

# BOOK REVIEWS

Selection of books for review is based on the editors' opinions regarding possible reader interest and on the availability of the book to the editors. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.



## DIALOGUE OR DIE

*Title* Unless Peace Comes  
*Editor* Nigel Calder  
*Publisher* Viking Press, Inc., 1968  
*Pages* 243  
*Price* \$5.75; \$1.95 paperback  
*Reviewer* W. A. Higinbotham

Science and engineering have played an ever more active role in warfare in recent times. To coordinate this effort the National Academy of Science was established during the Civil War and the NRC during World War I. In the Second World War, the whole scientific community was involved in developing weapons and counter weapons. Although the impetus for involvement has not since then been so compelling, a substantial fraction of the technical community is still involved in defense work. Not only has nuclear power come of age, but nuclear weapons and delivery vehicles have gone through four or five generations of "improvement" without increasing the security of any nation or the world as a whole.

The contributors to this volume believe that arms control, rather than arms development, offers the better chance for survival and, to illuminate this belief, they try to visualize what lies ahead on the present course.

Sir John Cockcroft and David Inglis discuss the present dilemma with regard to nuclear weapons, the destabilizing and dangerous implications of anti-ballistic missiles, multiple individually-guided reentry vehicles, and fractional orbital bombs. However, the essential point of this collection is that nuclear missiles are not the only possibilities

by which increased understanding in many fields may be exploited for military purposes. A widely recognized field is that of chemical and biological warfare, on which the US spends at least \$300 million a year. This subject is treated thoughtfully by Profs. Fetizon and Magat of the Faculté des Sciences, Orsay and Prof. Heden of the Karolinska Institute, Stockholm. While unquestionably very potent, there are tactical as well as humanitarian questions, so far, which tend to inhibit their use, but the tactical situation may change.

Any collection of essays must be uneven in content and effect. I found the chapters on automatic and on psychological warfare unconvincing and weak. On the other hand new (at least to me) thoughts on weaponeering are suggested by William Nierenberg for employment in the deep oceans, and by Gordon MacDonald for exploiting meteorology.

Perhaps most thought provoking, for those who don't often participate in the decision-making process, are the chapters by Andrew Stratton of England and Harvey Wheeler of the US, both of whom have been exposed to this process. "Diplomacy is already one of the chief victims of computerized thermonuclear warfare," states the latter, a frightening thought if true. This, perhaps, is the basic problem. It is too much for any one person to comprehend the technical situation and possibilities, much less to understand all the political and human factors which relate to conflict and to conflict resolution and which are intertwined with the arms race.

This little volume is a useful look at the present and the future, especially for the technically oriented. It is dispassionate and factual in the approved scientific manner and good basic material for the engineer or scientist who would contribute

responsibly to the dialogue on which survival must depend.

*William A. Higinbotham came to Brookhaven National Laboratory in 1948 and for 20 years was in charge of the Instrumentation Division. Last year, he transferred to the Nuclear Engineering Department where he and Herbert Kouts head BNL's safeguards work. His AB (1932) is from Williams College, which also awarded him an honorary DSc degree in 1963. His intense activity and interests (which range from square dance calling to participation in official discussions on arms control) are illustrated by the fact that one week after we asked him to review this book our reply post card was returned with the notation in discouragingly large letters: "I can't possibly." Yet a month later, when we phoned to find out why the book hadn't been returned, his secretary informed us that he began reading it, couldn't quit, and would write the review after all.*

## WHERE RESEARCH IS NEEDED

*Title* Radiation and the Control of Immune Response  
*Publisher* United Nations Educational, Scientific and Cultural Organization, 1968  
*Pages* 126  
*Price* \$2.50  
*Reviewer* William R. Bibb

The use of ionizing radiation in industry, biological sciences, and

medicine is increasing at a rapid rate. It has been well established from laboratory experiments and the therapeutic use of ionizing radiation that the immune system is exceedingly sensitive to irradiation. This sensitivity of the body's defense against infections presents a significant problem in medical management of patients exposed to high doses of therapeutic radiation as well as workers in the atomic energy industry who might be exposed accidentally to substantial amounts of radioactive materials. Also, it is worth recalling that this ability of radiation to suppress the body's capacity to reject foreign tissue can, and does, play a role in instances where this is desirable, i.e., in organ transplantation.

