with a resultant worsening of international relations by secrecy and suspicion, to industrial economic crises of overproduction worse than before the war, and finally to war itself.[11]

The alternative to such a grim scenario was posed as the development of atomic energy under conditions of full and free cooperation with the emphasis on its constructive industrial application. Such an alternative implied international political structures. The WFScW was, therefore, partly conceived as an expression of the responsibility of scientists to secure the international control of atomic energy towards peaceful ends.

In this chapter I review the formation of the WFScW and the unfolding of its problematic relationships with Unesco and the World Federation of Trade Unions (WFTU). The aspirations of the WFScW to represent the professional and trade union interests of scientific workers were as strong as its emphasis on issues of social responsibility. However, the political commitments of many of the leading figures of the WFScW and the increasing dominance of representative organisations from communist countries cast the Federation under grave suspicion of being a communist 'front' organisation. This suspicion was reinforced by its alignment with the WFTU.

This overtly political dimension created serious problems for many of its non-communist Western supporters. For example, the British AScW's continued affiliation created serious divisions within its membership and placed in peril its relationship to the TUC.

I go on to examine the implications of these political features for the aspirations of the WFScW particularly in its advocacy of the international control of atomic energy. I review its role in the foundation of the Pugwash movement as it was conditioned by these political factors.

2. The Formation of the World Federation of Scientific Workers

The founding of the WFScW was associated with many of the key figures of the British AScW. J.D. Bernal was to become a vice-president and draft the Federation's Charter; Roy Innes, general secretary of the AScW, was responsible for much of the initial organisational work and the drafting of the Federation's constitution; J.G. Crowther, secretary of the AScW's International Relations Committee (successor to its Foreign Scientists' Committee) became the Federation's secretary general designate in 1946; W.A. Wooster, an honorary general secretary of the AScW, was to become treasurer of the WFScW.

P.M.S. Blackett, president of the AScW in this period, also played an important role. For Blackett the internationalism of the trade union movement was the model which scientific workers should adopt. At the AScW's conference, Science in Peace, in February 1945, Blackett referred to the International Congress of Trade Unions, then meeting in London to plan an international

trade union organisation for the post-war world, as an 'inspiring event' and remarked that it was 'no accident that it is a workers' organisation who are first to rebuild international contacts, outside purely governmental circles'. Blackett regretted the fact that none of the British delegates to the International Congress came from a scientific background whereas the leader of the Soviet delegation and president of the USSR Council of Trade Unions, V.V. Kuznetsov, was a trained metallurgist having studied under Joffe at the Leningrad Polytechnic.[12]

Blackett also contrasted the solidarity and internationalism of the labour movement with the outlook of 'academic' scientists who were 'few in number and had little or no political cohesion'. He wrote that:

> Their social background and environment is on the whole not at all internationally minded, and is often heavily tinged by that peculiar and rather typically middle-class disease of zenophobia.[13]

He hoped that linking scientists more firmly to the trade union movement would break down their isolation:

> Perhaps one of the main and most valuable functions of the AScW is to provide to the scientist and technician just the possibility of throwing off the middle-class isolationism and gaining internal strength through contact with the great movement of organised workers.[14]

Blackett's high optimism for the future of the international trade union movement, though thoroughly understandable in the closing stages of the war, nevertheless overlooked the potential for division on the basis of political ideology.

Blackett held talks with Kuznetsov while he was in London on the future organisation of scientific workers.[15] A resolution at the AScW's Council meeting in June 1945 called on its Executive Committee to take steps to set up an international organisation to combine scientific organisations similar to the AScW in various countries of the world. In his presidential address Blackett indicated that moves had already been made in that direction.[16]

His discussions with Kuznetsov were followed up by J.D. Bernal and F. Joliot-Curie with Soviet scientists in June 1945 at the 220th anniversary celebrations of the Russian Academy of Sciences in Moscow. The proposed international federation of scientific workers could not be of a purely trade union character since many of the associations of scientific workers (such as Joliot-Curie's Association des Travailleurs Scientifiques) had not achieved trade union status.

An opportunity to widen these discussions to include representatives from other countries occurred at the conference Science and the Welfare of Mankind held in February 1946 in London. A resolution was carried at the conference calling for the formation of an international federation of scientific workers and the British Association was given the task of drafting the constitution. (The World Federation of Trade Unions had been inaugurated in Paris in October 1945 with Citrine of the TUC as its first president). The constitution for the inaugural meeting conference was drafted by Roy Innes who subsequently recalled that 'its production was a climax to all the activities and ideas of the wartime years, during which the concept of a federation of scientific workers emerged'.[17]

The brunt of the work in making arrangements for the formation of the international federation was undertaken by the AScW's International Relations Committee under the chairmanship of J.G. Crowther with Dr. R.C. Murray as secretary. The Committee corresponded with overseas associations and had produced a monthly bulletin to promote and explain the work of the Association for overseas scientists. The work of the Committee became redundant following the formal setting up of the WFScW.[18]

The inaugural meeting of the World Federation of Scientific Workers was held on 20-21 July 1946. The opportunity to bring together representatives of the various scientists' organisation sympathetic to the establishment of an international federation was provided by the Newton Tercentenary celebrations being held in London. British organisations represented at the inaugural meeting, in addition to the AScW, included the Institution of Professional Civil Servants and the Association of University Teachers.[19] In all there were delegates and observers from organisations in fourteen countries. The Natural Sciences Division of Unesco also sent an observer and a message of support from its director, Joseph Needham.[20]

The pivotal role of the AScW was recognised by the fact that the inaugural meeting was opened by its president, Blackett, followed by W.A. Wooster, its honorary general secretary. The meeting came to a unanimous decision to establish the World Federation of Scientific Workers following the presentation of a number of reports and discussions. A provisional executive council was elected which included Joliot-Curie as president and J.D. Bernal

and N.N. Semenov as vice-presidents. J.G. Crowther was appointed secretary general designate.[21] Crowther has subsequently described the Federation as 'an historic step towards the time when scientific workers of the world will speak with one voice on the critical problems of the place of scientists in modern society'.[22]

The avowed aim of the WFScW was to be:

> ...a centre through which the various national associations may render each other mutual advice and encouragement, to help the growth of the individual associations in their own countries, and assist them to work out common aims and methods of organisation.[23]

It was hoped that the WFScW would be able to achieve a united platform on issues such as secrecy in science and the freedom and planning in scientific research. However, the theoretical background to its approach to these questions lay in a Marxist analysis of the social relations of science.[24] To such general political issues it would also provide a forum for the professional and trade union aspirations of scientific workers. These would include standards of education, remuneration and working conditions.

The Constitution of the WFScW laid down the following as the aims of the organisation:

> (a) to work for the fullest utilization of science in promoting peace and the welfare of mankind and especially to ensure that science is applied to help solve the urgent problems of the time;
>
> (b) to promote international co-operation in science and technology in particular through close collaboration with the United Nations Educational, Scientific and Cultural Organisation;

(c) to encourage the international exchange of scientific knowledge and of scientific workers;

(d) to preserve and encourage the freedom and co-ordination of scientific work both nationally and internationally;

(e) to encourage improvement in the teaching of the sciences and to spread the knowledge of science and its social implications among the peoples of all countries;

(f) to achieve a close integration between the natural and the social sciences;

(g) to improve the professional, social and economic status of scientific workers;

(h) to encourage scientific workers to take an active part in public affairs and to make them conscious of, and more responsive to, the progressive forces at work in society.[25]

It was hoped to pursue these aims through the affiliated organisations of the WFScW but also through cooperation with and influence on other international bodies such as Unesco and the WFTU.

The task of the provisional executive council was to steer the WFScW towards its first General Assembly in 1948. Within the first year the affiliation of 17 associations in 14 countries had been confirmed.[26] An indicator of its political character was given by its intervention in the Conference on Human Rights, held in London in June 1947. Following representations from the WFScW the conference passed a resolution demanding full opportunities for native scientists in colonial countries. The Federation, according to Crowther, had 'issued a questionnaire to affiliated bodies on secrecy and had acted on behalf of scientists subjected to persecution in various countries'.[27]

The WFScW also set about establishing its international status by organising a number of conferences to attract attention in the

scientific community generally. In 1947 the WFScW, the British AScW and the Society for Visiting Scientists organised, in London, an international gathering to celebrate the memory of Paul Langevin. Langevin, an outstanding French physicist, had been a profound influence on Joliot-Curie and Bernal. He was a symbol of the socially and politically committed professional scientist.[28]

In the same year, in Paris, and with the generous support of the French government the Federation organised a conference to celebrate the tenth anniversary of the death of Rutherford, described by the atomic physicist Oliphant as '...a graceful and extremely successful tribute by scientific men from all parts of the world'. The conference was opened by a reception given by the President of the French Republic on the afternoon of November 7th 1947 at the Elysee Palace. As well as the many tributes from many of the world's leading atomic physicists (including, for example, Niels Bohr) Bernal delivered an address in French on 'the Function of International Science in the Solution of the Economic Problems of Today'.[29] In a similar tradition of celebrating 'great men of science', the WFScW planned a meeting to celebrate the centenary of Pavlov's birth in 1949. However, the political impact of the Cold War on the Federation was to frustrate this project.

The first General Assembly, the policy making body of the Federation, was held in September 1948 at the Castle Dobris near Prague at the invitation of the Czechoslovak Association of Scientific Workers. The Assembly consisted of delegates and observers from thirteen countries; Austria, Britain, Bulgaria, Canada, China, Czechoslovakia, Denmark, France, Hungary, Poland,

South Africa and the United States. UNESCO and the WFTU also had observers present. The British AScW represented the largest section of the Federation which had an overall membership through its affiliated organisations of around 24,000.[30]

Joliot-Curie, in his presidential address, rejected the view that science was in any way responsible for any of the world's current problems and called for the application of scientific method to social problems. Whilst advocating the progressive role of science he placed this in the context of opposing any form of elitism and stressed the need to place science in the service of the labour movement. Crowther reviewed the progress of the Federation in its two years of existence in his report as general secretary. He alluded to those who had opposed freedom to planning in science and argued that planning the large scale scientific research activities of the modern world was the very precondition of freedom. He saw clearly that those who attacked planning in the name of freedom

> ...were among the loudest of those who asserted that there was no connection between science and politics; a sentiment that had such a strong though mistaken attraction for many scientists.[31]

Resolutions submitted to the Assembly were processed by four working commissions; Organisation and Social Responsibility of Scientists; Atomic Energy, Secrecy and Peace; Reconstruction, Colonial Countries and Natural Resources; World Federation Journal and Finance. The topics covered by resolution reflected both the professional and political concerns of the Federation including, for example, the persecution of scientific workers, the unity of men of science against

war, international holiday camps for scientific workers(!), the control of atomic energy, secrecy in science, the distribution of radioactive isotopes, scientific development in colonial countries, utilization of world resources and the foundation of an international journal to propagate the views of the Federation. In addition a special resolution welcomed the formation of the Permanent International Committee for Peace by the Wroclaw Cultural Congress.

However, the most notable feature of the conference was the presentation and approval of Bernal's 'Charter for Scientific Workers'. The charter attempted, in the form of a rights/responsibility dichotomy, to specify the link between trade union organisation for scientific workers, society and social responsibility. Bernal wrote in the preamble to the Charter, that:

> scientific workers can adequately carry out their responsibilities to the community, if and only if, they are working under conditions which enable them to make full use of their gifts.[32]

The Charter contained seven sections covering the responsibilities of scientific workers, the status (and opportunity to become) scientific workers, facilities for employment, conditions and organisation of work and the special needs for science in developing countries. Bernal specified the scientists' responsibility to the community:

> To study the implications of science, particularly in their own field, to current economic, social and political problems and to make efforts to ensure that this knowledge is widely understood and acted upon.[33]

Bernal's view of the scientists' responsibility 'to the world' reflected the growing concern at the imminence of war as the tension between East and West grew:

> To maintain the international character of science;
> To study the underlying cause of war;
> To aid agencies seeking to prevent war and to build stable bases for peace;
> To work against the diversion of scientific effort to war preparation in particular to the use of science in providing methods of mass destruction;
> To resist movements inspired by anti-scientific ideas such as irrationalism, mystical intuition, racial inequality and the glorification of force.[34]

The Charter represented a comprehensive and programmatic statement of the political role for scientists nationally and internationally.

However, the appeal of this strategy to many of the national organisations was vitiated by the political conflicts and divisions generated by the Cold War. The resonances of the Federation's rhetoric were those of the communist left. The contradictions in the WFScW's position emerged initially in its relationship with UNESCO and then subsequently in its association with the WFTU.

By the time of the meeting of the second General Assembly in April 1951 the 'progressive' movement of scientists was thrown utterly on to the defensive and the prospects for an international synthesis of science and trade unionism were radically altered.

The growing pitfalls of internationalism represented by the WFScW were indicated by the parallel events at the World Congress of Intellectuals held at Wroclaw in Poland in 1948. This was a turning point in the relationship between the scientific Left and other liberal and left-wing intellectuals. The Wroclaw Congress

and the subsequent conferences and organisations (such as the International Liaison Committee for Intellectuals for Peace) were essentially propaganda initiatives of the Cominform.[35] Resolutions passed at the Congress were framed in terms of the Soviet line of the irreconcilability of the imperialist and socialist camps. The Soviet delegates strongly denounced Western bourgeois culture and ideology and argued that there could be no compromise between them and Soviet culture and ideology.[36]

The attempts of some of the Western delegates, including A.J.P. Taylor and Julian Huxley to advocate the adoption of a common platform for intellectuals throughout the world were attacked as 'obscurantist'. Huxley, the director-general of Unesco, refused to sign the final resolution and regretted that 'an opportunity for reconciling, in the intellectual and cultural sphere, what may broadly be called the Eastern and Western points of view' had not been taken.[37]

Bernal, on the contrary, supported completely the line adopted at the Congress - an attitude which brought his own position into question in the British scientific community.[38] Joliot-Curie, although not present at the Wroclaw Congress, subsequently played a leading role in the World Peace Movement which it inspired. The connection of leading figures of the WFScW with these developments helped to gain for the WFScW 'a reputation as a progressive front organisation dedicated to world peace, dominated by British and French communists or fellow-travellers and funded (partly) by the Soviet Union'.[39]

3. International Relations

3.1. Unesco and the WFScW.

The political tensions of the period were expressed clearly in the deterioration of the relationship between the Federation and Unesco. Unesco had initially welcomed the formation of the WFScW. As early as 1945 Julian Huxley, the executive secretary of the Unesco preparatory commission had written of his hopes that:

> in the near future we shall see some organisation federating or uniting the various associations of scientific workers throughout the world into a single international body which can play some sort of role in relation to UNESCO as the World Federation of Trade Unions will, I hope, play in relation to the U.N.[40]

Unesco had been welcomed by the scientific left; Joliot-Curie was, for example, vice-president of the French Unesco national commission. Joseph Needham was appointed director of the Natural Science Division of Unesco and in that capacity sent a message of support at the inaugural meeting of the Federation.

The aims of both organisations were, in some respects, coincidental stressing as they did the use of science for human welfare. The WFScW had specified collaboration with Unesco as an article of its constitution. J.D. Bernal was the representative of the British AScW on the British Committee (Natural Sciences) for Cooperation with Unesco. He had sought also to secure representation for the Association on the Social Science Cooperating Committee without success.[41] Bernal distinguished the aims of the WFScW from Unesco in the following way:

> The aims of the Federation are those of promoting the fullest utilisation of science and the greatest degree of effective cooperation between scientists in all parts of the world. To achieve this end it aims, through its constituent organisations, to improve the organisation of science on a national and international basis, and the professional, social and economic status of scientific workers throughout the world both in the natural and social sciences.
>
> It will be seen that in many ways this reproduces the objects of Unesco, but there is here no question of overlapping. The World Federation of Scientific Workers (WFSW) will act essentially as a coordinating body for the activities of the different national sections and their members, in turn, will both encourage and work for the objects of Unesco as well as the more specifically national problems in their own country. They will furnish the rank and file of the international scientific community.[42]

However, as the Cold War deepened Bernal's view of Unesco gradually changed to one of seeing it as a 'front' for the cultural imperialism of Western capitalist powers. The relationship between the two organisations had begun on a fraternal basis.

