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August 11, 1980

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Note to:

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 H. Pratt, BNL  
 W. Robison, LLL  
 W. Bair, PNL ←

Subject: Medical Opinion Provided to Copaken and the Government  
 of the Marshall Islands

Mr. Copaken and Mr. deBrum submitted the attached at a meeting at the Department of Interior on October 6, (which I did not attend) as evidence in support of their position that radiation-related diseases are prevalent throughout the northern Marshall Islands. Presumably, Dr. Merliss was requested to examine the population on Wotje Atoll; although, with a single reference to Utirik, atolls are not named in the letter. The point of Mr. Copaken and Mr. deBrum was that problems exist beyond Likiep, that since the Department of Energy has not sent physicians they have hired on their own, and that past information is questionable.



Bruce W. Wachholz, Ph.D.  
 EV/OHER

Attachment

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DIPLOMATE  
AMERICAN BOARD  
OF INTERNAL MEDICINE

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FELLOW  
AMERICAN OCCUPATIONAL  
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July 15, 1980

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Beverly Hills, California 90212

RE: Marshall Islands

Dear Mr. Stemple:

At your request I have prepared a summary of my opinions on my visit to the Marshall Islands. I was deeply impressed by the kindness of the people and by their gentleness and innate courtesy, and by the willingness of the vice speaker and the president to spend time with us and listen to us.

My medical background should be set out so that these opinions may be judged. I have practiced internal medicine for thirty-five years. I have been accredited by the Atomic Energy Commission many years ago to use radioactive isotopes in medical practice for treatment of certain thyroid diseases, including hyperthyroidism, and in the diagnosis of thyroid diseases. I think I was one of the first doctors to be so licensed for use of radioactive isotopes in their office in Los Angeles. There may have been ten or fifteen others of us at the same time. In preparation for this licensure I studied about six months at UCLA, taking courses in radioactive physics and radiation in general. I used radioisotopes for the diagnosis and treatment of thyroid disorders up until about five years ago, when space became crowded and the large scanner and the devotion of a room in my office was

no longer desirable. I am certified by the American Boards of Internal Medicine, and am a Fellow of the American Occupational Medical Association. I am registered in the states of California, Texas, and Illinois to practice medicine. Finally, as part of my internal medical training, I did one year of intensive pathology.

Now for my observation: I was immediately struck by the remarkable frequency of visual difficulties and the frequency of thyroid tumors. The frequency of thyroid tumors was shown by the examination of a number of patients who demonstrated thyroidectomy scars; by the examination of some hospital record, and most important by the history of the people telling me of the epidemic of these disorders on their islands. Since the populations on the islands varied from two hundred to more, often, particularly in the smaller islands, the individuals who spoke to me were able to give me a pretty fair idea of the number of thyroid tumors and visual difficulties that appeared on their island.

Since the nuclear explosions there has been a remarkable epidemic of thyroid tumors in the Marshall Islands, -- to my knowledge a singular epidemic since I have never seen its like before, -- starting about fifteen years or so after the onset of the atomic explosions, and continuing to the present. Some of the victims apparently were in their teens or pre-teens during the explosions and were most characteristically female but some of the victims were probably not yet born at the time of the explosion, although I do not have such a concise chronology that I can say this with absolute certainty. I recall seeing one patient young enough so that it would be hardly likely that she would have been born during the explosions.

The thyroidectomy scars that I saw on these patients were large scars, and for the most part it seems to me that the entire thyroid had been removed. This was borne



visual difficulties. I am not an ophthalmologist, and brought no instruments to visualize the lenses of these people's eyes. However, I learned that on one island about fifty per cent of the population is losing its vision. This does not come to me from one informant, but comes to me from three or four informants. One informant actually said that most of the adults were losing their vision. Sometimes it was occurring in children. This again does not seem to be concomitant with the blast or follow shortly on it. One would expect the cataract changes sooner if it was due to looking directly at the blasts, and I would not expect it in individuals unborn at the time of the blasts. This appears to be perhaps one of the most disabling disabilities on the island of Utrik, and if not for the apparent willingness of the island to take care of its own there would be many people on this island suffering by reason of their dimming sight. In a colder, crueler society these people would not be able to survive.

The frequency of eye problems is complicated by also the notable frequency of diabetes. Diabetes is an adequate cause of cataracts, and older diabetics may develop cataracts. However I asked very carefully of those patients whom I saw with visual difficulties, -- I assume they had had cataracts some had been operated on and had cataract removal -- whether they were diabetic and I understand that while several were, just as many were not, and the diabetic explanation for all of the cataracts and loss of vision does not seem credible. Again this seems to be a radiation effect.

