

educational activities is essential. Ideally, there should be a different educational provision for every student, and it is not beyond the bounds of possibility that one day this will be achieved. Meantime, it is hoped that the proposals made by the Board of Education to encourage educational institutions for research will be used to a considerable extent in the wide and exciting field of adult education. The White Paper suggests that a maximum of £100,000 a year should be spent on educational research. Compared with the amount spent at present, this appears to be a reasonable sum. When viewed against the human problems that need urgent investigation, it seems as inadequate as the other measures proposed for adult education in an otherwise well-designed White Paper.

INDUSTRY AND SOCIETY (2)

RELATION TO GOVERNMENT

THAT there must be some measure of public control of industry is not now seriously disputed. It is accepted explicitly by Mr. Samuel Courtauld in his valuable paper "Government and Industry: their Future Relations", and also in the Unilever Paper on unemployment, which, however, points out that this does not necessarily imply direct control, since the Government already possesses powerful indirect means of control. Production must be adjusted to human needs, not human needs to production, as has too often happened when industry has lost sight of the essential purpose of economic activity. Fundamentally, it might be said that government intervention in industry should be no more than to ensure that economic aims are subordinate to wider social purposes, and to create the conditions in which the desire to make industry a form of essential social service can best develop. It is not a question of size but of direction and fitness for the purpose. The big business may, as Lord McGowan points out, be essential for some purposes; for others the small unit may best serve our end.

When we come to the methods by which that public control is to be effected we have already a wealth of experience on which to call. Of this Madge's book gives an admirably concise survey, if necessarily much less comprehensive than is given in the two chapters on British experience in the regulation of business in Cushman's "The Independent Regulatory Commissions". The question is whether with all this wealth of experience we can agree to think together, as Dr. Barker says, about a solution of economic problems which agrees with the logic and character of our democratic community.

The amount of common ground in the numerous statements and reports which have appeared on this question of government and industry give real reason for hope of a solution by the democratic process of discussion and compromise, provided the issues are

clearly seen and the fundamental principles applied to test the soundness of each solution proposed for a particular problem or industry. Here once again Dr. Barker is an invaluable guide. The issues of common life, he reminds us, do not exist in themselves or in things which can be done and then put away. They exist in persons, and are rooted and grounded in opinions and feelings. The reorganization of industry is really the reorganization of human beings, the redirection of their opinions and feelings. The action of government is fundamentally a psychological readjustment of the opinions and sentiments of human subjects, and no government can deal promptly and successfully with these real issues unless it knows at first hand the opinions and sentiments which constitute the core of those issues, and unless it periodically renews its knowledge to meet the constant renewal of these opinions and sentiments. That is the fundamental justification of the democratic process, and the reason for believing with Dr. Barker that the defects of business enterprise are due to the absence or imperfect development of the methods of open discussion and voluntary agreement which have been so highly developed in the State.

While there is no escape from the necessity of planning in the field of economics, planning enhances the importance of a democratic system of government. It is the essential corrective of human values and a sense of perspective are to be preserved, and in itself prevents planning going to the extreme limits seen in the totalitarian regime. Prof. Zweig, in his book "The Planning of Free Societies", notes that all planned economies have so far failed in practice to establish a real and successful self-government. His appreciation of the work of the Tennessee Valley Authority and analysis of the causes of the failure of the American experiment in the self-government of industry under the New Deal are as pertinent in this connexion as his final review of the conditions for the proper working of planning.

Planning is not a franchise or immunity which lies outside the jurisdiction of free discussion and voluntary compromise. It requires efficient preparation by research and investigation. Its objectives should be limited and clearly defined, for it is a powerful implement which should be used with the greatest care and foresight and applied only so far as is necessary; its abuse may easily destroy the most precious values. To employ the minimum measure of control to achieve a given objective should be the supreme aim, and therefore planning should be restricted to general control.

As Dr. Barker points out, if the State itself forms economic organs such as an Economic Council or a Council for Industry, it does so to facilitate the reconciliation and adjustment of claims and counter-claims prior to the action of the State, to promote the self-planning and self-discipline which are also integral to the economic system, and to achieve fuller and more informed discussion; and not to devolve upon them the burden of decision. When the leaders, directors and experts in the various economic fields are encouraged to do the work of self-planning, that

work is not remitted to their unfettered discretion. The democratic State does not release economic self-planning and self-government from their necessary immersion in the general and total flood of political self-government. All economic planning must be compatible with the liberty of a general society of free minds, and statesmanship must ensure that short-term planning is restricted to its own proper issues and the long-term mode of planning, with its restraints on the distant future, reserved for the great issues which demand its operation.