When Unesco established its headquarters in Paris in September 1946, Joseph Needham offered accommodation and secretarial assistance. The second meeting of the Federation's Executive Council was held there in November 1946.[43] However, the attitude of influential communist members of the Federation were coloured by the absence of the Soviet Union and the Eastern Democracies from Unesco at its foundation. J.G. Crowther, who as secretary of the International Relations Committee of the AScW had liaised between its Science Policy Committee and the Federation, urged that:

> ...it was essential for the WFScW not to become too closely linked with Unesco as this might affect our freedom of policy in future and our future relations with the USSR and the WFTU.[44]

During 1947, however, a Draft Agreement was drawn up between Unesco and the WFScW which accorded the Federation consultative status in matters of common interest and recognised the Federation as the coordinating body for national organisations of scientific workers.[45] Thus in this early period of its history the Federation developed close links with Unesco. J.G. Crowther represented the WFScW at the second general conference of Unesco in Mexico city. In addition the Federation had successfully proposed to the Unesco Commission on the Popularisation of Science and its Social Relations that it should fund fellowships for research on the social relations of science.[46]

In Bernal's view, however, from the moment of its conception Unesco had been inextricably linked to the notion of the 'superiority of Western civilisation'. The major source of funding for Unesco was the United States. The absence of the Soviet Union and then the Peoples Republic of China from Unesco was critical. Bernal wrote that:

> All this results in the tendency for Unesco to become more and more to represent the ideological front of the American led majority in the United Nations. It has consequently been quite unable to establish any form of cultural contact with the Soviet Union even in special fields such as Arid Zone research, when it is certain that the Soviet Union has very much to contribute.[47]

The political and financial control exercised by the West on Unesco was evident when, in 1950, the Executive Board revised the arrange-

ments between Unesco and non-governmental organisations and as a direct result the WFScW was deprived of its consultative status.[48]

The Unesco observer at the WFScW's second General Assembly argued that the decision to withdraw consultative facilities reflected a lack of information rather than any political discrimination. However, Bernal wrote in his Report to the British AScW that the Federation had 'already furnished to the Executive Board of Unesco ample information which demonstrated that its work lay along the same lines and would compare favourably with other bodies subsequently accorded consultative status'.[49] Bernal still felt that the two organisations had similar approaches to the issues of science and human welfare, the international control of atomic energy and the problem of food production and scientific assistance to underdeveloped countries. He had raised the withdrawal of consultative facilities with the British Cooperating Committee but without success and subsequently resigned as the AScW's representative in 1952.

Bernal's overall view was that whilst many of the stated aims of Unesco were shared by the AScW and WFScW the policies which it was pursuing fell far short of these. On his resignation he recommended that AScW, if possible, should maintain its presence on the British Cooperating Committee as a means of finding out what was happening in the organisation of international science. It was not until 1965, however, that the relationship between Unesco and the WFScW were restored.[50]

The breakdown of the relationship between the World Federation

and Unesco had reflected the impact of the political and ideological schism on the international scientific community. It effectively denied an avenue of international cooperation to the WFScW although to Bernal it emphasised the importance of the Federation as perhaps providing the only organisational link between the scientists of Eastern Europe, the Soviet Union, China and those of Western Europe.

3.2. The WFTU and the WFScW

The trades union aspects of the Federation's aspirations came equally under severe attack through its association with the WFTU. This was to have profound implications for the relationship of the Federation to many of its constituent members. In particular, it was to have a divisive effect on the British AScW as the communist/non-communist split in the international trades union movement deepened in the late 1940s.

Bernal argued for a dual linkage of scientific workers on the one hand to other intellectuals and on the other to the mass of productive workers. He wrote that:

> Scientific workers are linked through the character of their work with other intellectuals; they are also, through the results of their work, linked with productive workers and the population as a whole. Science is not so much a distinct industry as a common productive service in which scientific workers are effectively in detailed contact with every branch of industrial and agricultural enterprise. They must work by associating themselves closely with the day to day activities of other workers, both individually and organisationally through the trade unions, shop stewards' committees, and joint production committees.[51]

Thus an important feature of scientists' social responsibility was to place their collective knowledge and ability at the disposal of the labour movement. This strategy, as we have already seen, had been effectively pursued by the AScW in relation to the Trades Union Congress in Britain. It was hoped by the Federation to apply this model at an international level by developing an agreement with the newly formed World Federation of Trade Unions. At the Annual Council meeting of the British AScW in May 1947 Joliot-Curie had already indicated that plans were being considered which would give the WFScW the status of the 'science advisory body' to the WFTU.[52]

The leadership of the WFTU had taken a particular interest in the WFScW from its inauguration in July 1946. The communist general secretary of the WFTU, Louis Saillant, a friend of Joliot-Curie, had sent a message of goodwill. The Executive Council of the WFScW was instructed by the General Assembly of 1948 to secure an accord with the WFTU.[53]

However, as these developments took place the fragile unity of the international trade union movement was shattered. The WFTU had been founded in Paris in October 1945 with a membership embracing communist and non-communist trades unions. The wider international crisis was reflected in the WFTU ostensibly over the issue of Marshall Aid but in reality the 'right' felt increasingly under threat as a minority representation. From 1945 the American Federation of Labour (AFL) (which, unlike its US rival the Congress of Industrial Organisations, was not a WFTU member) had been spending money in Europe advocating Marshall Aid and to incite a split in the

WFTU. A conference of trade union representatives from countries receiving Marshall Aid took place at which the influence of the AFL was strongly felt although the conference offically took place under the auspices of the British TUC. A European Recovery Programme Trade Union Advisory Committee (ERPTUAC) was established which in fact constituted an organisational focus for non-communist trades unions. The WFTU Executive Committee in Rome declared that the Marshall Aid meeting was a matter for individual affiliates and drew up a six-point plan to try to avoid internal conflicts between WFTU affiliates.

The WFTU was unable to staunch the tide of anti-communist feeling. In July 1948, the TUC general secretary and president of WFTU, Arthur Deakin had publicly denied that the WFTU was under Soviet control. However, at the September Trades Union Congress in Margate he was to declare that the WFTU was 'nothing more than another platform and instrument for the furtherance of Soviet policy'. Congress adopted an anti-WFTU resolution instructing it to suspend its activities for one year on pain of TUC and CIO withdrawal. The WFTU rejected the ultimatum and on January 19th 1949, the TUC, CIO, and the Dutch unions left the Paris Executive Committee meeting and the Federation. A matter of a few weeks later Deakin welcomed AFL proposals to establish an international anti-communist trade union organisation. And in December 1949, in London the International Confederation of Free Trade Unions was established.[54]

At the very time that this communist/non-communist split was taking place Joliot-Curie and Crowther had been negotiating with

the WFTU on behalf of the WFScW. Crowther had attended the second Congress of the World Federation of Trade Unions in Milan (June-July 1949) as the representative of the WFScW. In an address to the Congress he stressed the need for 'unity between workers by hand and by brain'. He saw the task of the WFScW as one of forging cooperation between organised workers and organised scientists to oppose certain divisive tendencies:

> While the need for the scientists and the people to come close together increased, the growing complication of science tended to drive them apart. Scientists were under pressure to separate themselves from other workers, and in capitalist society, to attach themselves to the ruling class. The effect of this was to place the control of the new science in the hands of the capitalist monopolies, and make scientists their intellectual slaves.[55]

The 'Agreement between the WFTU and the WFScW' was signed on 26th January 1950 by Joliot-Curie, President of the WFScW and Crowther, its General Secretary. The Agreement was signed for the WFTU by its President, G. Di Vittorio, and its General Secretary, L. Saillant.

The Agreement announced the shared aims of the WFTU and the WFScW and in particular specified collaboration on the following issues: the safeguarding and organisation of peace; the use of atomic energy in the creation of new activities giving rise to progress and prosperity; disarmament (including atomic and bacteriological); the influence of scientific progress on the employment of labour including the protection of workers against health hazards; bringing the benefits of science to the colonial and under-developed regions in the interests of the indigenous

populations; education, the democratisation of teaching and the popularisation of science.

Under the terms of the Agreement the WFScW was to become the 'Scientific Council' of the WFTU whilst retaining its autonomy. The WFTU in exchange would support the WFScW in the defence of the professional, social and economic interests of scientific workers. A joint committee consisting of 3 representatives from each organisation was to be established, to meet twice a year, to commission reports and research in pursuit of their joint interests. There was also to be reciprocal representation at each of their respective Congresses.[56] The accord between the WFScW and the WFTU clearly was designed to strengthen the trades union basis of the various national scientific workers and to define the areas of (political) action.

However, the accord produced the contrary result and threatened to split the Federation. The Executive Committee of the British AScW were greatly disturbed by the signing of the agreement which had been done without any direct consultation with constituent organisations. A letter was sent to WFScW requesting that the Assembly be convened as soon as possible.[57] The agreement also provoked sharp criticism from the associations in Holland, South Africa and New Zealand. The British TUC had issued a circular warning trade unions of the 'disruptive activities' of the WFTU and the AScW had received a letter from Sir Vincent Tewson, General Secretary of the TUC, drawing attention to the circular and referring to the accord between the WFTU and the WFScW. If the WFScW was to remain formally linked to the WFTU then AScW faced expulsion from

the TUC.[58]

In the event the second General Assembly was forced to agree to suspend the agreement with the WFTU.[59] The circumstances in which the Assembly was held in April 1951 symbolised the depth of international political division. Delegates from the 'Eastern Democracies' and the Chinese People's Republic had been refused visas to enter France - Paris being the venue for the conference. As a result parallel meetings were held in Prague and Paris. Joliot-Curie's Presidential address defended the activities of the WFScW leadership as consistent with its constitution and charter. He restated the optimistic vision of science's capacity to alleviate the human condition.

However, in addition to the problem of the accord with the WFTU, Dr. D. Mclean of the British Association had criticised Crowther for promoting the impression of the Federation as a communist organisation. He also voiced concern over the links with the Stockholm Peace Appeal. The moves to correct the image of the Federation as a communist dominated organisation came too late to prevent a number of organisations disaffiliating. These included the Australian Association of Scientific Workers, the Union of Office and Professional Workers of America and the Dutch Association of Scientific Research Workers (VWO).[60] The Institution of Professional Civil Servants had withdrawn from the Federation in 1949 at the height of the anti-communist purge of the civil service.[61]

Further indication of the continuing implications of Cold War politics for the organisation of scientific workers was the decision of the British Home Secretary to prevent a number of foreign scientists

attending a meeting of the Federation's Executive Council to be held in Cambridge. Since the setting up of the WFScW the Council had met on ten occasions; four times in London, five times in Paris and once in Czechoslovakia. The Council meeting for 1952 was to have been held at Madingley Hall, Cambridge from 22nd-23rd March. Leading officers of the Federation were British and members of the AScW - J.D. Bernal and C.F. Powell were Vice-Presidents, Dr. W.A. Wooster was Treasurer while J.G. Crowther was Secretary General. But those excluded by the Home Secretary's decision not to grant visas included Prof. F. Joliot-Curie (President of the WFScW), Dr. Pierre Biquard, Academician Vassily Mikitin (USSR Academy of Sciences), Prof. I. Lebedev (President of the Higher Institutions and Scientific Workers' Union of the USSR), Prof. Tsien San-Tsiang and Dr. Chi Tsin-Jen (Chinese Federation of Scientific Societies), Prof. L. Infeld and Prof. Z. Kuligowski (Polish Federation of Scientific Socieites), Prof. I. Malek (Czechoslovakian Association of Scientific Workers).[62]

The meeting was cancelled amid protests to the Government by the AScW and the WFScW. The Federation charged that the refusal of the British government not to allow foreign members to attend was 'an intereference with the international collaboration of scientists and, thereby, a serious blow to the mutual understanding between peoples'.[63]

It was subsequently arranged that the postponed meeting would take place in Vienna in June 1952. This proved to be an important meeting in ensuring the continued existence of the Federation.

The material basis of the WFScW was only secured by the affiliation of the Trade Union of Higher Educational and Scientific Workers of the USSR, the scientists section of the Polish Teachers' Union and the Hungarian Association of Scientific and Technical Societies - bringing the worldwide membership of the Federation to around 84,000 at the Vienna Council meeting.[64]

3.3. The Politics of the WFScW and the Organisation of Scientific Workers.

The disaffiliation of a number of its constituent organisations confirmed the mounting political pressures experienced by many of the associations of scientific workers. For example, the Australian Association had formally ceased to exist in 1949 although it had been a founder member of the WFScW. Jean Moran, the historian of the Australian AScW, has argued that:

> ...by mid-1946 the whole question of internationalism, free exchange of scientific knowledge and social responsibility in science had become clouded, in Australia, by allegations of Communist infiltration...espionage and security clampdowns. AASW's inflammatory statements opposing the sentences on Dr. Alan Nunn May (a former executive member of the British AScW in 1938) and Canadian scientists (including CAScW's President) convicted in 2 separate espionage trials, and its vocal opposition to the rocket range project proposal for Australia by the British government, played directly into the hands of its critics.[65]

Executive members of the Australian AScW were the subject of 'vitriolic and acrimonious Parliamentary attacks' and 'the scientific community retreated into a reaffirmation of freedom in science in an attempt to salvage its integrity'.[66]

Similarly the American AScW became moribund in the late 1940s but partly also through the rival activities of the Federation of American Scientists. Elizabeth Hodes' history of the American AScW recounts that:

> ...though the AAScW retained some distinguished scientists, it lacked atomic scientists among its membership. In the immediate post-war period, this hurt the organisation by limiting AAScW participation in the main post-war issue - control of atomic energy and forestalling a nuclear armaments race. The atomic scientists seemed a more appropriate group to lead this crusade. So, the AAScW was supplanted. On top of all this, it still had to defend itself against the smear of the 'red' label. It had become an extremely peripheral group through the combination of poor timing, poor strategy, and radical associations.[67]

In contrast the Federation of American Scientists (formerly the Federation of Atomic Scientists) took up an anti-communist position from its inception and its first secretary was dismissed because she was a member of the Communist Party. The Federation did suffer a loss of membership at the height of the Cold War but survived as a valuable and active organisation particularly on the problem of nuclear arms control. While the American AScW had been a member of the WFScW the Federation had rejected all suggestions that it should ally either with the American AScW or the WFScW.[68]

The Dutch VWO bore witness to a similar experience of the hostile environment for political activity by scientists' organisations. Rip and Boeker have written that:

> The increasing social pressures of the cold war, from 1948 onwards, induced internal conflicts in the VWO itself. A report on the frustration of science, proudly announced in 1954 at a conference of the Dutch Universities on 'Freedom and Restriction in Science and its Aspects in Society'...was not published

> because of doubts with regard to its scientific and political validity on the part of the editorial board of the VWO's journal Wetemschap en Samenleving (Science and Society). Bitter discussions took place on whether to issue a public condemnation of the communist regimes and the VWO's membership of the World Federation of Scientific Workers was cancelled (to be resumed only at the end of the sixties).[69]

The British AScW's continued support for the WFScW contributed to its strained relationship with the TUC and was also the focus of political conflict within the Association.[70]

The Association's Science Policy Committee had proposed a joint committee with members of the WFScW Executive Council to promote the Federation in Britain. This proposal was rejected by the Executive Committee which instead constituted its own sub-committee, (consisting of Dr. P.W. Brian, R. Innes, Dr. Mclean, T. Ainley and B. Smith), excluding direct representation from the Federation.[71] This reflected the political sensitivity of the relationship of the AScW to the WFScW and the desire of the Executive to maintain close control in view of adverse criticism. At every Council meeting from 1951 to 1957 there were resolutions calling for the disaffiliation of the AScW. This internal political pressure and the Association's financial problems meant that the Association was unable to give to the Federation the support that many on the left would have wished. The issue of the affiliation of AScW to WFScW was one of the guises under which the conflicts within the Association were expressed through the 1950s.