At present, the immune system of man, its regulatory mechanisms, and functions are still poorly understood. Most of our knowledge in this field originated from animal experimentation. It is not clear to what degree data obtained in various animal species may be transferred to conditions in man. In particular, the effects of ionizing radiation on the immune system in man are obscure.

In order to evaluate the possible immunological impairment caused by irradiation in man, a fuller understanding of the immune response under normal conditions is needed, in conjunction with studies conducted under stress conditions such as those following an exposure to ionizing radiation.

Recognizing this, the International Atomic Energy Agency convened a panel at the Foundation Curie in Paris with the co-sponsorship of the French Atomic Energy Commission on June 22-24, 1967, to discuss the effect of irradiation on the immune response and to make recommendations to the IAEA regarding further research in this area. The meeting was attended by 19 scientists from 14 countries and chaired by Professor G. J. V. Nossal from Australia. Representatives of the World Health Organization and the International Labor Organization also attended.

During the meeting 16 papers were presented and discussed in detail by the participants. The scientific presentations dealt with the induction of immunological tolerance to non-living antigens, studies of the primary antibody response induced *in vitro* by cells from normal ani-

mals, the transplantation of fetal hemopoietic cells into irradiated monkeys, structural and functional characteristics of gamma-ray irradiated human globulins, the capacity of the irradiated animal to recover its immunological competence following irradiation, and the mechanisms of action of irradiation as an immunosuppressive agent. The full text of these presentations and summaries of the discussions are included in the *Proceedings*.

At the conclusion of the formal presentations, the participants considered the following questions posed by the IAEA: 1) "What impairment of the immune response is to be expected in persons exposed to radiation hazards or being treated with any form of radiation?" and "What kind of control would be desirable and by what technique could it be achieved?" 2) "What type of research in radiation immunology should receive priority when granting research support?"

The general conclusions of the participants regarding these questions are included in the *Proceedings*. Currently, it appears that exposure to high doses of irradiation severely impairs but does not completely eradicate the immune system in man. Little attention has been given to a systematic evaluation of the immunological consequences resulting from low doses of irradiation in man. This lack of understanding of low-dose effects would make suggestions, for routine evaluation of individuals exposed to ionizing irradiation, premature. Clearly, more emphasis should be placed on defining the impairment of the immune response in humans receiving repeated low-level diagnostic or therapeutic exposure.

A major portion of the results included in the *Proceedings* have been published in appropriate journals. However, this publication may serve a useful function since it contains a considerable amount of data on the effects of irradiation on the immune system, between one set of covers. The general conclusions at the end of the book should be of interest to those concerned with the safety of workers or patients exposed to irradiation, particularly low doses of irradiation from internal or external sources, since the conclusions point out specific areas that require further research effort.

*William R. Bibb, a member of the Medical Research Branch of the USAEC, was the US representative to the IAEA Panel on "Radiation and the Control of the Immune Response." Prior to joining the USAEC in 1965, he was on the faculty of the University of North Carolina Medical School. His research interests include the effect of ionizing radiation on the immune system and the abrogation of this injury with bone marrow transplantation. His PhD degree is from the University of North Carolina at Chapel Hill.*

### STRONGLY RECOMMENDED

*Title* The Encyclopedia of the Chemical Elements  
*Editor* Clifford A. Hampel  
*Publisher* Reinhold Book Corporation, 1968  
*Pages* viii + 849  
*Price* \$27.50  
*Reviewer* W. Conard Fernelius

With the wide variety of books available today, the individual scientist is hard pressed to decide which of the available books he should purchase so that they will be available for ready reference. *The Encyclopedia of the Chemical Elements* is a must for this purpose.

The object of this volume is to present in a concise and authoritative manner information on the nature, properties, and behavior of each of the 103 elements. The emphasis in the articles about the individual elements is on the *elemental form*; this is just the kind of information lacking in most books on inorganic chemistry. This encyclopedia stresses recent advances and includes for each element material on its discovery and history, its prevalence, sources, derivation, physical properties, isotopes, nuclear properties, chemical behavior, the importance of the element and its compounds, applications of the element, and its biological and biochemical nature, including toxicological factors. In addition to the articles about the individual ele-