News of Science

Radioactive Fallout in the Marshall Islands

An article on radioactive fallout effects in the Marshall Islands appeared in the November issue of *Research Reviews,* a publication of the Office of Naval Research. The Japanese fishermen who were dusted on 1 Mar. 1954 as the result of a nuclear test in the Pacific have been widely discussed, but it is not so well known that there was another group of victims. The report in *Research Reviews* is based on an interview with Robert A. Conard of the Naval Medical Research Institute, Bethesda, Md., who was a member of the medical team that was assigned to care for the persons who had been exposed.

Within 36 hours of the time the incident was reported in Washington, a team from the hematology department of NMRI had assembled 2 tons of equipment and was on its way to Kwajalein, evacuation center for 239 inhabitants of four Marshall Islands and for 28 American servicemen who had been serving at a weather station. From the beginning, intensive medical histories were kept on all the people who had been dusted. Not only did the medical staff members record such routine information as temperature, appetite, and so forth, but they embarked on a whole series of special tests. It was important to find out as soon as possible the extent of the radiation each patient had received.

The 64 people on the island of Rongelap, where the fallout was said to be like snow, were the worst affected—they absorbed an average of 175 roentgens each (400 roentgens is believed to be a dose that will kill 50 percent of any group exposed). A group of 18 members of the Rongelap community happened to be away on a fishing trip. They were on Ailinginae, where the fallout was described as "mist," and they escaped with an average exposure of 69 roentgens.

The largest island group, the 157 inhabitants of Utirik, received the lightest dose, an average of 14 roentgens. The population of Utirik was unaware of anything unusual in the atmosphere.

The American servicemen, who had been posted on an uninhabited island, also received a dose that was considerably less than lethal, and they, too, described the fallout as mist. Because they were more aware of the harmful effects of the fallout, the members of this group washed and were otherwise careful. As a result they received only minor lesions and in 6 months all had returned to duty or to civilian life.

The physicians in charge of the treatment program selected control groups of inhabitants from islands that had not received fallout. These afforded a basis for comparison. The amount of the whitish powder that the inhabitants collected on their persons varied, and in some cases they went swimming or otherwise washed off the dust. The custom of dressing hair with a heavy coconut oil increased contamination of the head and added to difficulties later. In addition; dust fell in the open cisterns that are used to store drinking water. Some of the food that was eaten also had picked up dust. The woven mat houses of the area were readily penetrated by the dust; and thus practically everyone down to the tiniest babies was irradiated.

Thorough tests were made of dust from all four islands. The pulverized coral particles emitted both beta and gamma radiation. The proportion of beta was much higher, but in the case of the Rongelap people the gamma radiation was sufficient to bring about, during the first 10 days, some of the known symptoms of radiation sickness. During the first 2 days, about three-quarters of the people became nauseated and a few vomited and had diarrhea. Many complained of itching and burning of the skin. However these symptoms had subsided by the time the evacuees arrived in Kwajalein.

The skin sores and loss of hair (brought on by beta radiation) developed beginning about 2 weeks after the accident and affected the children more than the adults. There were many cases of painful skin ulcers, particularly in the group of 64 from Rongelap who had suffered the most exposure. Those parts of the body covered by clothing had few or no skin lesions.

Sores showed a tendency to develop in normally sweaty places. There were quite a few cases of sore places on the top of feet and between the toes, but none on the soles of the feet although the natives had walked around in the dust and probably had more contact on the soles of their feet than they did anywhere else. Apparently the soles of the feet were too thick for penetration of much beta radiation.

The skin lesions were the most obvious ill effect, and in some cases these lesions were painful. A number of the deeper lesions healed without a return of normal pigmentation; instead, there are white splotches. These are being carefully checked to see if there might be a tendency for the soreness to recur. So far, such a tendency has not been detected.

The medical team was confronted with a problem when the blood count on white corpuscles dropped and there was a depression in the blood platelets. The outbreak of an epidemic of colds along with the severe skin lesions made the evaluation of prophylactic therapy critical. During this time of crisis, a decision had to be made as to the use of antibiotics as a general treatment.

Because the state of health of most of those affected could not be correlated with the degree of depression of the blood cells in individual cases, antibiotics were not used except in a few instances in which the patient had some ailment not connected with the fallout. Children continued to have measles, and the incidence of tonsilitis was about the same as in the control population.

The one chronic diabetic, a mature man, continued with his health about the same. An elderly woman, said to be 100 years old, thrived and is still alive. In fact, no one has died in the 18 months since the accident occurred.

A small amount of fallout was absorbed internally with food and water, but the amount has been calculated to be too small to be harmful. Four women who were pregnant at the time of the accident all had their babies normally, and with no evidence of trouble for the baby in the future. Several of the women have become pregnant again, and their medical records are satisfactory.

Exposed chickens and pigs have been examined. Pigs from Rongelap show evidence of internal irradiation ten times as great as the dose received by the human population. However, as in the case of the pig from the Bikini tests, they seemed to be doing well. When these animals die they are thoroughly examined for radiation effects.

After 3 months, and when they were progressing satisfactorily, the evacuees were moved from the hospital grounds at Kwajalein to a location on the island of Majuro in the southern Marshalls. There they have returned to more or less normal living, with the exception that food and other supplies are pro-

vided. A number of relatives from the island groups have come to Majuro to live with their kin.