However, the resolutions proposing disaffiliation were consistently defeated. These resolutions were generally put forward

by industrially based branches such as Runcorn and Widnes, North Gloucestershire, Nottingham and Derby. At the 1951 Council meeting, for example, one resolution argued:

> That the Association should discontinue its affiliation to the World Federation of Scientific Workers on the grounds that:
>
> (1) the policy of the World Federation is inconsistent with that of the Association;
>
> (2) the Association is not adequately represented in the Federation;
>
> (3) the Association needs to make financial economies.[72]

This resolution was lost whilst a counter-proposal, carried at the 1953 Council, instructed the Executive Committee:

> (1) to devote more energy to bring WFSW matters to branches;
>
> (2) to treat the mobilisation of AScW behind WFSW aims with more urgency;
>
> (3) to honour the present financial obligations to WFSW and consider an increase.[73]

This resolution had been passed in the light of the forthcoming Assembly of the Federation in Budapest in September 1953. The Assembly was held at the invitation of the Hungarian Association of Scientists and Engineers. It was attended by thirty five representatives of organisations of scientists in Bulgaria, Canada, China, Czechoslovakia, Denmark, France, Great Britian, Hungary, India, Poland the USSR. The tone of the meeting played down political division and stressed the values of peaceful cooperation in the solution of international problems so that there could be a shift from military preparation to the peaceful uses of science. At the same time, however, there was criticism of the restrictions placed on the freedom of scientists to travel which reflected the

previous experiences with the British and French government's bans on Federation members. The Assembly re-elected Joliot-Curie as President and other principal officers including Bernal and Wooster.[74]

Wooster subsequently responded to criticisms of the Federation and the AScW's close links with it which had been consistently voiced at Council meetings. On the question of finance he pointed out that although in 1946 the affiliation fees had been set at 1½% of subscription income in view of the Association's financial crisis arrangements had been made for its affiliation fee to be only ½% for a number of years. He argued that this was both consistent with the Association's aims and 'value for money' in the sense that the Federation was a means of promoting international cooperation among scientists which was the basis for securing scientific progress and the application of science to human welfare. The Federation's funds were spent on meeting organisational expenses, producing a Bulletin, defending scientists against arbitrary treatment by governments and collecting and disseminating information on scientists' salaries and conditions.

Against the charge that the Federation was controlled by communists, Wooster argued that the ruling body, the Executive Council, was constituted from the affiliated organisations on a democratic basis. It was thus bound to reflect the political character of those organisations - communist and non-communist. Any truly international body was bound to contain communists which would be reflected in the choice of officers - in 'a situation of cold war' it was 'difficult to steer a path satisfying all affiliated organisations' as had been the case in the controversy

over the accord with the WFTU. Wooster pointed out that there had on the other side been dissatisfaction caused by the fact that the Federation had not taken a particular line in relation to alleged bacteriological warfare in Korea which the Chinese affiliated organisation had strongly urged.[75]

Indeed Crowther, the Secretary General of the WFScW, became so disillusioned with the middle-road apparently being pursued by the Federation that he resigned from office in 1954. He subsequently wrote that:

> The policy of avoiding questions on which there were deep differences of opinion, which appeared in the peace movement in 1950, had now become dominant in the WFSW. I followed the administrative rules which they had inspired, but I disagreed with them. When it became clear in 1953 that I would not find a useful channel of work in the WFSW I decided to resign in the following year.[76]

The communist dominated World Peace Council, whose president was Joliot-Curie, had launched a world appeal for an independent inquiry into whether the American (UN) troops in Korea were using bacteriological weapons. The WFScW had remained conspicuously silent on the issue and its resolutions at its Assembly in Budapest in September 1953 had reflected a search for a more neutral position. They had urged that:

> ...scientific workers everywhere should strive to secure the peaceful solution of all international difficulties, so that less attention will be given to military operations and more to peaceful uses of science;
> ...governments should and could, by international negotiations, reach agreement regarding the production of weapons of mass destruction.[77]

The Budapest Assembly had also introduced the new feature of lectures on purely scientific subjects with addresses by Bernal on X-ray analyses of materials, by Watson Watt on the education of scientific workers and by Wooster on differing X-ray reflexions and the physical properties of crystals.

The attempt by the WFScW to distance itself from established ideological positions was a prelude to making a more effective response to what had emerged as the major issue of international scientific social responsibility - the control of nuclear weapons technology. In the next section I go on to examine the WFScW's contribution in this area and particularly to the eventual setting up of the Pugwash conferences.

4. Nuclear Weapons and International Scientific Social Responsibility.

The formation of the Pugwash movement in 1957 owed much to the preparatory work of the WFScW and represented a recuperation of the movement for social responsibility in science at the international level.[78] However, the influence of Pugwash as a scientific pressure group was based on the prestige and eminence of its individual members. This was in contrast to the organisational model on which the WFScW was based which had attempted to combine the defence of the professional interests of scientific workers with the wider political issues of social responsibility. The WFScW potentially formed the base for the formation of an international movement to curtail nuclear weapons testing and to control the nuclear arms race. But the imputation of undue communist influence within the Federation vitiated its ability to develop

this role.

The close connections of Joliot-Curie with the communist inspired 'peace movements' and his presidency of the WFScW were important factors in limiting the general acceptability of the Federation within the scientific community internationally. However, the Federation had made conspicuous efforts to create a lower political profile for itself as a pre-condition for a sustained campaign on the control of nuclear weapons. In response to the Bikini tests of 1954 Joliot-Curie had suggested the idea of a conference of world scientists to undertake an objective assessment of 'the effects of nuclear weapons, the magnitude of the threat facing mankind in the event of their use, and the effects of continued testing of these weapons'. E.H.S. Burhop, a principal member of the AScW's Atomic Sciences Committee and the British Atomic Scientists' Association, was given the task of coordinating the Federation's work on the issue.[79]

Quite independently a massive public response had been generated by Bertrand Russell's radio broadcast 'Man's Peril' of 23rd December 1954.[80] Russell had portrayed the catastrophic consequences for civilised life of nuclear war. The broadcast had also contained the proposal that the neutral powers might appoint a commission of experts to assess the effects of nuclear war. Joliot-Curie wrote to Russell that: 'The danger that faces humanity appears so terribly real that I believe it essential for scientists whom people respect for their eminence to come together to prepare an objective statement on the matter'.[81] As a first step towards this goal Russell proposed the issuing of an

authoritative statement by leading scientists of varied political backgrounds. Russell sought and received Einstein's support for a redrafted version of the 'Man's Peril' broadcast which was to become known as the 'Russell-Einstein Manifesto'.[82]

However, some of the leading figures in the WFScW had reservations about the political overtones of Russell's statement. Alternative drafts had been proposed by Bernal and Burhop but rejected by Russell although he had made some changes 'with a view to conciliating communist opinion' according to Russell's biographer Ronald Clark. Burhop wrote to Pierre Biquard that:

> Of course, he (Russell) remains a convinced advocate of World Government. But he has carefully refrained from referring to that in the document. On our part we believe that peace can only be secure when capitalism and imperialism have been eliminated. But we also do not insist on saying this in the document. That is as it should be.[83]

Einstein's death shortly after signing the draft declaration in May 1955 provided Russell with further reason for resisting any subsequent amendment although Joliot-Curie continued to voice political reservations. There was a further exchange of letters the result of which was his agreement to sign the Russell-Einstein Manifesto but on condition that certain qualifications were added as footnotes. The rhetorical question 'Shall we put an end to the human race; or shall mankind renounce war?' was to be qualified by the phrase 'as a means of settling differences between states' to avoid the implied condemnation of movements (of the Left) in a struggle against injustice within a state and of wars of liberation being fought by subject colonial peoples.[84]

The Russell-Einstein Manifesto was made public on July 9th 1955 amidst a blaze of publicity. Other signatories of the document included P.W. Bridgman, Max Born, Joliot-Curie, L. Infeld, H.J. Muller, L. Pauling, C.F. Powell, J. Rotblat, and Hideki Yukawa. Otto Hahn and Manne Siegbahn, two nobel prize winners, refused to sign because of the communist signatories. Clark comments that opposition to the declaration might have been stronger had the WFScW's role been fully known.[85] The statement naturally commanded the support of the WFScW's affiliated organisations such as the British Association of Scientific Workers.[86] It also received the support of the Atomic Scientists' Association.

The Manifesto called on Governments, in the light of the fact that a future world war would involve the use of thermonuclear weapons, to find peaceful means to resolve international disputes. It called on scientists to 'assemble in conference to appraise the perils that have arisen as a result of the development of weapons of mass destruction and to discuss a resolution in the spirit of the appended draft'. The breadth of support for the declaration represented a significant recovery from the most divisive period of the Cold War. Clark has commented that:

> In 1955 the idea that scientists should concern themselves with world affairs was still discussed seriously only within a very small circle; outside it, such a breakthrough was considered certainly presumptious, possibly ill-informed and probably communist-inspired...as for the Right Wing, those who might have been expected to douche the idea with cold water tended to be non-committal; those in the political centre began, for the first time, to admit the possibilities.[87]

Following the successful launch of the Russell-Einstein Manifesto the WFScW and its affiliated organisations were especially active in promoting moves to an international conference. At the commemoration of the tenth anniversary of the WFScW held in Peking in April 1956, C.F. Powell argued that the principal responsibility of scientists was 'to warn of the destructive effects of war with atomic and thermonuclear weapons and also the dangers arising from test explosions'. Powell spoke of an acute dilemma confronting humanity:

> It will be decided in our times whether the long and painful progress of humanity, from savagery through barbarism to civilisation, is to be followed by an advance towards a splendid future; or whether we are to suffer a stunning blow in a war with atomic weapons, a battered remnant of humanity beginning life anew in a strange world in which even the surviving animal and vegetable life of our planet has assumed strange and distorted forms.[88]

However, the leadership of the Federation were aware of the political obstacles which lay in the path of an initiative sponsored by the WFScW. At the Fourth General Assembly in East Berlin, in September 1955, Burhop had acknowledged that a conference organised by the WFScW 'would be unlikely to be sufficiently broad to produce the desired impact on popular opinion...under such circumstances it might even increase the divisions between scientists of different points of view rather than bringing the maximum possible degree of unity on problems of nuclear weapons'.[89]

Moves to set up a large conference of eminent scientists on the nuclear issue had also been encouraged from another source. Joseph Rotblat of the Atomic Scientists' Association(ASA) and Eugene

Rabinowitch for the Federation of American Scientists (FAS) had been discussing the possibility of organising an international conference on science and society. In the event the conference was not held but under the aegis of a meeting organised by the Association of Parliamentarians for World Government, 3rd-5th August 1955 members of the ASA and FAS together with a number of Soviet scientists had the opportunity to exchange views. The Russell-Einstein Manifesto was endorsed and established three commissions on (1) the assessment of the consequences of nuclear weapons and nuclear power development (with Rotblat as convenor;) (2) the problem of disarmament (with Peter Hodgson as convenor); (3) the social responsibility of scientists (with Jacob Bronowski as convenor). Although the commissions remained dormant the contacts made at the meeting, particularly with the Soviet group headed by Alexander Topchiev, played a significant part in preparing the way for first Pugwash conference.[90]

C.F. Powell as vice-president of the ASA and chairman of the executive council of the WFScW followed up an early contact with Nehru (the founding president of the Indian Association of Scientific Workers) by Russell. New Dehli was proposed as a meeting place for the conference in January 1957.[91]

A conference organising committee including Powell, Rotblat and Burhop met at Russell's invitation to plan the meeting which was to consist of twenty to twenty five eminent scientists chosen on an international basis. Rotblat has pointed out that Russell insisted from the beginning that the proposed conference must in no way be associated with any established organising body, and

that it must consist of a truly neutral and independent effort'.[92] Invitations to the conference were sent out under Russell's signature and on behalf of the other signatories of the Russell-Einstein Manifesto. But the political and material problems of the project were emphasised by the difficulties arising from the Anglo-French invasion of Suez and the Soviet suppression of the Hungarian uprising.

The proposed conference in New Dehli had to be abandoned and the project was only saved by the intervention of a wealthy Canadian industrialist, Cyrus Eaton.[93] He had offered Russell full financial support and the use of his house as a conference centre in the village of Pugwash, Nova Scotia. The first conference was held there in July 1957 two years after the publication of the Russell-Einstein declaration. However, Russell's influence and the whole way in which the Pugwash conferences were to be constituted meant that the WFScW was excluded from direct and public participation. Leading figures in the Federation did continue to play significant parts in the Pugwash movement: Powell was chosen as the first chairman of the conference, Burhop was one of the organising secretaries and Prof. Chou Pei Yuan another active Federation member was also present.[94]

However, the subsequent history of the Pugwash movement and its lack of impact proved disappointing, for example, to Joliot-Curie.[95] The first Pugwash meeting concentrated its activities around three committees discussing radiation hazards, the problems of the international control of nuclear weapons and the social responsibility of the scientist.[96] A second conference on the

theme of 'The Dangers of the Present Situation and Ways and Means of Diminishing Them' was held in April 1958. This was quickly followed by a much larger gathering at Kitzbühel and Vienna, Austria, in September 1958. This meeting (with over 70 participants) issued the Vienna Declaration which, as a statement of principles for the movement, confirmed its stance of political neutrality and non-alignment.[97]

5. Conclusion

The political and ideological divisions within the scientific community were evident in the support given to the Committee on Science and Freedom formed by the CIA-backed Congress for Cultural Freedom. This mirrored internationally the ideological position of Britain's Society for Freedom in Science in opposing the activities of the scientific Left. The Committee on Science and Freedom was responsible for the organisation of the International Congress of Science and Freedom in July 1953, The avowed aim of the Congress was 'to discuss the danger to cultural freedom which has arisen in totalitarian countries especially those behind the Iron Curtain'.[98] The Congress, however, formed the platform for the propagation of the idea of scientific practice abstracted from its historical context and social consequences.

Werskey has suggested that the WFScW was the 'Stalinist equivalent' of the Congress for Cultural Freedom.[99] However, I have sought to show that the origin and evolution of the WFScW reflected a more complex historical process. The WFScW was never

so closely identified as an instrument of communist policy as, for example, the World Peace Council.,

The WFScW was an international organisation of scientists of a new type which attempted to locate their professional and social responsibilities on a trade union basis. However, the failure to achieve many of the objectives laid out in its Charter resulted from the weakness of many of its affiliated organisations (particularly in the West) and the vehement ideological conflicts aroused by the Cold War.

At its formation the strength of many of the newly created scientists' organisations had been over-estimated and some were unable to weather the storms of the rigorous political climate. Some, like the Australian AScW, had been unable to secure the trade union base which had been a feature of the British AScW's wartime success. The Canadian AScW had been undermined by the association of some of its leading members with Soviet espionage activities.[100]

The ideological division of the international trade union movement and the WFScW's links with the communist dominated WFTU created major problems for those organisations, such as the British AScW, whose national trade union movement supported the ICFTU. The Federation appeared to be drawn out of its genuine internationalist aspirations towards the position of a 'front' organisation dominated by a pre-dominantly communist leadership. It was thus unable to create the conditions under which it could aid and encourage the growth of the national associations of scientific

workers which had been a major aim.

The financing of the Federation by its affiliates on a *per capita* basis was a major problem.[101] In its early years Britain's AScW, the largest of its affiliated organisations, was itself hardly able to meet its financial obligations to the WFScW. The future of the Federation was only secured by the affiliation of the Trade Union of Higher Educational and Scientific Workers of the USSR in 1952 which exacerbated further the political difficulties. The Soviet Union had originally restrained the affiliation of its own relevant organisations so as not to appear to dominate the Federation.

