

CLIMATES FOR RESEARCH

Scientists in Organizations

Productive Climates for Research and Development. By Donald C. Pelz and Frank M. Andrews. Pp. xii+318. (New York and London: John Wiley and Sons, Inc., 1966.) 80s.

THIS is the work of two American social psychologists and it deals with the factors which are favourable to progress in original scientific research when the work is done both by individuals and teams. Observations and opinions of the work of more than 1,300 scientists in university, industrial and government laboratories in the United States were obtained. The numbers of scientists considered were large enough for a proper statistical analysis of the results. The authors claim that the book is based on more extensive objective and quantitative data than has ever before been examined in this area. The study is particularly useful in that the crucial laboratory factors can be modified to some extent by the heads of research departments, managers, and the scientists and technicians themselves. There can be no doubt that much of this investigation is valid for work in British scientific research institutions, but there are differences. The great difference in esteem between the Master's postgraduate degree and the PhD which is held in America does not obtain to the same extent in Britain. The deeper purse which finances many investigations in the United States and the generous staffing which is conducive to adequate teamwork with a well-spread set of complementary specialisms, common in America, are rarer and ideal in Britain. Reasonable financial rewards will operate as a stimulus both to the individual as a person and to the team as an organization which often requires highly sophisticated and expensive apparatus, which on occasion will try the resources of heavy engineering. Research, even in subjects other than physics, has moved far from Rutherford's "tobacco-tin stage".

The authors have portrayed their findings with many charts and tables, and have provided a complete description of the research on which the findings are based. This, in itself, is useful as a model and guide for other workers in sociological fields, who at times have used statistical formulae with little background knowledge of experimental techniques and the interpretation of results. It should be kept in mind that all the statistical analysis in the world may be helpless if the very rare Newton, Planck or Rutherford is caught in their net!

The chief areas which were explored by the authors of the book were freedom, communication, motivations, satisfactions, creativity, age, groups and co-ordination. The principal factors of the results of the researches show that effective scientists were self-directed by their own ideas and valued freedom. But at the same time they allowed several other people a voice in shaping their directions; they interacted vigorously with colleagues. Effective scientists did not limit their activities either to the world of "pure science" or of "applied science" but maintained an interest in both. Their work was diversified. Effective scientists were not fully in agreement with their organization in terms of their interests; what they personally enjoyed did not necessarily help them to advance in the structure. Effective scientists tended to be motivated by the same kinds of thing as their colleagues. At the same time, however, they differed from their colleagues in the styles and strategies with which they approached their work.

In effective older groups, the members interacted vigorously and preferred each other as collaborators; yet they held each other at an emotional distance and felt free to disagree on technical strategies. Thus, in numerous ways, the scientists and engineers who were studied did effective work in conditions which were not completely comfortable, but contained "creative tensions" among forces pulling in different directions.

Among the interesting by-products of the research, which appeared when it seemed important to remove the effects of certain extraneous factors, was the fact that PhDs in government research in America published 50 per cent more than university PhDs, and assistant scientists in government research published twice as much as those in industry. This appeared to stem from the obligations of government laboratories to let the public know where their money was going. Again, the relatively low publication rate among scientists in industrial laboratories could be attributed to "company security".

W. L. SUMNER

OBITUARIES

Professor H. N. Green

HARRY NORMAN GREEN, who died on May 16 at the age of 64, published many papers on nutrition, traumatic shock and the immunological aspects of cancer.

He graduated MB, ChB from the University of Sheffield in 1924 and the next year gained his BSc, with first class honours. His MSc and MD followed in 1926 and 1927. He then combined the posts of clinical assistant to Sir Edward Mellanby at the Royal Infirmary, Sheffield, with that of research assistant in the department of pharmacology. After two years as lecturer in pathology at Cambridge, he returned in 1935 to Sheffield as professor of pathology. In 1953 he became director of cancer research at the Universities of Leeds and Sheffield and professor of experimental pathology and cancer research at the University of Leeds.

Green was interested in that part of experimental pathology which has a bearing on clinical medicine. His earlier work, in collaboration with Sir Edward Mellanby, concerned the effects of vitamin A deficiency in the spread of infection. The advent of the sulphonamides as clinically effective antibacterial agents led him to study their mode of action. He demonstrated that bacteria produced one, or possibly more, factors capable of inhibiting the action of the drug. He made considerable progress towards the characterization of these factors.

The advent of the Second World War produced an immediate interest in traumatic shock; Green was approached by the Medical Research Council to investigate the problem. On the basis of conclusions drawn from the clinical examination of cases of industrial injury, he and his collaborators began to examine the problem experimentally. It was shown that adenosine triphosphate and related nucleotides accounted for the shock inducing properties of muscle extracts. A period as leader of British Shock Team 2, Royal Army Medical Corps, enabled him to demonstrate the release of nucleotides from the injured tissues of battle casualties and thus to confirm in man the experimental findings. The background to this work was described in a monograph with Dr H. B. Stoner, entitled *Biological Actions of the Adenine Nucleotides*.

Green's interest in cancer started with a series of investigations on the carcinogen, 2-acetylaminofluorene. These were followed by the study of those fractions of coal tar which were able to inhibit the growth of transplanted tumours in animals, work which was never published in full because of the fear of raising false hopes of an impending cure for cancer. A number of chemically pure tumour inhibiting but non-carcinogenic compounds were isolated and were also shown to be without effect on induced or "spontaneous" tumours in rodents. It was the consideration of this work which led, in 1954, to the immunological theory of cancer. The idea that immuno-