As another radiation effect there was a period of time when there were an unusual number of stillbirths or the birth of monstrosities. I have heard this called the year of the animal, although I understand this phrase to be offensive to those women who bore such offspring and I heard the particular phrase only from men and not commonly used. It was the time when children were born with incompletely formed bodies, incompletely formed arms or legs, or deformed heads. This occurred late, and not in the nine months after a near-by explosion when one would expect radiation effects. Moreover it occurred in islands distant enough so that direct radiation effects governed

by the universe square ration rule, emanating immediately from the bomb would be highly unlikely.

I think the ill effects still persisting on these islands is not only due to soil contamination but is also due to entry of the radioactive elements with a longer half life into the food, where it has been biologically concentrated, and is eaten by the people. Whether the material that contains the radioisotopes is in one particular vegetable or several or whether it is in the fish or birds, I simply do not know. One would think, that if the lagoon fish were involved, the food-chain exposure would involve only a few islands since I am told that lagoon fish usually stay in their lagoon. If the large fish on the seaside that swim between atolls are involved and carry radioactivity in their flesh, these fish also being eaten by the islanders, one would expect a wider diffusion of the effects of the radioactivity, -- which is what has happened. There certainly would be diffusion by birds and actual transfer from one atoll to another of radioactive material in the excrement of birds flying between the attols.

The wide diffusion of radioactive effects among the islands of the Marshalls, strongly suggests entry into the food chain with transportation between islands. This is as yet only an opinion. Yet otherwise one must assume that the fallout just simply was so high, and has spread so far beyond that estimated by our finest nuclear scientists that distant islands and distant atolls in the Marshalls were involved, bringing about the radiation effects that I have described.

To my knowledge, two cases of leukemia were found, one in a high government officer, and the other in a boy. There may be others. I am suspicious also that radiation plays a part here also because of the frequency of leukemia in the Nagasaki-Hiroshima survivors.

I think that these three: the tumors of the thyroid

including cancer, disturbances in vision probably due to cataracts, and deformities of birth are a part of the radiation injury, and that the continuing injury is in large part due to food-chain entry by long-lived radioactive elements. I strongly suspect that the leukemias were radiation induced. There are other areas about which I wonder and about which I am suspicious, but as yet have formed no firm opinion. I am told by the islanders that diabetes has become very common. When I spoke to the old people who remember the way the islands were before the nuclear testing, they all routinely deny that diabetes was a great problem for the inhabitants. Now as I speak to the Marshallese, I think that they have more diabetes than the Navajo Indians, and I had always thought the highest incidence was among the Navajos. Although diabetes is exceedingly common among the Marshallese, I know of no direct radiation effect that causes diabetes. On the other hand, I do not know all that is to be known about food chain radiation injury and neither does anybody else. Our particular human experiences on radiation have been either with therapeutic radiation or the exterior type of radiation at Hiroshima and Nagasaki. Knowledge about food-chain radiation is scant and I am unable to say whether the diabetes is related to the radiation or not.

There are some sexual problems among the males of the island, or among the females. A number of men from one atoll had told me that they developed a failure of sexual interest after the explosions, this persisting, and in several cases their families did not expand after the bomb blasts. This also is likely radiation induced but I cannot say whether this is food-chain or whether this is perhaps external radiation coming from the soil, since the testicles are in an exposed position, particularly in people who so commonly sit on the ground or squat as do the people of the Marshall Islands.

Immediate effects of the radiation occurred in some individuals who spoke to me, these changes consisting of hair loss, and burns of the skin. The burns of the skin occurred in those islanders in which there was a dusty, powdery fallout after the explosion called Bravo, which was effected by meteorologic or inadvertence. There were

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deaths from these ulcers, according to the memory of the individuals that I spoke to. Startingly, I was told repeatedly of deaths on Utric in the month following the bomb blasts. Several people from Utric told me of three in the month following the first blast, at least two of them being in children and one, to my memory, in a young woman. One suspects that this immediate type of response is due to direct radiation connected directly with the fallout, and probably not food-chain, although absolute certainty is not available.

All of the people have consistently told me that the damage to the vegetation and the foods that they eat, -- extremely limited to start with -- has been devastating. The Marshallese eat a limited diet consisting of fish, breadfruit, coconut, and arrowroot. The most sensitive to radiation of the plants proved to be arrowroot. But this was a highly important foodstuff on these small islands. As I understood from the Marshallese that I spoke to, before the blast the arrowroot grew as a tuber or rhizome on the root of a bushy type of plant. A healthy arrowroot plant would have six or so tubers, and would yield a good deal of nutritious food. After the blast, the arrowroot plants themselves started to diminish and the number of tubers on the roots decreased until the point came at which the arrowroot has almost been lost on some of the islands and no longer serves as a staple in the diet. The Marshallese describe to me the tubers shrinking to two to three on a bush, and then to small tubers, and then to the plant just not growing at all, or growing in a deformed manner. Similar effects occurred in the coconut trees. The tops of the coconut trees turned red or brown after the blasts, and many coconut trees have not borne as well since. The breadfruit trees have borne smaller fruit and often deformed fruit. Some of the trees themselves have become deformed.