During the 1950s the Federation strove to strike a posture of political neutrality but was never able to redress the damage of, for example, its association with the WFTU. It was, nevertheless, able to contribute to the growth of a broader movement for the international control of nuclear weapons. In addition its success was to have maintained a channel of communication between scientists of East and West for the discussion of matters of mutual concern against the background of a world deeply divided along ideological lines. The Federation maintained a unique forum at the international level for the discussion of the social role of science and the social responsibility of scientists in the control of the utilisation and consequences of scientific practice.

Chapter 3

1. Association of Scientific Workers, Science and the Nation (Harmondsworth, Middlesex: Penguin, 1947), p.246.

2. J.G. Crowther, 'The World Federation of Scientific Workers', Nature 160 (8 November 1947), pp.628-29.

3. G. Werskey, The Visible College (London : Allen Lane, 1978), p.276.

4. Elizabeth Hodes, 'Precendents for Social Responsibility among Scientists : The American Association of Scientific Workers and the Federation of American Scientists, 1938-1948', (Ph.D.thesis, University of California, 1982).

5. Jean Moran, 'Australian Association of Scientific Workers, 1939-47 - an overview', paper for ANZAAS, 14 May 1981, p.1. See also Jean Moran, 'Scientists in the Public and Political Arenas : A Social-intellectual working of the Australian Association of Scientific Workers, 1939-49', (M.Sc.thesis, Griffith University, 1982), pp.191-192.

6. A. Rip and E. Boeker, 'Scientists and Social Responsibilities in the Netherlands', Social Studies of Science 5 (1975), pp.457-84.

7. M. Goldsmith, Frederic Joliot-Curie (London, Lawrence and Wishart, 1976), p.175.

8. The definitive historical accountof the U.S.scientists' movement of the 1940s is Alice Kimball Smith's A Peril and a Hope (Chicago, University of Chicago Press, 1965). For an analysis from the viewpoint of political sociology see David Nichols, 'The Associational Interest Groups of American Science' in Albert H. Teich, editor, Scientists and Public Affairs (Cambridge, Massachusetts : MIT Press, 1974), pp.123-170.

9. Goldsmith, Frederic Jolio-Curie, p.175.

10. J.D. Bernal, The Social Function of Science, (London : George Routledge, 1939), pp.186-87. E.H.S. Burhop also recalls a meeting in 1936 in Paris between British scientists from Cambridge and London and Fresch scientists including Langevin and Joliot-Curie in the face of the growing menace of Fascism. 'In these discussions the idea germinated of an international organ-isation of scientists to press for the proper applicatcn of science to constructive ends and against obscurantist and Fascist trends. These discussions were the direct fore-runner of the formation of the World Federation of Scientific Workers' in Burhop, 'Scientists and Public Affairs', in M. Goldsmith and A. Mackay, editors, The Science of Science, (London : Souvenir Press, 1964), p.34.

11. Association of Scientific Workers, 'Scientists and the Atomic Bomb', Press Statement, 1 December 1945, AScW Archives, Modern Records Centre, University of Warwick, ASW/3/3/1.

12. P.M.S. Blackett, 'Fundamental Research', February 1945. Typescript of speech at Session 2 of the AScW Conference, Science in Peace, Blackett Papers, The Royal Society Library, Folder E13. The theme of Blackett's speech was the need to democratise decision making about fundamental research and he saw trade unionism as a way of transforming Britain from a political democracy to an economic democracy. And therefore stressed the importance of AScW's trade union character and links with the trade union movement.

13. P.M.S. Blackett, 'Reflections on the Trades Union Congress 1944', (Typescript), p.4. Blackett Papers, E12.

14. Ibid., p.6.

15. J.G. Crowther, Fifty Years with Science (London : Barrie and Jenkins, 1970), p.314.

16. Manuscript draft of Blackett's presidential address to the Council of AScW, June 1945, Blackett Papers, E15.

17. Goldsmith, Frederic Joliot-Curie, pp.175-76. M.Goldsmith, Sage : A Life of J.D. Bernal (London : Hutchinson, 1980), p.126.

18. R. Innes, 'Science Policy Committee', Scientific Worker 1 (October 1946), p.23.

19. J.E. Mortimer and Valerie A. Ellis, A Professional Union : The Evolution of the Institute of Professional Civil Servants (London : George Allen and Unwin, 1980), p.143.

20. Goldsmith, Frederic Joliot-Curie, fn.p.176.
Representatives were present from scientific workers' associations in America, Australia, Britain, Canada, China, France and South Africa; from the Institute of Professional Civil Servants and the Association of University Teachers in Britain; the Dutch Association of Scientific Research Workers; the Scientific Section of the Union of Polish Teachers; the Federation of American Scientists and the Engineers and Architects Association of Southern California. Observers came from Belgium, Czeckoslavakia, Denmark, India, Italy, Norway, Republica Spain, Invitations were sent to - but could not be accepted by - the New Zealand AScW, the USSR Union of Higher Educational Establishments, the Scientific Section of the American Union of Office and Professional Workers, and the Greek Society for Science Rehabilitation.

21. 'World Federation of Scientific Workers', Nature 159 (15 March 1947), p.365.

22. Crowther, Fifty Years with Science, p.273

23. 'World Federation of Scientific Workers', p.365.

24. Crowther had contributed much to the spelling out of the social responsibility of scientists conceived from a Marxist perspective. See particularly J.G. Crowther, The Social Relations of Science (New York : 1942, reprinted London : Cresset Press, 1967).

25. Quoted by E.H.S. Burhop, 'Scientists in Public Affairs', pp.37-38.

26. J.G. Crowther, 'The World Federation of Scientific Workers', Nature 160 (8 November 1947), pp.628-29

27. Crowther, Fifty Years with Science, p.311.

28. Crowther, 'The World Federation of Scientific Workers', p.629.

29. M.L. Oliphant, 'Rutherford Celebrations in Paris', Nature 160 (6 December 1947), pp.806-07.

30. J.G. Crowther, 'The World Federation of Scientific Workers', Nature, 162 (23 October 1948), pp.644-45.

31. Goldsmith, Frederic Joliot-Curie, p.178.

32. World Federation of Scientific Workers, Science and Mankind No.1, London, 1949, quoted in J.D. Bernal Science in History, 4th ed. Vol.4, (Harmondsworth, Middlesex : Penguin, 1969), p.1291.

33. Quoted in J.D. Bernal, 'Science against War', in J.D. Bernal and M. Cornforth, Science for Peace and Socialism (London : Birch Books, c.1949), fn.p.50.

34. Ibid.

35. H. Pelling, The British Communist Party : An Historical Profile (London : Adam and Charles, 1958, reissued 1975), pp.145-146.

36. Julian Huxley recalled that 'I myself heard Fadeyev, at the Wroclaw Conference of Intellectuals, attack the writing of a number of Western men of letters, including T.S. Eliot (who shortly afterwards was awarded the Nobel Prize for literature), ending up by saying 'if hyenas could use fountain pens and jackals could use typewriters, that is how they would write'! J. Huxley Soviet Genetics and World Science (London : Chatto and Windus, 1949), fn. p.163.

37. Huxley, Soviet Genetics, fn.pp 152-53

38. J.D. Bernal 'Wroclaw and after', Modern Quarterly 4 (Winter 1948-1949), pp.5-21.

39. Werskey, The Visible College, p.277.

40. Julian Huxley, 'Organising the mind of humanity' in Science and the Atomic Age (London : Peoples Press Printing Society March 1947). This was one among five articles which had originally appeared in the Daily Worker by Huxley, Joliot-Curie, Martin Ruhemann John Hughes and J.B.S. Haldane and subsequently collected and published in association with the AScW.

41. J.D. Bernal, 'United Nations Educational Scientific and Cultural Organisation. Report on Activities of British Comittee', (Undated typescript), Bernal Papers, Cambridge University Library, Folder I.F.1.

42. J.D. Bernal, 'International Scientific Organisation', in J.D. Bernal, Freedom of Necessity (London : Routledge and Kegan Paul, pp.249-50.

43. Goldsmith, Frederic Joliot-Curie, p.176.

44. Association of Scientific Workers, Science Policy Committee minutes, M216/46 28 December 1946, AScW Archives, ASW/1/4/1.

45. Crowther (1947), 'World Federation of Scientific Workers', p.629.

46. Crowther (1948), 'World Federation of Scientific Workers', p.644-45.

47. Bernal, 'United Nations Educational Scientific and Cultural Organisation. Report on Activities of British Committee'.

48. Goldsmith, Frederic Joliot-Curie, p.181. By this time Huxley and Needham were no longer with Unesco.

49. Bernal, 'United Nations Educational Scientific and Cultural Organisation. Report on Activities of British Committee'.

50. Goldsmith, Frederic Joliot-Curie, p.181

51. Bernal, 'Science against War', p.51.

52. Daily Worker, (26 May 1947), p.6.

53. W.A. Wooster, 'Value for Money or our capacity to give', Scientific Worker 9 (September 1954), pp.11-12.

54. H. Pelling, A History of British Trade Unionism (Harmondsworth Middlesex : Penguin, 1969), pp.229-30. See also H. Samson 'Big Three Issues of ICFTU', Morning Star (28 June 1983), p.2.

55. Crowther, Fifty Years with Science, p.313.

56. 'Agreement between the WFTU and the WFSW', 7 July 1950, (AScW translation, mimeographed), AScW Archives, ASW/3/23/81.

57. Association of Scientific Workers, Science Policy Committee minutes M93/50 10 June 1950, AScW Archives, ASW/1/4/2/6.

58. Association of Scientific Workers, Science Policy Committee minutes M118/50 22 July 1950, AScW Archives, ASW/1/4/2/8.

59. T. Ainley a delegate for the British AScW explained that although his organisation was not opposed to the WFTU it could not remain a member of the WFScW if the accord was maintained. The British AScW could not allow itself to be expelled from the TUC.

60. Goldsmith, Frederic Joliot-Curie, pp.179-181.

61. Mortimer and Ellis, A Professional Union : The Evolution of Institution of Professional Civil Servants, p.143

62. 'World Federation of Scientific Workers', Nature 169 (29 March 1952), pp.526-27.

63. Times (15 March 1952), p.62.

64. Goldsmith, Frederic Juliot-Curie, p.182.

65. Jean Moran, 'Australian Association of Scientific Workers, 1939-49', pp.11-12.

66. Ibid.

67. Elizabeth Hodes, 'Precedents for Social Responsibility among Scientists : The American Association of Scientific Workers and the Federation of American Scientists, 1938-1948', p.260.

68. D. Nichols, 'The Associational Interest Groups of American Science', p.151-152.

69. Rip and Boeker, 'Scientists and Social Responsibility in the Netherlands', p.463.

70. Interview with Dr. W.A. Wooster, Cambridge, 8 January 1984.

71. Association of Scientific Workers, Science Policy Committee minutes, M.141/50 16 September 1950, AScW Archives, ASW/1/4/2/7. The proposed committee was to have consisted of Bernal, Crowther, Wooster and Murray for the WFScW and Dr. P.W. Brian, Dr. Edwards and R. Innes for the AScW with T. Ainley as convenor. See also Science Policy Committee minutes M.163/50 11 November 1950, ASW/1/4/2/9.

72. Association of Scientific Workers, 'Agenda, Motions and Amendments, 34th Annual Council', 1951, p.21, AScW Archives, ASW/1/1/22.

73. Association of Scientific Workers, 'Agenda, Motions and Amendments 36th Annual Council', 1953, pp.17-18.

74. W.A. Wooster, 'World Federation of Scientific Workers : Assembly at Budapest', Nature 172 (10 October 1953), p.658-59.

75. W.A. Wooster, 'Value for Money - or our capacity to give', Scientific Worker 9 (September 1954), pp.11-12.

76. Crowther, Fifty Years with Science, p.320.
Crowther apparently felt that over time the policies of the WFScW were being shaped to meet the demands of assocations of scientific workers in capitalist countries. The retreat over the issue of the agreement with the WFTU being but one example of this.

77. Wooster, 'World Federation of Scientific Workers : Assembly at Budapest', p.659.

78. A definitive account of the early history of the Pugwash Conferences has been provided by one of its key participants. See J. Rotblat, Science and World Affairs : History of the Pugwash Conferences (London : Dawsons of Pall Mall, 1962).

79. Goldsmith, Frederic Joliot Curie, pp.192-193

80. R.W. Clark, The Life of Bertrand Russell. (Harmondsworth, Middlesex : Penguin, 1978), pp.662-71.

81. Joliot-Curie to Bertrand Russell quoted in Clark, The Life of Bertrand Russell, p.669.

82. For the text of the Russell-Einstein Manifesto see Rotblat, Science and World Affairs : History of the Pugwash Conferences, Appendix 1, pp.39-41.

83. E.H.S. Burhop to Pierre Biquard, quoted in Clark, The Life of Bertrand Russell, p.673.

84. Rotblat, Science and World Affairs : The History of the Pugwash Conferences, p.40. See also Clark, The Life of Bertrand Russell, pp.675-76 and Goldsmith, Frederic Joliot-Curie, p.195.

85. Clark, The Life of Bertrand Russell, p.678.

86. C.F. Powell had successfully moved a resolution at the TUC in 1954 condemning weapons of mass destruction and urging new international initiatives for disarmament. See above chapter 2 section 3.4.

87. Clark, The Life of Bertrand Russell, p.678.

88. C.F. Powell, 'The Significance of Our Times', in E.H.S. Burhop, W.O. Lock, and M.G.K. Menon, editors, Selected Papers of Cecil Frank Powell, (Amsterdam : North Holland Publishing Company, 1972), p.375.

89. E.H.S. Burhop, WFSW Bulletin (March 1956), p.2, quoted in Goldsmith, Frederick Joliot-Curie, p.196.

90. Rotblat, Science and World Affairs : History of the Pugwash Conferences, pp.5-6.

91. Ibid., p.7.

92. Ibid.

93. Ibid., pp.7-8.

94. Goldsmith, Frederic Joliot-Curie, p.198

95. Goldsmith has commented that 'Joliot felt a sense of disappointment at the lack of impact of the Pugwash Conferences. There were no real measures of disarmament, stockpiles of nuclear weapons remained untouched and the number of atomic nations had increased'. Ibid.

96. 'Statement from the First Pugwash Conference, held at Pugwash, Nova Section, July 7-10, 1957' in Rotblat, Science and World Affairs : The History of the Pugwash Conferences, Appendix 2, pp.44-48.

97. 'Statement from the Third Pugwash Conference held at Kitzbühel and Vienna, Austria, September 14-20 1958', in Rotblat, Science and World Affairs : The History of the Pugwash Conferences, Appendix 4, pp.51-58.

98. E. Hindle, 'Science and Freedom', Nature 172 (5 September 1953), pp.445-46. The Congress was attended by over 100 delegates including 4 Nobel laureates. Prominent at the Congress were Polanyi and Baker of the Society for Freedom in Science. Polanyi delivered a paper on 'Pure and applied science and their appropriate forms of organisation'. See Report of the Hamburg Congress on Science and Freedom 23-26 July 1953 (London : 1955), p.43.

99. G. Werskey, 'Making Socialists of Scientists : Whose side is history on?' Radical Science Journal Nos.2/3 (1975), fn.p.37.

100. 'The Canadian Royal Commission Report', Scientific Worker 1 (October 1946), p.29. The Royal Commission report into espionage activities in Canada had claimed that the primary force motivating such activity was sympathy with communist ideologies. The report identified 17 people as agents - 9 scientists, 5 of whom were members of a branch of the Canadian AScW. One of the accused, Prof. Raymond Boyer, was the National Chairman of the Canadian AScW.

101. Wooster to Blackett, 1 November 1948. Wooster was the acting honorary treasurer of the WFScW and wrote following the first assembly that '...Poland, Czechoslovakia, Hungary and Bulgaria promised to give considerable support to the Federation. The British delegates thought is should be possible to raise £100 in this country by private appeals to individuals...There was opposition expressed on the EC of the AScW about a year ago when the proposed was mooted. I think it was felt that such an appeal might comete with the support for the AScW itself'.