While the physicians who are caring for the islanders have reported that at the end of 1 year there are no continuing ill effects from the fallout, the checks on their condition will be continued for many months, or perhaps years to come. Eventually the people will all be returned, if they so desire, to their native islands, but in the meantime the Atomic Energy Commission and the Navy are both thoroughly inspecting the habitats to make sure there will be no hazards from anything—vegetation, water, or dwellings—that might contain lingering radiation.

Asian Wildlife Conservation

Ecological studies are one answer to preservation of threatened species, according to Lee M. Talbot of the University of California, who recently traveled through 30 countries of the Middle East and South and Southeast Asia on a 6-month mission for the Survival Service of the International Union for the Protection of Nature. Purpose of the trip was to survey the present status of some of the world's rarest animals and to determine how the IUPN can best cooperate with local authorities in wildlife conservation measures. Data were obtained through discussions with conservationists, scientists, and government leaders and from expeditions into the remote habitats of some of the animals that are threatened.

Talbot's visits and expeditions were generally arranged by the host governments. He was encouraged by the interest in wildlife problems exhibited by the governments of India, Burma, Malaya, and Indonesia, and by their invaluable cooperation with the IUPN survey project.

India, for example, has established a country-wide Indian Board for Wildlife, and subsequently, individual state boards. The country has the last surviving specimens of the Asian lion. Under government protection their population has increased from less than a dozen individuals in 1900 to nearly 300 this year. Although the lions are protected from most hunting, their habitat in the Gir Forest in northwest India has been reduced by about 50 percent in the last 50 years by overgrazing and subsequent encroachment of agriculture. Since the wild-game food supply has been diminished by hunting and by competition with domestic stock, the lions now kill an estimated 10 cattle a day.

Approximately 300 great Indian rhinoceros survive in India's wildlife reserves in Assam and Bengal. An unknown number still exist in the Teria area of Nepal, where nearly 100 specimens were reported killed last year.

The last Javan rhinoceros are located in the Udjung Julon Reserve in western Java. These 20 to 40 animals, and a rich variety of other Javan wildlife, are protected by the newly formed Nature Protection Department of the Indonesian Forest Service.

This interest of these governments in wildlife conservation has generally originated with scattered individuals—for example, E. P. Gee in Assam and A. Hoogerwerf in Java. Through their studies and writings, such men have brought the conservation problem to the attention of their governments and to some segments of the public. However, Talbot stresses that throughout South and Southeast Asia there is no widespread conservation consciousness, that there are virtually no trained wildlife technicians, and that practically nothing is known of the ecology of the principal animal species.

Based on the findings of the study, Talbot has made the following proposals to IUPN to meet the immediate needs for preservation of threatened species and for general wildlife conservation:

1) To educate and stimulate wide general interest, the publication of an illustrated children's textbook giving a simplified introduction to conservation.

2) The appointment of a wildlife adviser who would be available to governments that request his services to fulfill the immediate need for a technical approach to the problems of wildlife and the establishment of park areas.

3) The establishment of a program to assist the authorities in these countries to set up their own wildlife technician training organizations.

4) The conduct of ecological studies of the principal animal species in order to obtain the necessary data on which to base effective management programs.

Persons interested in the work of the IUPN are encouraged to write to the secretary general at the union's new address: 31 Rue Vautier, Brussels, Belgium.

News Briefs

■ The first international training course for health physicists opened last month at the Karolinska Hospital, Stockholm, Sweden. It was organized by the Government of Sweden and the World Health Organization Regional Office for Europe in cooperation with the national atomic energy agencies of various countries, including the United States.

The 5-week program is being directed by Elda E. Anderson of Oak Ridge National Laboratory. Lecturers are drawn from the United Kingdom and France. Participants in the course represent Belgium, Denmark, France, Federal Republic of Germany, Iceland, Italy, the Netherlands, Norway, Sweden, and Switzerland.

This course is intended particularly for physicists in European countries where atomic energy programs are now in a rapid and comparatively early stage of development. The course also provides for an exchange of experience among countries where research workers have been concentrating on different aspects of radiation protection.

The Stockholm program arises directly out of the Geneva Conference on the Peaceful Uses of Atomic Energy and was endorsed by government delegates at the meeting of the WHO Regional Committee for Europe in Vienna.

■ The announcement of the latest Soviet nuclear explosion on 26 November contained more detail than past announcements, which have been limited to a few words, one or two sentences at most. The text of the Soviet statement follows:

"Recently, in connection with the plan for scientific research and experimental work in the field of atomic energy, tests of new types of atomic and thermonuclear [hydrogen] weapons have been carried out in the Soviet Union.

"The tests fully justified the corresponding scientific and technical calculations, showing the important new achievements of Soviet scientists and engineers. The last explosion of a hydrogen bomb was the most powerful of all explosions carried out until now.

"In the interests of avoiding radioactive 'fall out' the explosion was carried out at a great height. At the same time wide research was conducted on questions of the defense of peoples.

"In connection with the fact that clamor has been raised in certain Western countries over the above-mentioned tests in the U.S.S.R., Tass is authorized to state the following:

"The Soviet Government has stood and does stand for the prohibition of atomic and thermonuclear weapons with the establishment of effective international control.

"Such a decision would permit the use of atomic energy to be directed toward exclusively peaceful aims. Proposals for the unconditional prohibition of atomic and the thermonuclear weapons were made by the Soviet Union both in the United Nations organization and at the recent conference of the four powers' foreign ministers in Geneva, but were not accepted. The Soviet Union also submitted a proposal for the moral and political condemnation of atomic and hydrogen weapons.

"The Western powers also refused to accept this proposal.