These considerations suggest that the question of the relations of government and industry is really one of developing good tools of procedure and using them well. Fortunately we may read much encouragement in this respect in the Nuffield College Statement on "Industry and Education" and in Mr. Madge's survey, "Industry after the War". It is implicit in the distinction drawn between three main classes of industry and enterprise that we should choose the tools appropriate to the particular task. First, there are the key enterprises such as the basic utility and transport services. Secondly come major industries occupying vital positions in the nation's economy and apt to fall under monopolistic or semi-monopolistic control, and thirdly there are industries of smaller or medium size to which these conditions do not apply.

For the first there is general agreement that the appropriate form of control is a public corporation, combining a high degree of independence in operation with the necessary safeguarding of the public interest by remote public control. Such control may vary widely in type, and each key industry will require treatment appropriate to its special operational conditions. While the only extension proposed by the Nuffield College Statement for the public corporation is that of transport, it is made clear that the principle is capable of further application, and a timely warning is uttered against the danger, in establishing new forms of industrial organization, of treating as static a fluid situation. Every care must be taken to avoid impeding structural change due to the development of new techniques, or to give a group of producers any vested right to impede the growth of new processes either within the industry itself or outside.

For the second main group of industries the statement proposes the establishment of industrial boards. These would be statutory bodies presided over by chairmen appointed and paid by the State. These boards would be responsible, in consultation with the economic organs of the government, for the formulation of general economic policy for the industries concerned, interpreting the State's requirements to the industry, and the requirements of industry to the State. Consisting mainly of representatives of the industry, including those of labour, they are conceived as a measure of industrial self-government which will promote efficiency while safeguarding public interest, in particular against monopoly. They aim at throwing on industry the responsibility for conducting its own affairs under adequate safeguards for the public interest.

These proposals would go far to meet the dangers to which attention has been increasingly directed of late. They bear some resemblance to the tribunals proposed in 1919 by the Report on Trusts, when the public interest is adversely affected by monopolist organization. The statement is even more explicit on this point in a further section. It advocates dealing drastically with forms of profit-maintenance which result in the indefinite survival of inefficient producers, as well as in unduly high profits for the more efficient. The inefficient producer, unless he is made efficient, must go, subject only to the need for spreading the disappearance of uneconomic enterprise over a period long enough to avoid serious hardships or widespread unemployment.

There are other suggestions with regard to machinery of government in the Nuffield College statement which deserve note. The importance of substantial changes in the recruitment and organization of the public services and in the methods of industrial administration is stressed. Apart from the development of a technique of control and administration which will be effective and reasonably simple both from the point of view of the business man and of the Civil Service, it will in effect be necessary to develop a kind of public administration to deal with the State's new and expanding functions in the industrial field. This in turn involves recruiting new types of men and women, and once again we find emphasized the importance of closer assimilation between the rates of salary paid in public and in private business, of encouraging freedom of movement between publicly and privately administered concerns, of ensuring that technical as well as administrative ability is given the fullest recognition and scope, and of attention to the right training of those who are to enter the service of industry and commerce.

Further, public enterprises, urges the statement, should be so managed as to cover costs, including a reasonable return on their real capital assets, and where any element of subsidy is deemed necessary in the public interest, it should be open and not concealed. To avoid undue rigidity the managerial and technical staffs of public industrial enterprises should not be called upon to work under Civil Service conditions or be given similar guarantees of permanence, although the arrangement of pensions schemes so as to facilitate migration into and out of the public services is advocated. Similarly, the highest administrative positions in all branches of the public industrial services should be effectively opened to all possessing the right personal and technical qualifications, and should neither be the preserve of a particular administrative class nor closed in practice to the best men by inferior standards of remuneration and conditions of employment. Once again we encounter the suggestion of the constitution of standing parliamentary committees as a means of making parliamentary supervision of economic policy more practical and effective, a suggestion which merits more solid reasons for negation than the Government has yet given in Parliament. The publication of informative accounts is only one of the further

measures which the statement suggests to encourage confidence in the integrity of industry and to overcome past prejudices.