CHAPTER 4

THE SCIENTIFIC LEFT AND THE CRISIS OF MARXISM

1. Introduction

At the heart of the practice of the scientific Left was a Marxist approach to the historical and social relations of science. This standpoint was shared equally by Fabian socialists such as P.M.S. Blackett and by communists such as J.D. Bernal. It was linked to a political approach which had characterised the pre-war idea of 'the Popular Front'. Bernal had written :

> In countries like Britain, where the progressive forces are kept divided by rigid party loyalties, hardly as yet affected by the movements in the rest of the world, the scientist individually and through his organisations can best help by making no exclusive commitments and assisting all progressive parties without favour. The kind of help the scientist can bring is in exact surveys of social and economic conditions, in preparing plans on technical questions, and in criticising current civil and military programmes. Inevitably this will of itself help to show the concrete necessities of the situation - the abolition of restrictive private control of the competitive, wasteful and dangerous elements in national sovereignty, and of the exploitation of depressed classes or races - and emphasise the necessity for unity to achieve these ends rather than separate activities which fail as often as they succeed and gain at most partial and ephemeral ends.[1]

In the preceeding chapters I have emphasised the external pressures and constraints which came increasingly to frustrate such a project in the post-war period - the heightening of the Cold War and the reformist outlook of the labour movement.

However, in this chapter I examine the nature of the internal crisis of Marxism which also undermined this scientists' movement. This crisis had a double aspect. There was, accomanying the Cold War, a decisive shift away from the general strategy of 'the Popular Front' towards a regressive sectarianism which was, for example, manifest in virulent criticism of the policies of the Labour Government and the right-wing leadership of the trade union movement. I have dealt with this to some extent in the context of the development of AScW policy and its relationship with the TUC.

At the same time there was a theoretical rupture with the preceding Marxist theory of science and its social relations. This was most dramatically encapsulated in the Lysenko controversy and the emergence of the theory of the 'two sciences' - 'bourgeois' and 'socialist' science. A number of studies have traced the impact of the Lysenko controversy on the wider scientific community and the role of left-wing scientists within it.[2]

However, I discuss briefly two organisations, the Engels Society and Science for Peace whose histories reflect the changing nature of the scientific left.

The Engels Society, established in 1946, functioned initially as a modest discussion group for communist scientists concerned with the application of Marxist philosophy to the natural sciences. It was then propelled by the political and ideological conflicts of the Cold War into the Lysenko controversy. In this second phase of its existence the Communist Party aimed to constitute the Society as a complementary organisation to the Association of Scientific

Workers in the ideological sphere. As the political nature of AScW policies came increasingly under attack, the Engels Society was to provide an alternative forum for the discussion of the politics of science distancing the Association from the Communist Party. The failure of this project with the demise of the Society in 1951 emerged from the internal crisis of Marxism revealed by the Lysenko debates and the success of the ideological offensive mounted, for example, by the Society for Freedom in Science.[3]

The impact of the Lysenko controversy and the implied revision of the progressive role of science divided the scientific Left itself and weakened the appeal to other non-communist progressive scientists.

I go on to discuss the formation of Science for Peace which was an attempt to recuperate a broader base for scientists' involvement in political issues. This too fitted into the broader pattern of communist 'peace propaganda' stemming from the late 1940s. But it was also a response to the particular political constraints that were operating on the AScW and the fact that the Atomic Scientists' Association had, under the impact of the Lysenko controversy, retreated from taking up political positions on Government policy. Science for Peace was to provide an alternative forum for the expression of scientists' social responsibility in the circumstances of an accelerating arms race.

At the same time within the trade union movement major issues of technological change had been placed on the political agenda. As the Communist Party continued to play an important role within the trade union movement it attempted to mobilise its own technical

expertise amongst the scientific Left to develop a Marxist analysis of the new features scientific and technological change. Such analyses would inform the left-wing's interventions - especially on the automation debate - within the Trades Union Congress.

I conclude this chapter with the renewal of the crisis for the scientific Left generated by the events of 1956 - the Twentieth Congress of the Communist Party of the Soviet Union and the suppression of the Hungarian uprising.

2. The Communist Party and Science Policy

A focus for communist scientists' discussions during the Second World War was provided by the 'Faculty of Science' of Marx House in London. For example, a symposium held at Marx House in December 1939 examined the position of science and scientists in the war situation. Participants included the Marxist economist Maurice Dobb and scientists Hyman Levy and J.D. Bernal. In his contribution Bernal traced the historical role of science in the development of capitalism and its effect on the status of the scientific worker. Bernal emphasised that a complete break would have to be made with the capitalist economic system before science could be fully utilised for human welfare. He linked the need for a political response to the 'frustration of science' under capitalism by scientists to the growing realisation by scientific workers of the need for a new type of organisation. Such an organisation should be based on the experience of trade unions in the defence of their economic and cultural interests.[4] (The AScW represented the vehicle for the fulfillment of this strategy).

A similar meeting under the auspices of the 'Faculty of Science' of Marx House was held over the Easter weekend of 1942. This reviewed the state of science and technology in the Soviet Union. The wartime alliance had stimulated interest and enthusiasm in the nature of the social system in the Soviet Union. Bernal spoke on planning in the USSR, Haldane on the condition of the biological sciences and Dr. Martin Ruhemann on the role of the scientific worker in Soviet Society.[5]

In addition to such educative and ideological endeavours a Science Advisory Committee was established within the Communist Party's Industrial Department to oversee the trade union organisation of scientists as it was emerging in the Association of Scientific Workers. Communist Party members played a prominent part in stimulating the successful growth of the AScW and occupied a dominant position within its broader left-wing leadership.

The Science Advisory Committee, in addition to its role in relation to the AScW, was actively engaged in advising the Party's leadership on questions of science policy. In parallel with the concerns of the AScW in science policy matters the Committee was concerned with science and its relationship to economic policy and production, scientific manpower, and atomic energy.[6]

The Science Advisory Committee was responsible for the production of a number of policy statements which included A Plan for Science (1947) and Higher Education (1947).[7] A Plan for Science[8] with its stress on the planning of science and the state direction of research illustrates the close links between the policies of the Communist Party and the AScW as expressed, for instance, in Science

and the Nation (1947). A Plan for Science proposes a similar policy framework - a central body responsible to the Cabinet - the National Research and Development Council which would have the responsibility for drawing up a comprehensive national plan for science. The Council would consist of representatives from the research councils, government departments, the Royal Society, universities, industrial management, the TUC and scientific workers. Again the treatment of industrial research is similar with centralised research planning in the nationalised industries. For the private sector a much more interventionist role for the state is described than that proposed by AScW.

The analysis of A Plan for Science is more overtly based on the theory that monopoly capitalism acts as a fetter on scientific and technological development within enterprises by:

(1) impeding the fullest development of scientific skill and expertise through secrecy, duplication of research and the use of the patent system as a means of suppressing invention;

(2) directing science into channels of little benefit to the majority of people through, for example, luxury production at the expense of long term and fundamental research.

The elements of intervention by the state in industrial scientific research to ensure conformity with the national plan for science included:

(1) the establishment of research institutes to be financed by the state and administered by scientists to conduct research intermediate between fundamental and applied;

(2) a key role for research associations funded by a compulsory levy on private firms with open publication of research findings;

(3) the government to place R & D contracts with firms in highly monopolised industries subject to adequate inspection by scientific workers through their trade unions;

(4) government control of private industrial research through taxation policy.

A Plan for Science outlined an essentially centralist and statist approach to the planning of science but stressed also the extension of democracy into key areas of decision-making in science. The Party's programme was more explicit in its proposals for trade union representation and involvement in the organisation of scientific research. A number of such proposals were made:

(1) trades unions should press for representation on the governing bodies of research associations to exert a direct influence on policy;

(2) to play a full part in the control and management of industry trade unionists should acquire scientific and technical knowledge;

(3) joint production committees should have the same rights to discuss the work of factory laboratories as with production in general;

(4) trades unions should be represented on the NRDC;

(5) trades unions should involve themselves in monitoring R & D contracts.

The document emphasised the necessary alliance between organised scientific workers and trades union movement in general. This should be given material expression in the representation of scientific unions on the workers side of joint production committees. This had been an important campaigning issue of the AScW during the Second World War.

The extension of democratic control is especially developed in relation to scientific workers and coupled to a critique of 'rigid subordination' of scientists to administrators and bureaucrats:

> in every scientific institution the governing body which controls policy should contain elected representatives of the rank and file scientific workers and similarly in government departments.[9]

The document makes clear, however, that the only way of ensuring rational and planned social control of science and technology is within the framework of a socialist society. The fundamental assumption was that science, efficiency and social needs were naturally coincident.[10]

Many of the points raised in the Science Advisory Committee's plan were to have their echoes within later TUC discussions. But more immediately they found expression in the Party's response to the domestic economic crisis of 1947/48 in the statement 'Science and the Crisis'.[11] This again reflected a close coordination of AScW and Party policy, particularly evident during the Bernal's presidency of the AScW. 'Science and the Crisis' was part of an orchestrated campaign launched principally through AScW which saw the conjunction of science and planning as the key to solving Britain's economic problems.[12]

The statement proposed immediate reduction of expenditure on military research and the switching of scientists and laboratories to priority civil research; the drawing up of a plan for science aimed particularly at the nationalised industries based on discussions with industrial workers and scientists (with the objectives of increasing output, efficiency and labour saving); the inclusion of scientists on joint production committees; the establishing of a wages policy which would attract scientists to essential industries.

However, the Labour Government's acceptance of the Marshall Plan was interpreted as a move towards capitalism rather than socialism. The brief period of the Communist Party's critical support for the Labour Government was at an end. Harry Pollitt announced:

> With a Labour Government an active partner in the imperialist camp and carrying through a capitalist solution to the crisis, it is necessary that important changes in the policy of the Communist Party to meet the situation should be made.[13]

Henceforth the organising principle of party policy was to be the Stalinist doctrine of the 'two camps'. Of decisive importance was Zhdanov's speech to a conference of Soviet philosophers in June 1947 which laid down the philosophical groundwork which would transpose the political division of the world into the sphere of science and culture. The critique of 'bourgeois science' became the duty of communist scientists.[14]

The Engels Society assumed responsibility for organising all party scientists while the Science Advisory Committee at Party Centre was 'liquidated'.[15] The organisational pivot for the Party's ideological work became the National Cultural Committee which included leading party theoreticians John Lewis, Maurice Cornforth and Emile Burns. The new combative mood was illustrated by a meeting of the Committee held in November 1947 called to consider a document by Lewis, 'Main Trends on the Ideological Front'. The meeting was to discuss 'the ideological offensive now being conducted by the reactionaries to prepare the minds of the people for war'.[16]

Lewis's report ranged over science, psychology, history, literature, religion and ethics. In the sciences Lewis critically listed a number of concepts for the ideological 'Index':

> (a) science outstrips man's moral development
> (b) science incapable of dealing with values, purposes etc.
> (c) indeterminacy: proves freewill and opens the door to the supernatural
> (d) Jeans and Eddington - science doesn't give us a material world but a spiritual or mental ultimate
> (e) spiritualism and telepathy
> (f) genetics in relation to the superior strata in the community. Superior qualities inherited. Popular in Party circles (psychologists),[17]

It was to become the task of the Engels Society to combat reactionary tendencies in the natural sciences and also in psychology (for example intelligence testing, psychoanalysis and social psychology).

3. The Engels Society

In February 1946 a group of communist scientists meeting at Imperial College agreed to form a Society to meet regularly to discuss the Marxist approach to the philosophy of science and scientific method.[18] This was one of several initiatives taken at the time by the Communist Party to open up discussions on theoretical matters across a wide range of disciplines. This included, for example, the setting up of a C.P. Historian's Group in the same year.[19] The scientists group, subsequently to be named the Engels Society, elected Prof. Hyman Levy as its chairman with Mrs. Kitty Cornforth as the group's secretary. This first meeting heard a paper read by Dr. S. Lilley on 'Causality and Determinism'. And throughout the first year of its existence the topics of discussion were principally of a philosophical character. For example, Maurice Cornforth, who was subsequently to play an increasingly important role in the Society's affairs, delivered a paper on 'Deduction, Induction and the Scientific Method'. This was primarily a critique of Aristotelian logic for its purely formal treatment of inference, its neglect of change and dialectical contradiction and stressing the Marxist insistence on 'practice' as the criterion of truth.[20]

The Bulletin of the Society, first circulated in July 1948, defined its aim as one of coordinating activities in the field of the sciences from a Marxist standpoint to 'organise through discussion of outstanding theoretical and practical problems facing science, combating reactionary tendencies in science and ensure that Marxists shall make their maximum contribution'. Membership would be open to 'all science workers who are concerned with approaching and developing the problems of their science from the standpoint of Marxism-Lenninism'.[21]

The principal and practical preoccupation of the Society throughout 1947 was a project to produce, collectively, a popular text which would describe 'the materialist picture of the world presented by contemporary science'. Maurice Cornforth outlined the central themes of the book in a letter to Bernal.[22] These would include emphasis on applied science, the social function of science and the development of 'technique'. The underlying concern was to present the development of science in terms of the conflict between materialism and idealism. Cornforth wrote that:

> Engels pointed out how three great discoveries i.e. the theory of the transformation of energy, the cell theory and the theory of evolution, already gave in his days the basis for a comprehensive view of the interconnection in nature by means of the facts provided by empirical natural science itself. We try to show in this book how this view has been carried forward by recent developments of science.[23]

Part One, the Physical Universe, was to contain contributions on observational astronomy and the principles of mechanics by George Barnard and Lilli Stein; matter - atoms and chemical elements by

Bernal; nuclear physics by E.H.S. Burhop and R.M. Shackleton on the solar system and the earth. The Second Part would deal with 'Life'; life on the earth's surface by J. Bacon and A. Parker Rhodes; the nature of life and the problem of its origin again by Bacon and Rhodes; the evolution of living organisms by Haldane; the basis and evolution of integrated behaviour by Martin Roth; and V. Gordon Childe would conclude with the evolution of man.

Cornforth met with some difficulty in getting contributors to submit their required sections while at the same time Haldane was critical of the proposed biological section of the book.[24] Despite these practical and theoretical difficulties Cornforth had received the imprimatur of the Party for its production. He wrote to Bernal in November 1947 that:

> I went to see John Gollan about it who made an official statement to the effect that such a book was highly desirable. So I am communicating this to the people who are supposed to be helping in order to stimulate activities.[25]

By March 1948 a number of synopses for chapters had been produced and the book given the preliminary title of Scientific Materialism: the Scientific Picture of the World. (Bernal had drafted around 20 pages of rough notes of his section).[26] Haldane withdrew from the project claiming pressure of work but his relationship with the Party had become strained during this period.[27]

The project was ultimately abandoned in part due to practical difficulties but more as a result of general changes in policy in the response to the Cold War. Ideologically the Party was embarked on a course which would emphasise a dogmatic version of dialectical

materialism as the final arbiter in questions of theory. In particular dialectical materialism was to adjudicate on the political acceptability of scientific theory. The decision to abandon the project for an Engels Society book reflected this 'sectarian' swing in the Party's outlook. Cornforth wrote that:

> It was decided to drop this scheme, since it could not be successfully carried out until much more work had been done in clarifying the issues involved in the Marxist criticism of bourgeois science: the trend of the book was uncritically to present the latest findings and ideas of bourgeois science as the materialist picture of the world.[28]

The Engels Society henceforth was to have a crucial role in elaborating this general critique of 'bourgeois science'. This was emphasised in the autumn Bulletin of the Society in 1948 which clarified the membership aims:

> The Society is in the main intended for qualified scientists who are members of the Communist Party. This should not, however, be interpreted so rigidly as to exclude either non-party scientists or undergraduates who can make a useful contribution. But the main task is to organise the Party scientists in the Society.[29]

The constituency of the Engels Society had originally been conceived as limited to Party scientists directly involved with 'ideological' questions and was not intended to include the trade union organisation of scientific workers.

