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It is difficult to prepare a meaningful review of any Symposium; one has to have participated directly. Furthermore, there is usually only a skeletal continuity to the program, and there are often many gaps in the scope of the information that is presented. This particular Symposium was characterized, in a few well chosen concluding remarks by Joseph Silverman, University of Maryland, as "the most realistic group I have ever encountered at a radiation processing meeting. . . . When a speaker has been optimistic, he has been challenged from the floor, specifically on matters of cost and feasibility . . ." Indeed, the published discussions to the papers provide valuable additional insight to the progress and problems in this specialized field, and the lively tempo of the Symposium can be discerned in these informal remarks. The multilingual reader will also benefit from those reports that are published in French and Russian.

As a staunch defender of electron accelerators, I have to take issue with Silverman's criticism that "they are still inadequate as radiation tools," although I must admit that I found little in the Proceedings of the Symposium to rebut his words. It is indeed unfortunate that there are so few published details on the long-term performance of electron accelerators in production use. These data certainly exist, but in some cases at least they are considered as proprietary information.

Rather than to comment individually on the reports on so many varieties of radiation-induced processes, I prefer to generalize by saying there is in these Proceedings a wealth of interesting (and sometimes provocative) data and commentary for the industrial-process engineer as well as for the radiation chemist.

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*president of High Voltage Engineering Corporation, with which he had been affiliated since 1947. He has been involved, since 1939, in the development of particle accelerators and their applications in research, medicine, and industry. A member of several scientific and technical societies, he is currently a member of the Board of Directors of the American Nuclear Society and a member (past chairman) of the ANS Publications Committee. His BS degree (in physics and chemistry) was won from Massachusetts Institute of Technology in 1943.*

*Title* Handbook of Atomic Elements

*Author* R. A. Williams

*Publisher* Philosophical Library, Inc.

*Pages* 125

*Price* \$6.00

*Reviewer* Adrian H. Daane

This is a book containing one page of data on selected properties for each of "the atomic elements" (supposedly omitting the non-atomic elements). It provides little or no information not available in the many other handbooks already published, although the arrangement may be more convenient for some purposes. A brief examination of the book found the following points which raise questions about the general value of the publication:

1. The number of protons and number of electrons are tabulated for each element as items of data, an unnecessary semi-redundancy.
2. The choice of 30°C for the standard state seems strange.
3. The hexagonal unit cell (p. 116) is incorrect.

Although a random checking of some of the specific values of some of the data found them correct, the work does not seem such that it can be recommended for the \$6 price when everyone is forced to carefully budget expenditures for one's pro-

fessional library. Of even more concern is the fact that this represents a cluttering of the literature by an uncritical publisher.

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*Title* Peaceful Uses of Atomic Energy in Africa

*Editor* International Atomic Agency and the Nuclear Science Commission of the Democratic Republic of the Congo

*Publisher* Unipub, Inc.

*Pages* 574 + front and rear material

*Price* \$16.00

*Reviewer* David M. Richman

It has long been my view that the publication of the proceedings of a symposium, except when the subject is limited and the papers provide complete and up-to-date coverage, is anticlimactic; the value of a symposium comes from the interaction among its participants and what they derive from it. The proceedings normally have limited value and any major scientific contributions are ultimately published in scientific journals that receive much wider dissemination.

There is, I have happily discovered, another aspect to the publication of proceedings of symposia. It is in the recording of problems and the grouping together of approaches to their solutions. *Peaceful Uses of Atomic Energy in Africa* is an important contribution to recording such problems and the evolution of

science and technology in Africa. There is much interesting information about the more urgent problems, social and economic as well as technological, which confront the African nations. The role that atomic energy can play in providing solutions to these problems is presented effectively in many good and varied papers, two-thirds of which are published in French, the rest in English.

The symposium was organized by the Organization of African Unity in collaboration with the IAEA and the Nuclear Science Commission of the Democratic Republic of the Congo. It was held July 28 to August 1, 1969 in Kinshasa, in the Congo.

The location of the symposium and the large attendance by scientists from the Congo demonstrated the tremendous benefits gained as a result of the availability of a 50-kW TRIGA Mark I reactor which originally had been placed in operation in 1959 and had been acquired with financial assistance from the United States. This reactor, the first one in Africa, received prominent mention because of the use it receives for isotope production and activation analyses. It is in a center for training in the Democratic Republic of the Congo and used for that as well. There were two other operating nuclear reactors in Africa at the time of the meeting. They are in the United Arab Republic and in South Africa.