The resemblance between this picture of the relations between government and industry and the practical target outlined by Mr. Madge is striking. Mr. Madge visualizes a Minister of Production, but with extended powers and functions more clearly defined, and assisted by both an executive staff, drawn largely from men with experience of the productive side of industry, and a research and advisory staff, to survey industrial problems and draft plans for their solution. Members of this section should not be permanent members of the Civil Service, but drawn from the ranks of management, the professions, the trade unions and the universities. Use would also be made of independent research work in the universities and elsewhere. A similar proposal has since been advanced in the report of the Sub-Committee of the Liberal Party.

Under this government machinery there would be three types of industrial organization, all of which would be given a fair chance to prove their worth: State-owned and State-managed; privately owned with some or all directors appointed by the State; and privately owned and privately managed. In some industries all three methods of control and management might be used experimentally; in others a whole sector would be State-owned or privately-owned. Provision would be made in all types for joint consultation with labour on labour questions and other matters both at the works and at the national level, and books and records should be open for inspection by the research and advisory section of the Ministry of Production, which would review the efficiency of these methods and make its findings public. It will be noted that Lord McGowan recently advocated a step in this direction in recommending the registration of every international trade agreement with the Board of Trade, so that the Government would possess a complete picture of British participation in cartels.

What is hopeful in this whole approach is the emphasis laid on co-operation and a new spirit in industry. Machinery, either in the mechanical sense or in that of organization, is not enough. True it is that there are severe limits to the extent to which industrial democracy is practicable. The number of those sufficiently interested, apart from the question of technical qualification, to take any continuously active part in the management of an industry and the determination of working methods and conditions is relatively small. But while it is important to do everything possible to provide outlets for originality, energy and organizing ability, and to imbue all members of an industry from its directorate downwards with the spirit of public service, it is important that the humblest workers should feel that they have the opportunity to rise higher according to their ability, that their treatment is fair, and that their work provides worth-while opportunities for human energy and skill. If we succeed in this, it will matter little to the workers in any industry that general policy and technical control must be ordered from above. Secure

that policy and control are ordered in the general interest of the community, they will recognize that power as legitimate power, and find in their occupation once more the social satisfaction which is the basis of a functioning society.

It should be noted that the Nuffield College Statement looks to social security legislation on the lines of the Beveridge Report as providing a necessary foundation for better industrial relations as well as to this greater publicity, and its concluding emphasis on the key factor of management and the powerful reaction of the situation on the position of managers and technical staff will be noted by scientific workers.

The fuller recognition of industrial management as a skilled profession, requiring both high personal qualities of enterprise and imagination and appropriate forms of special training, should not only improve the technical efficiency of industry but also foster good relations among all who are partners in the work of production. Moreover, the more industry becomes a partnership of all grades and sections of those engaged in it, the greater become the demands upon its managers for skill in the democratic handling of men as well as in the technical sphere. But even the question of closer collaboration between industry and education is secondary to that of collaboration between industry and the consuming public, and between those responsible for the direction and management of industry and those they employ. All engaged in industry must put first in their relation to industry the aim of serving the public, so that no question of sectionalism or exploitation can arise to disturb the confidence and good relations existing between industry and the rest of the community.

CHEMICAL PHYSICS: THE COMMON THEORETICAL BACKBONE OF CHEMISTRY AND PHYSICS

Introduction to Chemical Physics

By Prof. J. C. Slater. (International Series in Physics.) Pp. xiv+521. (New York and London: McGraw-Hill Book Co. Inc., 1939.) 33s.

A WORD of apology is due to this book and its author for the delay in this review. The review copy was received by the reviewer just before he started for Canada on a liaison mission which lasted some ten months. On his return the book was overlooked until recently, when, during a prolonged period of leave, it was found and studied with avidity, and the writing of this notice at last undertaken. The book is excellent, and, no matter how great the unfortunate delay, deserves a proper notice in the columns of NATURE.

What precisely is 'chemical physics'? The author gives one answer in his preface which the reviewer willingly accepts. One may define, roughly, chemistry as the science of atoms and the way they combine, and physics as the science of interatomic forces and the large-scale properties of matter resulting from