The key concept to emerge as characterising the Party's work in the ideological field was that of the 'battle of ideas'. The National Cultural Committee was responsible for organising in April 1948 a 'National Battle of Ideas' conference.[30] Meanwhile the

newly formed committee of the Engels Society was organising for its first major conference in the autumn of 1948.[31]

Over 100 communist scientists took part in the weekend conference of 22nd and 23rd October. The aim of the conference was to clarify the 'nature of the frustration and disorganisation of science due to monopoly capitalism' and 'to differentiate the trends of 'bourgeois' and 'socialist' science'.[32] The emphasis on the emergent theory of the 'two sciences' marked an important shift away from the underlying propositions which had animated the previous efforts to politically mobilise scientists - in particular the unity, objectivity and progressive nature of the sciences. The interrogation of the fundamental categories of the natural sciences to measure their consistency with dialectical materialism drew attention away from the need to redefine science policy in light of post-war realities.

The two principal papers at the conference were presented by J.D. Bernal and Maurice Cornforth. Bernal's introductory paper 'Science and the General Crisis of Capitalism' followed the line of the Soviet Marxist interpretation of capitalism.

> The major contradiction, the central feature of the general crisis on capitalism, is the contradiction between the gigantic development of the powers of production, principally in the United States, and the poverty of the working masses throughout the world, particularly in the colonial and semi-colonial countries. The resulting lack of outlets for production capacity is the prime cause of the economic crisis.[33]

Bernal went on to analyse the particular problems of the British economy in the context of this central contradiction - technical backwardness and its parasitic and imperialist nature. Bernal was

sharply critical of the Labour government for failing to tackle the fundamentally capitalist nature of Britain's problems. He believed that government policies were adversely affecting the professional aspirations of scientific workers through a more general attack on workers' living standards. The priority given to the military applications of research and development was distorting and limiting the course of scientific development. While in the civil sphere the sciences were being used to 'palliate the intrinsic inefficiencies of a scarcely modified capitalist system'. Bernal called for a radical change towards 'real' socialist policies.[34]

A feature of Bernal's analysis was the introduction of the notion of the 'second industrial revolution' which was to figure in the discussions of the labour movement on automation in the mid-1950s.[35] Bernal writes that this 'revolution':

> ...requires as a necessary initial condition a scientific, conscious, fully integrated and planned economy incompatible with capitalism. Of course, even the first industrial revolution, as Marx pointed out, was in the long run incompatible with capitalism but it flourished for a time. The second can now only be fully exemplified, as at Oak Ridge, in a distorted form devoted to that one reliable investment of decaying capitalism - War.[36]

Bernal saw the United States as the 'centre of reaction' and principally responsible for the Cold War with the Marshall Plan fulfilling the political and military objectives of US imperialism:

> ...the fruits of the Marshall Plan for European countries and for Britain in particular are: Economic and political dependence on the USA; restriction of basic industries, capital cuts and disruption of post-war recovery; perpetuation of the capitalist system under U.S.A. tutelage; the onset of a new capitalist economic crisis; military preparataions for war against the Soviet Union.[37]

Bernal identified three specific trends in the use of science in Britain on the basis of his general analysis:

(1) the trend towards predominant concentration on war research;

(2) the trend towards an emphasis on immediate export production and away from long-term development in industry;

(3) the trend towards increasing colonial research.

The 'militarisation of science', however, represents the most dangerous distortion of science, '...the objective of destruction is increasingly becoming an objective of blind slaughter without even military excuse...foreign to the whole tradition of science'. Military secrecy in science was spilling over into other fields threatening the open system of communication in science. Concentration on military science drew manpower, equipment and expertise away from application in the civil sphere.

> A healthy science requires to be linked through and through with popular and democratic forces at home and abroad. This means drawing the scientist of the future predominantly from working-class families as representing the most numerous section of the population. It implies education and training scientists not apart from the people but closely in touch with production and trade union activity. It implies an organisation of science of a democratic character and the linking of scientific activity with general economic planning.[38]

For Bernal the responsibility of the scientist was to take action to secure cooperation with other progressive forces so that science could be used for social welfare and peace.

In 'Science against War' Bernal maintained an 'externalist' view of the impact of the new political and economic circumstances on the social function of science. However, the theme of Cornforth's address to the October conference of the Engels Society, 'The Battle of Ideas in Science', was essentially 'internalist', introjecting the 'two camps' theory into the content of scientific theory.

Cornforth elaborated the characteristics of 'bourgeois science' which proceeded from its subjection to the interests of monopoly capitalism. The 'internal logic' of the sciences was distorted by its subjection to the needs of monopoly capitalism which led to unevenness and lack of balance in the development of the sciences. Fundamental research was diverted into harmful and anti-social directions. Scientists become increasingly specialised with the failure to build a 'unified scientific picture of the world which would serve as a weapon of struggle for enlightenment and progress'. The goals of science had become to increase the effectiveness of capitalist exploitation and preparation for war.[39]

Cornforth argued that scientific theory was dominated by 'idealist' and 'metaphysical' conceptions evident in cosmology and physics, the history of science and other areas. This 'internalist' critique was to be elaborated within a number of groups within the Engels Society which were to be established following the conference. For Cornforth the characteristics of 'socialist science' were that it placed science wholly and unreservedly in the service of the people's interests. The 'dialectical materialist world conception' would be the guide in the progressive realisation, in the planning of scientific work as a whole and in the integration of fundamental

theory, of the unity of science:

> To apply dialectical materialism in scientific work is at one and the same time to engage in the sharpest polemical struggle against idealist distortions in science and against the distortion and misuse of science in the interests of capitalist monopolies and their war preparations, and to develop the ideas and methods of progressive science that serves the people.[40]

Four groups were established within the Society, the Physics Group, the Chemistry Group, the Psychology Group and the Biology Group, to investigate 'idealist distortions' in bourgeois science.[41]

The formation and subsequent promotion of the Engels Society by the Communist Party had been inspired by the idea of developing a coherent outlook on the ideological problems of science and the problems of science policy. This contribution was seen as distinct from the organisation of scientists in trade unions. Cornforth commented of 'the tasks of the Party in the sphere of the natural sciences' that:

> There is the task of achieving a clear public expression on the part of the Party regarding major questions of science policy - of which the atomic bomb question is only one, and which it is important to see as a Party task and not as something to be done exclusively through AScW. (The tendency in the past to try to make the AScW the vehicle for the expression of Party policy has had harmful effects in the AScW, and this tendency was rightly corrected by the industrial department.)[42]

But the recognition of the damage done to the AScW by too close an identification with communist policies had come too late. And the theoretical divisions generated by the Lysenko controversy had vitiated the attempt to shift the function of policy development from the AScW to the Engels Society. Little discussion had taken

place on the substantive questions of science policy. Some attempts had been made to form branches of the Society in Leeds, Birmingham, Manchester and on Merseyside. These were short-lived. The Society had failed, as Cornforth recognised, to draw the majority of Party scientists into its ideological discussions and activity.[43]

The Transactions of the Engels Society continued to be circulated until 1952 but the organisation in the form of the Engels Society appears to have ceased to exist between 1950 and 1951. It was replaced by a Communist Party Science Group operating under the auspices of the Party's National Cultural Committee.[44]

4. Science for Peace

The introduction of the Communist Party's programme, The British Road to Socialism, in 1951 placed a new emphasis on the need for alliances between the working class and other social groups and movements in society.[45] It argued the possibility of the advance to socialism in Britain taking place within the terms of the established national and parliamentary traditions and not along the lines of the Soviet model of revolutionary insurrection. Such a perspective required an appreciation of the outlook and interests of other social groups which had been a feature of the pre-war 'popular front' strategy. This implied a move away from the dominant mood of sectarianism established by the response to the development to the Cold War.

However, Cornforth's address to the Party's Science Group in 1951 still emphasised the identification of two distinct trends in science - 'bourgeois science and socialist science'.[46] But Cornforth urged that support should be given to a new organisation Science for Peace whose aim was to unite scientists of all shades of opinion and ideological positions. This was some recognition of the need to promote a more broadly based movement of scientists which did not necessarily endorse stands taken by the Soviet Union. He stated that:

> ...we can understand that the propaganda for Marxist and socialist ideas and methods in science need not arouse hostility and denunciation, but goes hand in hand with a common striving for peace, to settle international differences and ideological differences by methods of peace.[47]

But the credentials of Science for Peace were called into question in the context of the establishment of a number of similar organisations with influential communist backing. These included Authors' World Peace Appeal, Medical Association for the Prevention of War, Musicians' Organisation for Peace, Teachers for Peace and Artists for Peace.[48]

A factor in the formation of Science for Peace was the failure of the Atomic Scientists' Association (ASA) to fulfill its original aims at its foundation in 1946 to press for the international control of atomic energy.[49] Its political role had been undermined by the Lysenko controversy which had divided the membership and provided the proponents of the Society for Freedom in Science with arguments to oppose the involvement of scientists in political questions. By 1951 those who stood out against this trend to 'depoliticisation', such as N.F. Mott, Kathleen Lonsdale and E.H.S. Burhop, were increasingly isolated.[50]

The ASA eventually abandoned the attempt to act as a forum for an independent critical review of government policy on atomic energy. This was reflected in the discussion of policy at the annual general meeting in 1951 held at the Clarendon Laboratory, Oxford, which saw a sharp rebuff for those who wanted the ASA to play a more openly political role.[51] Professor Lord Cherwell advanced what had become the dominant view that the ASA should refrain altogether from expressing views on political matters. He saw the most useful role for the ASA as a source of expert advice, guidance and assistance to the public and Government in technical matters. N.F. Mott, president of the ASA, conceded

that it was not possible for scientists as a body to agree on political matters and thus the Association ought not to make overtly political pronouncements. However, he saw a residual role for the ASA as a forum in which scientists could discuss amongst themselves and with the public the social and political implications of their work. Cherwell on the contrary argued that:

> Scientists wishing to express political views should join frankly political organisations, and allow the ASA to remain as a learned society that could give the public reliable and unbiased statements about atomic energy.[52]

Although no formal decision was made on the basis of the debate, the in-coming president, Prof. M.H.L. Pryce, indicated that the Council of the ASA would take account of the views expressed.

Following the 1951 annual general meeting the Council of the ASA concentrated its attention and efforts on the Atomic Scientists News and refrained from issuing any statements on policy matters. Under Pryce the ASA increasingly adopted the role of a learned society eschewing the political and social relations of science.[53]

Science for Peace received support from many of those who had been active in the ASA and were frustrated by its retreat from politics. In addition the constraints placed on the AScW's involvement in politics also acted as a stimulus for the creation of a new organisation.[54] The proposals to form a scientists' peace organisation were circulated in January 1951 by its provisional secretary Dr. A.H. Gordon. It was proposed to establish a national centre for information and to stimulate the formation of local groups and to coordinate their work. The aims of the new organisation were to include:

> To unite scientists in actions directed towards removing the danger of a third world war and ensuring that science can be fully used for constructive purposes.
>
> To provide the public with the information on the probable effects of a third world war, and on the benefits that properly applied science can bring to mankind.[55]

A letter to the Times signed by a 'provisional Science for Peace committee' announced the formation and aims of the group in August 1951. Signatories to the letter included a wide spectrum of support from diverse political backgrounds: C.A. Beevers, J.D. Bernal, A. Comfort, C.A. Coulson, T. Goodey, F.G. Gregory, R.A. Gregory, Dorothy Hodgkin, Kathleen Lonsdale, Dorothy M. Needham, J. Needham, N.W. Pirie, C.F. Powell, L.F. Richardson, L. Rosenfeld, G.W. Scott Blair, R.L.M. Synge, F. Wood-Jones.[56]

The letter was formulated in terms of what Werskey has subsequently described as the 'liberal ideology of science' emphasising the moral neutrality of science - that it could be used for good or evil purposes:

> The weapons of modern war are a product of scientific technology. Their increasing destructiveness is compelling scientists to recognise their moral responsibility. It is our duty to appeal to people and Governments for a negotiated and lasting settlement which will prevent a recourse to these instruments of extermination... [57]

There was an implicit repudiation of the idea that there was any distinction between 'socialist' and 'capitalist' science:

> ...We assert the international character of science; it is a world-wide republic of the mind. Scientists form one fraternity united in a common concern for human betterment. It is our duty to strive for the removal of all barriers that restrict or embarrass the free intercourse of scientists throughout the world.[58]

The first National Conference of Science for Peace took place on 19-20 January 1952. A statement of principles was adopted in similar terms to those indicated in the statement of provisional aims and in the collective letter to the Times. The statement emphasised the imminent danger of a third world war, the responsibilities of the scientist in the light of the good and evil potentialities of science to educate the public on the benefits of science, the duty of scientists to 'urge the peoples and governments to work for a negotiated, reasoned and enduring settlement that will prevent a recourse to the increasingly destructive weapons of another war'.[59]

Prof. F.G. Gregory FRS was elected as chairman of the National Committee of Science for Peace which consisted of Prof. I. Rosenfeld, Dr. E.H.S. Burhop, Dr. A. Comfort, J.D. Bernal and N.W. Pirie.[60]

A resolution was passed at the conference which called on the Government to enter into negotiations with other Governments with a view to obtaining formal repudiation of the use of biological warfare. This reflected allegations that the U.S. Army had used such weapons in the Korean war. A further resolution affirmed that international agreement on the elimination of atomic weapons with strict international control and inspection was essential if international tension was to be eased.[61] However, its stance on biological warfare linked it to a prevailing pattern of communist propaganda on the role of the United States in Korea.[62]

Thus in spite of the fact that a number of the leading figures in Science for Peace (including its chairman F.G. Gregory) were supporters of the Labour Party, the organisation was proscribed by

the Party in 1952. A resolution carried at the second annual conference of Science for Peace in March 1953 expressed 'profound regret' at the Labour Party's attitude. Gregory charged that the Labour Party's search for political respectability led it to do 'its level best to muzzle criticism of its own members on matters of vital importance'.[63] Support at a formal level was also denied from the AScW for Science for Peace.

The AScW's Science Policy Committee had made recommendations to the Executive Committee that in view of the fact that many of the sponsors of Science for Peace were AScW members it ought to be officially represented at the conference.[64] This recommendation was turned down because of the political overtones of Science for Peace. However, Innes attended the conference in a personal capacity in order to be able to report back to the Science Policy Committee.[65]

The second annual conference also carried unanimously a resolution which 'deplored the pressure on men and women who have recently graduated from university to undertake research at military establishments or within the university under schemes financed by such establishments'.[66]

The explosion of Britain's first atomic weapon at Monte Bello, Australia, in October 1952, according to Burhop underlined the danger in which Britain stood of involvement in atomic warfare. He moved a resolution which called on the Government to make a new approach to America and Russia to secure agreement on the international control of atomic energy.[67] In spite of the formal

distance between Science for Peace and the AScW the two organisations positions on 'Britain's bomb' were very similar. A statement from the Executive Committee had reiterated the rejection of the use of atomic weapons by any nation and had reaffirmed the conviction that an agreement on international control could be reached through negotiation:

> We, therefore, deplore the entry of the British Government into the arms race as a retrograde step and an additional factor contributing to international tension. The recent Annual Council of the Association of Scientific Workers expressed its concern at the waste of scientific effort and public money used in the manufacture of the British atomic bomb and considered that this expenditure of money and effort could have been usefully employed in furthering the industrial application of atomic energy for peaceful purposes.
>
> We, therefore, call upon the Government to combine concentration on the peaceful uses of atomic energy with a fresh initiative to secure international agreement to ban atomic weapons.[68]

Although Science for Peace had attempted to base its appeal on the middle ground of the politics of science it was never able to escape the taint of being a communist front organisation. Nevertheless, through its conferences and its quarterly Bulletin it was able to rehearse many of the arguments, particularly concerning the hazards of nuclear radiation, which were to be later deployed by the movement for Britain's unilateral nuclear disarmament.[69]

5. The Social Relations of Technology

Science for Peace represented an attempt by the scientific Left to draw a wider section of the scientific community again into a movement to oppose the accelerating pace of the arms race. The Left was also called upon to respond to the impact of other aspects of the increasing rate of scientific and technological change particularly on the trade union movement. The issues of automation and the peaceful development of atomic energy had become firmly established on the agenda of the Trades Union Congress. In a special number of the Marxist Quarterly in April 1956 an attempt was made to set that agenda, from a Marxist perspective, for these debates.[70]

Of the five contributors three were influential members of the AScW - Bernal, D.G. Arnott and S. Lilley. Another of the contributors was an influential trades unionist, Les Cannon, who was head of the ETU's education college at Esher. R. Frances provided an interpretation in terms of orthodox Marxist political economy of the introduction of automated machinery.