Many of the "peaceful uses" discussed will be familiar to American scientists and engineers. The successful use of isotopic tracers in the developed countries, for instance, has been a stimulus for similar efforts in Africa. Such efforts clearly reflect, however, a deep awareness of regional problems and the need for local support of these efforts in the developing countries where technical resources are limited.

Of great value to the participants is the final section of the proceedings which contains the report and recommendations of the OAU on the symposium. They tend to be specific and practical. OAU member states are urged to use atomic energy for peaceful purposes in all relevant fields as a part of their day-to-day activities and to incorporate such uses in appropriate projects in their overall development plans. The ag-

ricultural sciences session, for example, resulted in a set of recommendations for ordering the priority of research topics, stressing international cooperation, emphasizing regional studies on livestock diseases.

There were eight sessions in the Symposium. The first, "Evolution of Nuclear Science in Africa," included five papers that provide historical perspective as well as interesting data and information on the role of nuclear science in African economic and social development.

The opening address was given by Dr. A. Mustafa, Minister of Scientific Research, and Chairman of the Board of Directors of the Atomic Energy Establishment, Cairo, UAR. His remarks are worth quoting:

"The symposium has particular importance, not only because it is the first of its kind to be held in Africa, but also because it deals with a relatively new technology that is considered to have far-reaching potentialities for the future scientific, economic, industrial and social development of the developing countries. . .

"For the continent of Africa, which has suffered a long era of foreign domination and under-development, and which is now passing through a phase of active development of its resources and the application of modern technology to the welfare and prosperity of its people, nuclear technology represents an important source of vast potentialities which should be carefully assessed and fully exploited.

"This is one of the reasons why our meeting is important and may represent a turning point in nuclear developments and cooperation in Africa. Its role in African cooperation may be compared with the role which the first United National International Conference on the Peaceful Uses of Atomic Energy, held in 1955, played in international cooperation throughout many parts of the world."

In mentioning the role of nuclear power, Dr. Mustafa provides information on the installed electrical capacity in 44 African countries; it was about 15 000 MW in 1969. This is only about 2.5% of the total world capacity. The *per capita* consumption is most countries in Africa is well below 100 kWh, less than 2% of the average for Europe. O. E. S.

Lloyd, Area Officer for Africa in the Division of Technical Assistance, IAEA, provided information on nuclear power's potential. He said there is hydroelectric potential of 400 000 MW in Africa and estimates that less than 44 000 MW will be utilized by 1980. Thus, the favorable position of hydroelectric power in the immediate future appears assured.

Other papers in the first session discuss facilities and programs which provide insight into the problems of relating the developing countries' needs to the available resources. In this context it was interesting to learn that the Food and Agriculture Organization of the UN has stressed that too much emphasis has been placed on research not directly related to development work in the agricultural field and that agricultural research in developing countries should serve agricultural development needs rather than agricultural science. Greatly expanded applied research in techniques appropriate to the conditions and resources of developing countries which are by no means those appropriate to developed countries are needed.

The second session, "Agricultural Sciences," included 15 papers and communications. A wide variety of subjects were discussed including isotope applications aimed at economic use of mineral fertilizers, inducing mutations in plants through irradiation, basic studies on animal diseases and nutrition using isotopic tracers, pesticide behavior in soils, and use of the sterile-male technique for control or eradication of insect pests. International cooperation including supporting IAEA programs is prominent in the papers presented.

The third session, "Hydrology, Geology, Raw Materials," included nine papers. The first of these, "Nuclear Raw Materials," by J. Cameron, discusses the anticipated world demand for uranium and the importance this can have for developing nations. The paper goes into the current geological theories important to any national efforts to pursue exploration for uranium deposits. Practical methods of detecting and assessing uranium deposits are also discussed in this and in several other papers by scientists from the UAR, the Congo, and Gabon.

Other papers in this session dealt with problems of soil erosion and hydrology in the Lake Chad basin.