S. Lilley presented a broad outline of recent technical aspects of automation contrasting developments in the capitalist countries with those in the Soviet Union. This was a central and shared theme in all the contributions. The confident approach and optimistic attitude to science and technology of the socialist countries in general was opposed to the pessimism and ambiguities to be found in some responses in Western capitalist countries. There was an unequivocal belief in the ability of socialism

through planning to harness the full potential of science and technology to the interests of the whole people. The corollary of this was the inability of monopoly capitalism to develop science and technology beyond the bounds of the need to intensify exploitation to maintain profitability or to sustain militarisation.[71]

Lilley in an earlier work had placed technological innovation in production processes in the context of a long-term process of historical transition from capitalism to socialism. A key feature of the development of capitalism had been that for a limited historical period it had been able to play a progressive role revolutionising the means of production to qualitatively new levels of growth and productivity. However, Lilley argued that inherent tendencies within capitalism raised barriers to such continued development.[72]

Automation was identified as a paradigm case demonstrating this effect. Lilley was clear as to the potential social benefits to be derived from the savings in production costs created by the raising or productivity levels resulting from the introduction of automated technologies. The potential benefits included increasing wage levels, lower prices, a shorter working week, longer full-time education and early retirement. Lilley was also committed to the view that a general tendency of automation was the raising of the average level of skill employed in production. Further advantages for workers would include improved working conditions. There would also be higher product quality as a benefit for the consumer.

However, these potential benefits were constrained in capitalist societies by the inherent tendency to overproduction and the saturation of markets. Lilley wrote that:

> Faced with the ever present bogey of possible saturation of markets, management must inevitably be cautious about the extent to which to automate. Machines cannot be given the sack in times of 'recession' as human operators can. The drive for short-term profits must inevitably prevent the far-sighted planning of developments in automation to give the maximum advance.[73]

The logic of the introduction of automation implied the transition to a socialist society:

> ...with the machines and factories owned by the people, so that no sectional interests can pervert the course of technical progress, and with a planned economy which avoided the dangers of unemployement and slump by the very simple (sic) process of arranging to produce what is needed, not what a manufacturer wishes to sell for profit.[74]

And for this reason Lilley was at pains to refute the idea that the Soviet Union was backward in this field. He acknowledged that the USA had made more extensive use of 'bread and butter' automation (for example in the use of automated transfer machinery). The Soviet Union, on the other hand, partly as a result of the needs of post-war reconstruction, had adopted a strategic approach. It had concentrated on the full-scale automation of a number of individual plants, aiming for the complete integration of automated processes, as the learning base for a more widespread introduction of automation when resources permitted. Lilley wrote that:

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introduction of automation in terms of the advantages to be derived by those firms extracting more than the average rate of profit. He argued that:

> Automation in the hands of the monopoly capitalists will be used as a weapon to crush competition, to achieve complete domination of markets and to secure the maximum rate of profit made possible by the great advance in the productive forces.[79]

Francis saw automation as one aspect of a new phase in the development of monopoly capitalism characterised by a 'gigantic struggle for markets'. Automation would greatly increase the power of monopoly firms having sufficient resources necessary for high levels of investment in new plant. The rate of diffusion of new technology would be governed, under capitalism, by employment and wage levels. The impact on jobs and wages, he argued, could to a large extent be controlled or influenced by the trade union movement. This influence could be exerted by pursuing a policy of vigorous struggle for higher wages and against redundancy.

Francis also suggested a number of global effects of automation which would tend to deepen economic crises. These included (a) an increase in the general economic instability of capitalism resulting from the uneven distribution of technical advance; (b) a widening of the gap between the developed and under-developed regions of the capitalist world; (c) a magnification of the contradiction between the productive power of capitalism and the consuming power of the working class. Francis identified both automation and nuclear power as technologies which created the necessity for social revolution:

> Automation and nuclear power will prove tremendously disruptive forces in capitalist society. They represent a very great intensification of the conflict between the material forces of production and the existing capitalist relations of production, between the social techniques of production and the private ownership of the means of production.[80]

D.G. Arnott, secretary of the AScW's Atomic Sciences Committee, placed the development of nuclear power for civil purposes in a similar theoretical framework. Arnott had represented the AScW at the United Nations' 'Atoms for Peace' Conference in Geneva in 1955.[81] He summarised the conclusions reached at the conference in the following terms:

> ...in fission-power we had a source of energy that could fulfill all the demands made on it in the foreseeable future; and that, with reasonable scientific luck, this source of energy would be supplemented by another one which might prove both greater and safer to use. With regard to the fission process there are certain difficulties of detail, and certain alternative processes need to be developed; but the fundamental problems are solved. Scientifically, the days of energy shortage can now disappear forever - a totally new situation in human history.[82]

In discussing Britain's civil nuclear power programme Arnott commented that:

> Capitalism has never shown itself able to absorb the full fruits of science; except in time of war it has always tailed miserably along behind - miles behind. How will it behave now, when faced with the greatest scientific challenge of all - a challenge to which the socialist world will not fail to respond in full?[83]

Arnott located the obstacles to the unrestricted development of Britain's civil programme in the political circumstances of the

Cold War which had given priority to military demands. The peaceful development of atomic energy competed for resources with the military. For example, qualified scientists and engineers employed at the Atomic Weapons Research Establishment ought to be released for the more rapid development of the civil programme. The need to produce military grade plutonium had affected the design of ostensibly civil power stations so as to impair their efficiency:

> It was officially admitted at Geneva that Calder Hall could have had a 50% increase in its power output with an insignificant increase in expenditure by making certain well understood modifications in the design. Now Calder Hall is only economic if its by-product uranium is sold or re-cycled. Clearly, therefore, as long as it is stock-piled for potential military use, British nuclear power will never be a genuine economic proposition.[84]

However, the distinctive feature of Arnott's paper in comparison to those of Lilley and Francis was the introduction of an 'environmental' perspective in which he drew attention to characteristics of the technology which were intrinsically negative. He suggested 'limiting factors' on the development of nuclear technology which were a function of its inherently hazardous nature rather than of particular social relations. He wrote that:

> Broadly, we face two dangers, neither of which can at present be defined precisely. Firstly we are threatened by the possibility of waste radioactivity escaping beyond human control and producing long-term, indirect but profound consequences at the nature of which we can only guess. Secondly, although we know enough to protect our own person from radioactive injury we do not yet know enough to protect our descendants; and the evidence suggests that the radiation levels necessary to produce genetic damage to remote posterity may be far more critical than those which are known to be harmful to individuals during their lifetime.[85]

Thus the potential dangers sprang not simply from military applications (for example, weapons testing) but also from civil developments. Arnott drew attention to the considerable unsolved problems associated with radioactive waste, reprocessing and storage. These hazards were exacerbated by the dangers inherent in a race for the development of nuclear power driven by competition between East and West. Arnott emphasised the call which had been made at the Geneva conference for the establishment of international standards of radiation protection. An issue which he was to take up actively through the AScW and the TUC in the context of proposals put forward by the British government for domestic standards.[86]

Bernal in dealing with the theme of science and education again focused on the contrast between the Soviet performance and Britain which was 'lagging far behind in technical training'.[87] Bernal's analysis of the British shortage of scientific and technical manpower hinged upon an attack on the class-basis of the education system. He saw this system as under threat from the demands of a social and economic system increasingly based on new developments in science and technology. At the same time as a large number of scientifically and technically trained people had to be rapidly assimilated into controlling positions, there was also the need to raise the technical level of the working class generally. The needs of the new science-based industries for higher skill levels, he believed would strengthen the bargaining position of the working class. Thus 'now developments in industry and science were challenging effectively for the first

time, the exclusive directing functions of the bourgeoisie'. This was in contradiction to the 'whole principle of government and industrial management under capitalism...that all directing positions must be in the hands of people who by birth, marriage or interest are sound supporters of the system'.[88]

While the class system over the long term restricted access to higher education; in the shorter term problems also arose from the maldistribution of qualified scientists and engineers. Bernal wrote that:

> Scientists in Government service and industry are most unevenly distributed. In Government service out of 3,700 scientists employed, some 2,700 or 73% are directly employed on military projects and much of the work of the remainder on such subjects as aerodynamics, radar and electronic, clearly connected with it.[89]

Similarly on the basis of evidence from an FBI survey, Bernal suggested that 80% of research workers in industry were employed in engineering, aeronautical and chemical firms again closely linked to defence requirements.

Bernal had already launched his own initiative with the circulation of his memorandum 'The Finance of Fundamental Research in Britain' in January 1956 and was to become linked with the Labour Party's science advisory groups.[90]

Les Cannon in discussing the political and trade union aspects of both automation and nuclear energy launched a more direct attack on the right-wing of the labour movement.[91] He attacked those trade union and labour leaders who uncritically supported the introduction of automation within the framework of

capitalist social relations and in particular J. Crawford of the TUC's General Council who was chairman of both the Production Committee and the Scientific Advisory Committee. He labelled Crawford as a member of the 'great technological advance under monopoly capitalism' school of thought for his defence of 'reformist' motions on automation at the Labour Party and TUC annual conference. Cannon wrote that:

> It is necessary to say that there will be certain developments in the capitalist countries...in the automising of production processes and the peaceful uses of nuclear energy where it serves the aim of securing maximum profit. But the inherent contradiction of monopoly capitalism will not permit any large-scale uninterrupted extension of the use of these techniques, but will on the contrary (if its aims are not defeated) strangle these developments in a tangle of over-production, mass unemployment and misery.[92]

Cannon rejected a labour movement strategy which would be based on a simple attitude of acceptance or rejection of automation. The long term goal was the formation of a 'People's Government' which would 'harmonise material and cultural requirements with the maximum utilisation and development of the highest production techniques'.[93] In the short term Cannon argued for the reversal of existing TUC policy in favour of a policy of resistance to redundancy, guaranteed annual wage increases, increased unemployment benefit, a shorter working week and extensive programmes of re-training. The TUC's General Council should end its 'collaboration with the monopolies' and withdraw from the British Productivity Council. However, the key issue was that of public ownership which alone in the long term could harmonise the relations of production

with the forces of production. It would be wrong, therefore, to argue for nationalisation for 'technological reasons'.[94]

Cannon wrote of the Soviet Union's response to technological change that:

> This supremely confident attitude is based upon the sure knowledge that this Five-Year Plan, which conforms to the law of planned proportionate development of the economy, will be fulfilled as its predecessors were. It is because the social relations of production, based on the social ownership of the means of production, correspond with and promote the further development of the forces of production, thus eliminating periodic crises of over-production and the destruction of productive forces which accompanies these crises.[95]

Cannon's commitment to this view was not to survive the events of 1956. He left the Communist Party as a result of the Soviet suppression of the Hungarian uprising and was subsequently deprived of his post in the ETU by its communist dominated leadership. He had been elected as a delegate to the 1957 TUC Congress but was prevented from attending by the union and became an ally of Chapple and Burne in their struggle to overthrow the leadership of the ETU.[96]

6. Conclusion

In the light of the political events of 1956 the claims made for the socialist countries as models of planned social development were decisively eroded. Khrushchev's denunciation of Stalin's crimes in the secret session of the Twentieth Congress of the CPSU, the social and political unrest in Hungary and in Poland plunged the British Communist Party into crisis. Margot Heinemann has

written of the impact of Khrushchev's revelations that:

> It was soon obvious that support for the CPSU and the Soviet Government could never again be as simple and instinctive as before. Underlying this support had been the conviction that the main forms of oppression and persecution known to us had their roots in the capitalist system and its class and property relations. Once establish a socialist system, it was thought that such oppression would disappear. This conviction had been shattered; it left a theoretical vacuum which the CPSU's resolution of the Cult of the Individual failed to fill.[97]

For some communist scientists, however, the Lysenko controversy had already rendered 'simple and instinctive' support for the Soviet Union problematic. J.B.S. Haldane finally resigned from the Communist Party in April 1956.[98] Ironically on the 2nd April 1956 the Lenin Academy of Agricultural Sciences of the USSR had ordered the republication of the works of N.I. Vavilov and on the 9th April Lysenko was dismissed as president of the Academy.[99]

Divisions within the British Party were further deepened by the Soviet suppression of the Hungarian uprising in October 1956. Hyman Levy was in the vanguard of those who severely criticised the Party's leadership for misleading its members over the situation in the Soviet Union - particularly with regard to anti-semitism. Levy was conscious of a fundamental failure of socialist democracy and self-criticism in the Soviet Union which also had implications for the conduct of the British Party. Levy was expelled from the Party in 1958.[100] He remained an active supporter and elder statesman of the AScW, for example, in November 1959 at the London Area Science Policy Conference he gave a talk on 'the History of Science Policy work of the Association'.[101]

Bernal's responses to the political events of 1956 were documented in his revision of Science in History which was published in its second edition in 1957.[102] The changes from the first edition were partly demanded by the fact that a Russian translation was in preparation as the Twentieth Congress was meeting.[103] The revisions concerned principally Part VI, 'Science in Our Time', and dealt specifically with Bernal's treatment of the Soviet Union and the socialist democracies to incorporate the new interpretation of the course of socialist development under Stalin. Bernal wrote that:

> ...in rewriting the relevant parts of the first edition, which were written during the most acute period of the Cold War, I have tried to bring out the constructive possibilities of science in the hope that the world may settle down to develop its economy and science in peace.[104]

An important feature of Bernal's revision was a reassessment of the Lysenko controversy. Bernal admitted that 'largely on account of the way that the controversy was being used by the protagonists of the Cold War to discredit the Soviet Union I was led to pass over the inadmissable way in which the controversy was conducted in the Soviet Union'.[105] He ascribed the ascendancy of Lysenkoism to its apparent compatibility with the prevailing 'mood and policy' of the government which precluded an objective assessment. Bernal abandoned his earlier view of Lysenkoism as a 'socialist science' embodying Marxist theory and practice and attributed its successful promotion to 'enthusiasm, mostly ill-informed' carrying the day. He recognised his own culpability in earlier debates in defending the unjustifiable 'demotions and

transfers of scientists and the alteration in teaching methods'. The political moral which he drew from the controversy with regard to the role of the state in such matters was that:

> Where the State is deeply concerned with teaching and research in science, and rightly interested in securing the best in both, it can intervene for this purpose, but only on the best scientific advice and never in such a way that only one view in a controversial question is presented. This is now recognised in the Soviet Union.[106]

Bernal's self-criticism was, nevertheless, tempered by a continued sympathy for some of Lysenko's 'scientific' achievements. Now that the controversy had subsided Bernal felt that some aspects of Lysenko's practice was still worth consideration from a physiological and biochemical standpoint. He maintained that Lysenko had achieved some practical success in spite of doubts arising in some cases through lack of adequate statistical controls and some obvious failures. Bernal wrote that:

> Lysenko himself struck me as an honest but fanatical man, impatient of any opposition but with a definite feel for plants and soil. His practice is less like biology and more like certain parts of medicine, an art guided by scientific ideas. All through the controversy he admitted that chromosomes were important in sexual inheritance but were far less important than the factors he was dealing with.[107]

To some extent Bernal's treatment of Lysenko mirrored the theory of 'the Cult of the Personality' which was used to explain the historical significance of Stalin. In 1953 on Stalin's death Bernal had contributed an obituary, 'Stalin as scientist', eulogising his life and work.[108] In his revision of Science in History Bernal attempted a 'provisional interpretation' of the

history of Stalinism in the light of Khrushchev's denunciations and his own previous position. He substantially accepted the Soviet view of the objective and subjective factors which were relevant to such a project. This was to place 'Stalin's life and deeds, his achievements no less than his crimes, must be understood in relation to the events in the Soviet Union and the outside world'. He characterised the history of the world's first Soviet State as 'one of enormous constructive effort against persistent internal difficulties, natural and social, and against the bitter enmity of the capitalists, as exemplified by wars, economic blockades, and unceasing hostile propaganda and attempts at subversion.[109] He acknowledged 'the cruel and criminal nature' of Stalin's personal regime in opposition to the democratic, just and humane ideals of socialism.