The fourth session, "Medical and Biological Sciences," included 14 papers indicative of regional problems and how they are being attacked. For instance, a short communication "Scope for the Use of Radioisotopes in Tropical Haematology" by A. E. Boyo, University of Lagos, Nigeria, highlights some of the areas of tropical haematology in which the use of radioisotopic techniques are likely to advance basic understanding of the behavior and effects of anemias and contribute importantly to clinical management of these diseases. Other titles include "Contribution to the Study of Protein Deficiency: Use of Radioisotope Techniques," "Application of Radioisotope Techniques to the Study of Endemic Goitre of Idjwi Island," "Techniques for Measuring Zinc in Bone," and a survey paper on "Uses of Radioactive Isotopes and Radiation Sources in Biological Studies in U.A.R."

Other sessions that were included in this rather interesting meeting were on "Reactors," "Training," "Physical Sciences," and "Chemical Sciences." Probably of great interest to an American Nuclear Society audience would be papers on the role of research reactors in developing countries, and several such papers are included.

Twenty-one papers in the physical and chemical sciences include research results of studies in Mossbauer spectrometry, nuclear chemistry, and radiochemistry. One survey paper entitled "Activities of the Middle Eastern Regional Radioisotope Centre for the Arab Countries," by I. B. Hazzaa, includes a discussion of programs in hydrology, agriculture, entomology, and medicine and is perhaps somewhat out of place in the "Physical Sciences" Session but is certainly worth reading.

To summarize, I feel that these proceedings are of interest for the perspective provided with regard to the current state of technology in the African nations and the promise held for applications of atomic energy to help in their development. Particularly impressive was the activity in the Congo.

Perhaps foremost was that this was a meeting in Africa of African

nations aimed at solving African problems. For many attendees the variety of subject matter and the level of presentation of those papers that were of a survey nature provided a good introduction to the field.

Finally, for anyone interested in nuclear science in Africa, I also heartily recommend a recent article by Glenn T. Seaborg in *Science*, Vol. 169, p. 554, August 7, 1970, on his recent trip to Africa, entitled "A Scientific Safari to Africa."

*David M. Richman has been with the USAEC's Division of Research since 1960. His responsibilities include basic nuclear and chemical engineering research and separation chemistry research programs at Ames, ANL, BNL, and ORNL, as well as the support of university research in these areas. He is also involved in the Division of Research program for the production and distribution of the transplutonium elements for research. In his role as a physical science research administrator, Mr. Richman has a deep concern for bridging the gap between basic research and development.*

*Title* Radiation Sensitivity of Toxins and Animal Poisons

*Editor* Monica Krippner

*Publisher* International Atomic Energy Agency, Vienna, Austria, 1970

*Pages* 118

*Price* \$4.00

*Reviewer* Albert L. Picchioni

This book is a compilation of 11 research papers presented at a panel meeting held by the International Atomic Energy Agency in Bangkok on May 19-22, 1969, on the radiosensitivity of toxins and animal venoms. The authors of these papers reviewed the basic problems of radiation sensitivity of toxins and venoms under various irradiation conditions, and discussed the applications of ionizing radiation and nuclear techniques to isotopic labeling and preparation of toxins and venoms. Some of the specific topics covered are the

use of irradiation for inactivation of botulinal toxins in food; the use of irradiation as an instrument for studying fundamental properties of toxins of microbiological origin; the nature of radiation damage to the antigenic potentialities of proteins; a technique of labeling snake venom with radioactive isotopes as a tool to study the biological effects of pure venom components; and current concepts concerning the biochemistry, chemical structure, and methods of purification of cobra venom and results of studies involving structure-activity relationships and immunochemical studies of this snake venom. Also presented is an excellent review of aflatoxins with special reference to physicochemical properties, biological effects including carcinogenic properties, and the results of recent studies on the radiosensitivity of Aflatoxin B<sub>1</sub>.

This compilation of papers on toxins of bacterial and plant origin should be of great interest and value to anyone concerned with the toxicologic aspects of toxins as well as the relationship of toxins in various aspects of food and feed production and conservation.

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*Title* Atomic Energy

*Author* Matthew Gaines

*Publisher* Grosset & Dunlap, 1970

*Pages* 159

*Price* \$3.95

*Reviewer* Raymond L. Murray

It is refreshing these days to see a new semipopular book that expresses enthusiasm about the applications of nuclear energy for the benefit of society. In this little book,