Bernal was thus not brought to question the fundamental bases of an economic and social system which had created the political space for the development of the Stalin phenomenon. Indeed he was prepared to argue that:

> Stalin must also have possessed great abilities otherwise his long rule would have brought the Soviet Union to ruin. He never faltered in his resistance to capitalism, nor was his essential loyalty to the economic aims of socialism ever in question. Judged on results alone, the period of Stalin's rule was one in which the economy of the country was built up and its most violent enemies defeated.[110]

Of course it was precisely the vision of socialism which had been brought into question and the means by which it might be achieved.

The Soviet suppression of the Hungarian uprising took place

as Bernal was completing his revision. Bernal had already indicated that the roots of the crisis lay in the negative features in the introduction of socialism in Eastern Europe:

> The tragedy of Hungary was that the change to a more liberal regime came too late and led to bloodshed and the intervention of Soviet forces. When these are withdrawn and an independent Hungarian government established, we may hope that an economy will result capable of preserving the gains of socialism in industry, science and education without the political abuses that marred their introduction.[111]

In his capacity as President of the World Peace Council (an organisation proscribed by the TUC) Bernal had urged that the main aim (both in the case of the Suez invasion and the Soviet intervention in Hungary) was the disengagement of the Great Powers. Foreign troops should be withdrawn from occupation as some sort of prelude to a process of disarmament. He urged that 'vital questions such as the freedom of Hungary can never be decided as long as small countries are forced to be attached to one side or the other in the Cold War'.[112]

In his proscript to Part VI of Science in History, November 1956, Bernal remained optimistic as to the future course of events. He wrote that:

> Viewed in the light of the larger movements of the history of our time, the events in Egypt fall into place as a belated attempt to hold back the advance of African and Asian peoples from their full share in the modern world; while those in Hungary represent a tragic consequence of delaying too long the process of democratization and restoration of national independence which began with the death of Stalin. Both these great movements will go on and will certainly generate more strains

> before they can be brought into harmony with the general world order.[113]

He went on to argue that this posed a particular challenge to social scientists of both East and West to lay bare the sources of conflict and suggested that 'in this re-examination doctrines and laws - Marxist or anti-Marxist - can no longer stand unchallenged'.[114]

Chapter 4

1. J.D. Bernal, The Social Function of Science (London : George Routledge, 1939), p.405.

2. See for example Greta Jones, 'British Scientists, Lysenko and the Cold War', Economy and Society 8 (February 1979), pp.26-57 and G. Werskey, The Visible College, (London : Allen Lane, 1978), pp.292-304.

3. W. McGucken, 'On Freedom and Planning in Science : the Society for Freedom in Science, 1940-48', Minerva 16 (1978), pp.42-72.

4. 'Scientific Workers and the War', A symposium organised by the Faculty of Science of Marx House, December 30-31 1939, Nature 145 (13 January 1940), pp.61-62.

5. 'Science and Technology in the Soviet Union', Nature 149 (16 May 1942), pp.545-547. See also J.D. Bernal, 'Present-day Science and Technology in the USSR', Nature 148 (27 September 1941), pp.360-361.

6. Communist Party of Great Britain, 19th National Congress, Report of the Executive Committee December 1945 to November 1946, p.14, Marx Memorial Library, London.

7. Communist Party of Great Britain, 20th National Congress, Report of the Executive Committee, February 1947 to November 1947, p.13.

8. Communist Party of Great Britain. A Plan for Science (London : C.P.G.B., 1947).

9. Ibid. p.12.

10. See also F. Steward, 'Science and Technology Policies for the Labour Movement - A Review of Post-war Endeavours in Britain', paper presented to the Group for Alternative Strategem for Science and Technology, Aston University, July 1981, pp.4-11, for a comparison of Science and the Nation and A Plan for Science.

11. John Gollan, 'Draft Statement on Science and the Crisis', 6 April 1948, (Typescript), Bernal Papers Cambridge University Library, I.F.2.

12. J.D. Bernal, 'Crisis : Plan of Campaign', August 1947, (Typescript), Bernal Papers, I.F.2.

13. H. Pollitt, 'Report to the Executive Committee', World News and Views (20 December 1947), quoted in H. Pelling, The British Communist Party : A Historical Profile (London : Adam and Charles Black, 1958, reissued 1975), p.42.

14. See M. Cornforth, 'The Recent Soviet Discussions on Philosophy', Modern Quarterly 3 (1947/48), pp.22-43.

15. M. Cornforth, 'Report on Engels Society', June 1949, (Mimeographed), Bernal Papers, I.16.2.

16. John Lewis, 'Main trends on the ideological front for extended meeting of National Cultural Committee 14.11.47', (Mimeographed), Bernal Papers, File I 16.1

17. Ibid.

18. Cornforth to Bernal, 18 March 1946, Bernal Papers, File I.16.1.

19. G. McLennan, 'The History Men', review of The British Marxist Historians : An Introductory Analysis by H.J. Kaye, in Marxism Today 29 (March 1985), pp.39-40.

20. Kitty Cornforth to Bernal, May 1946, Bernal Papers, I.16.1.

21. Cornforth, 'Report on Engels Society', pp.1-2.

22. Cornforth to Bernal, 18 June 1947, Bernal Papers, I.16.1.

23. Ibid.

24. Cornforth to Anita Rimmel, 7 August 1947, Bernal Papers, I.16.1.

25. Cornforth to Bernal, 11 November 1947, Bernal Papers, I.16.1.

26. Bernal, 'Notes for Engels Book', (Manuscript), Bernal Papers, I.16.1.

27. In addition to Haldane's disgruntlement over the Lysenko affair his relationship with the Daily Worker was increasingly strained. He resiged as Chairman of its editorial board in 1950. Although the final breach with the Communist Party was not to take place until 1956. See R. Clark, J.B.S. : The Life and Work of J.B.S. Haldane (London : Hodder and Stoughton, 1968), pp.183-86.

28. Cornforth, 'Report on Engels Society', p.3.

29. Quoted in Cornforth 'Report on Engels Society', p.2.

30. Communist Party of Great Britain, 21st National Congress, Report of the Executive Committee February 1948 to July 1949, pp.12-13.

31. Engels Society Committee minutes, 10 June 1948, Bernal Papers, I.16.1.

32. Cornforth, 'Report on Engels Society', p.2.

33. Bernal, 'Science and the General Crisis of Capitalism', (Mimeographed) p.2., paper presented at Engels Society Conference, 22-23 October 1948, Bernal Papers, I.16.1.

34. Extended versions of Bernal's and Cornforth's contributions to the October conference were subsequently published jointly. See J.D. Bernal, 'Science Against War' and M. Cornforth, 'The Battle of Ideas in Science' in Science for Peace and Socialism (London : Birch Books, c. 1949), pp.3-54 and pp.55-86.

35. The idea of a 'second industrial revolution' was elaborated by Bernal to the idea of a 'Scientific-Technical Revolution' in successive editions of Science in History (London : Watts, 1954), 2nd and 3rd editions : London : Watts, 1957, 1965. Paperback (4th) edition : London : Watts/Penguin 1969.

36. Bernal, 'Science Against War', p.8.

37. Ibid., p.30.

38. Ibid., p.45.

39. Cornforth, 'The Battle of Ideas in Science', pp.60-64.

40. Ibid., p.84.

41. Cornforth, 'Report on Engels Society', pp.3-5.

42. Cornforth, 'Report on Engels Society', p.8.

43. Ibid., p.6.

44. Communist Party of Great Britain, 22nd National Congress, Report of the Executive Committee November 1949 to December 1951. In this report no specific reference is made to the Engels Society in contrast to the previous Congress report.

45. Communist Party of Great Britain, The British Road to Socialism (London : The Communist Party, January 1951).

46. M. Cornforth, 'Report to A.G.M. of Party Science Group'.

47. Ibid., p.4.

48. H. Pelling, The British Communist Party : A Historical Profile (London : Adam and Charles Black, 1958, re-issued 1975), pp.145-146. For a discussion of the formation of Artists for Peace see Lynda Morris, 'The Artists' International Association', Marxism Today 27 (August 1983), pp.40-41.

49. Interview with Dr. Bill Williams at the Second Conference on Science, Society and Education, Leusden, Holland, 19 August 1982. Dr. Williams has been responsible for the ASA's most successful propaganda exercise - the so called 'Atomic Train' - which had toured major British railway stations in 1947 and 1948. The object was to popularise the technical background to atomic physics and to present the arguments for Britain's pursuit of the civil rather than the military application of atomic energy.

50. For an account of the discussions within the ASA see Greta Jones, 'British scientists, Lysenko and the Cold War', pp.45-47.

51. See 'Annual General Meeting', Atomic Scientists News (September 1951), pp.24-26 and 'Atomic Scientists' Association', Nature 167 (15 December 1951), p.1027.

52. 'Annual General Meeting' (1951), p.26.

53. An editorial in the ASA's journal stated: 'We do not presume, as an Association, to advise official circles on atomic energy, for they have their own experts (who are, of course, more often than not, members of the Atomic Scientists' Association). But it is very desirable that there should be a body of informed opinion to lead the public discussion of such as Governmental administration and control of atomic energy'. Atomic Scientists Journal 3 (September 1953), pp.1-2.

54. Amicia Young to the author, 28 January 1984. Amicia Young was a key member of the AScW's Publicity Committee in the 1950s.

55. 'Scientists Peace Organisation', 22 January 1951, (Mimeographed), Bernal Papers, I.31.

56. 'Science for Peace', Times (24 August 1951), p.7e.

57. Ibid.

58. Ibid.

59. 'Statement of Principles' (Adopted by first National Conference of 'Science for Peace' at the Holborn Hall, London, on 19/20th January 1952), Bernal Papers, I.31.

60. 'Science for Peace', Times (21 January 1952), p.3c.

61. Ibid.

62. See chapter 2 section 3.4. above.

63. 'Science for Peace Conference', Times (16 March 1953), p.5c.

64. Association of Scientific Workers, Science Policy Committee minutes, M2/52 15 December 1951, AScW Archives, ASW/1/4/2/17.

65. Association of Scientific Workers, Science Policy Committee minutes, M30/52 23 February 1952, AScW Archives, ASW/1/4/2/19.

66. 'Science for Peace Conference', Times (16 March 1953), p.5c.

67. Ibid.

68. Association of Scientific Workers, 'British Atom Bomb', Statement agreed at the Executive Committee meeting 13/14th September 1952. See also Times (16 September 1952), p.3d. The statement had been prepared by a sub-committee which had consisted of Cassidy, Cope, Wooster, Innes and Burhop.

69. Werskey, The Visible Collge, pp.307-8.

70. 'Atomic Power and Automation : Special Number', Marxist Quarterly 3 (April 1956). The Marxist Quarterly had replaced the Modern Quarterly in 1954 as the British Communist Party's theoretical journal.

71. S. Lilley, 'Technical Aspects of Automation', Marxist Quarterly 3 (April 1956), pp.84-98.

72. S. Lilley, Men, Machines and History (London : Cobbett Press, 1948). Lilley had also produced a text for the Communist Party's Young Communist League which was a simplified account of a Marxist approach to the social relations of science. See S. Lilley, Science and Progress (London : Cobbett Publishing Co., 1944).

73. Lilley, 'Technical Aspects of Automation', p.96.

74. Ibid.

75. Ibid., p.92.

76. J.D. Bernal, 'The know-how of a new era. Russia is making it so must we', Daily Worker (14 February 1956), p.2.

77. R. Francis, 'Economic Causes and Effects of Automation', Marxist Quarterly 3 (April 1956), pp.119-134.

78. Ibid., pp.133-134.

79. Ibid., p.130.

80. Ibid., p.134.

81. A report of the conference prepared by Arnott for the AScW and published in conjunction with the Labour Research Department, see Atomic Sciences Committee of the Association of Scientific Workers, A World to Gain : The Story of the International Conference on the Peaceful Uses of Atomic Energy at Geneva, 1955 (London : Association of Scientific Workers and the Labour Research Department, 1956).

82. D.G. Arnott, 'Power : Technical Considerations', Marxist Quarterly 3 (April 1956), p.102.

83. Ibid., p.106.

84. Ibid., p.117.

85. Ibid., p.110.

86. See chapter 6 section 3.2.2. below.

87. J.D. Bernal, 'Education and Science', Marxist Quarterly 3 (April 1956), p.138.

88. Ibid., p.142.

89. Ibid., p.143.

90. See chapter 7 section 2 below.

91. L. Cannon, 'Political and Trade Union Angles on Automation and Nuclear Energy', Marxist Quarterly 3 (April 1956), pp.67-83.

92. Ibid., p.75.

93. Ibid., p.76.

94. This criticism was directed at the National Union of Public Employees (NUPE) resolution, defeated at the 1955 Congress. See chapter 6 section 3.1. below.

95. Cannon, 'Political and Trade Union Angles on Automation and Nuclear Energy', p.68. Cannon's analysis in particular drew heavily upon the Stalinist Marxism of the late 1930s - embodied in the 'Short Course' edited by a Commission of the Central Committee of the Communist Party of the Soviet Union, History of the Communist Party of the Soviet Union (Bolsheviks) (Moscow : Foreign Languages Publishing House, 1939).

96. H. Pelling, A History of British Trade Unionism (Harmondsworth, Middlesex: Penguin, 1963, reprinted with minor revisions 1969), p.251.

97. M. Heinemann, '1956 and the Communist Party' in The Socialist Register 1976, editors R. Miliband and J. Saville (London : Merlin, 1975), p.45.

98. M. MacEwen, 'The Day the Party had to Stop', in The Socialist Register 1976, p.24.

99. Z.A. Medvedev, Soviet Science (Oxford : Oxford University Press, 1979), p.91. See also 'Scientists in who 'Adjust Facts' Rebuked' Daily Worker (29 May 1956), p.2.

100. Werskey, The Visible College, pp.309-316. See also Saville, 'The Twentieth Congress and the British Communist Party' in The Socialist Register-1976, pp.16-17.

101. H. Levy, 'History of Science Policy Work of the Association', 20 June 1961, (Typescript of a talk given by Prof. H. Levy at the London Area Science Policy Conference in November 1959), Bernal Papers, I.7.1.

102. J.D. Bernal, Science in History (London : Watts, 1954) and 2nd edition (London : Watts, 1957). For a contemporary discussion of Bernal's 'Marxist Vision of history' see J. Ravetz, 'Marxism and the History of Science', ISIS 72 (September 1981), pp.393-492.

103. Goldsmith provides an account of a meeting held in Moscow in November 1957 organised by the Academy of Sciences to disuss Bernal's Science in History on the publication of the Russian edition. See M. Goldsmith, Sage : A Life of J.D. Bernal (London : Hutchinson, 1980).

104. Bernal, Science in History, 2nd edition, Preface, p.xv.

105. Ibid., p.228.

106. Ibid., p.827.

107. Ibid., p.669.

108. J.D. Bernal, 'Stalin as Scientist', Modern Quarterly 8 (Summer 1953), pp.133-142.

109. Bernal, Science in History, 2nd edition, p.831.

110. Ibid., pp.831-32.

111. Ibid., p.850.

112. J.D. Bernal, Daily Worker (6 December 1956), quoted in M. Heinemann, '1956 and the Communist Party', in The Socialist Register 1976, p.48.

113. Bernal, Science in History, 2nd edition, p.864.

114. Ibid.