I am also struck by the high incidence of hypertension in the people of the Marshall Islands. The incidence of hypertension in the average white American male goes up to about five per cent depending on age. The frequency of hypertension however among the Marshallese far outnumbers that, and judging from the hospital records that I looked

at when I visited the hospital, and the answers to the questions that the people gave me, the incidence of hypertension is probably over twenty-five per cent and might be in the older people as high as forty per cent. For some years now general medical opinion indicate that hypertension is a stress disease. It can be induced in animals by crowding. If one takes experimental animals of small size, -- rodents, for example, -- and puts them into large cages where they are free to move about, there is no particular increase in hypertension. If one puts them in small cages where they are crowded a good deal, and particularly puts them in positions where, because of inadequate space or, inadequate food, competition between them for sustenance and living space developes, then the incidence of experimental hypertension increases very greatly. It has increased in western peoples in time of stress. A study in Texas City in our own nation some fifteen years ago found that when a ship blew up in the harbor, the ship carrying ammonium nitrate, and much of the seaward portion of the city was destroyed, the incidence of hypertension in the town rose greatly. It has been found also that when people with no particular ethnic hypertension are moved to areas of substantial stress in which they have to accommodate to new problems, hypertension emerges as a disease. For example, Easter Islanders, an island off the coast of Chile, have no hypertension when they remain in their ethnic niche. When these men travel to Chile and enter the competitive economic world there, they develop the same amount of hypertension as do the Chileans. In developed societies breaking of social patterns by individuals or by groups does lead to hypertension. Captain James Graham some forty years ago found that the soldiers of the British Fifth Army after defeating with Rommel's forces in North Africa developed a substantial frequency of hypertension which could not be always relieved by simple rest. Even after keeping the soldiers in a rest zone for months, some of them left with fixed hypertension which they did not have before the start of this battle. Consequently I believe that the high incidence of hypertension is in part due to the cultural upheaval that has been induced in these islands by the results, direct or indirect, of the atomic bombs. There very likely are other forces here that have induced

social changes and pressures, and it is not my belief that the only force or the only stress on these people is the effects of the atomic bombing. I think it is a major cause however.

These are my initial reactions. The recommendations which I make are as follows:

1. All slides on the tissue removed from the thyroid of the Marshallese and retained at Tripler, or Guam, or Cleveland General Hospital or Brookhaven should be examined by a single pathologist of your choice and one skillful in the recognition of thyroid cancer. I do not mean this as a reflection on the integrity or skill of the pathologists who examined the tissue initially, but I do recommend verification of the benign nature of the tumors as reported.
2. It would be highly desirable to collect firm health statistics independent of any prior statistics taken by the Trust Treaty or AEC scientists. I am not certain what criteria were used in the collection of former statistics, and I am not certain as to whether doctors were sent, and I certainly am not at all satisfied that a vigorous search has been made in respect to cataracts or other complaints that these people have. I would think that such medical investigation would should be done on a number of different islands.
3. I recommend a consultation with a geneticist, to examine the chromosomal pattern of a number of Marshallese Islanders.
4. I recommend a horticultural expert who should study the effects of the radiation on the vegetable foodstuffs and a marine biologist to consider the question of concentration of radioisotopes in the bodies of the larger fish. That some of these studies have been done before should not discourage similar studies by experts of your designation.

5. Full hospital transcripts of every patient seen at Tripler, Brookhaven Institute, the Cleveland General Hospital, or at Guam should be obtained and these full records should be returned to Marjuro for the investigation and the study of physicians who need them for treatment. It is impossible for a physician to treat with best results patients without fully knowing prior records, and from my visit to the hospital I learned rather clearly that the records from Hawaii or from the United States were not getting back to the several physicians at the hospital, thereby hampering their work.
6. All data in the possession of the AEC or Brookhaven on the radioactivity of the soil and most particularly the foodstuffs of the island should be revealed fully to the Marshall Island authorities.
7. A study of the migration of larger fishes and birds between the islands possibly carrying food-chain radioactivity should be undertaken. (I understand lobsters migrate communally relatively long distances.) Tuna and large fish swim from atoll to atoll.

I am going to state clearly however at this point and in this context, that in some circumstances I have not been impressed with the assiduity of the Trust Treaty physicians or the Atomic Energy Commission physicians. For example, there was a general complaint of dimming vision some five or six years ago on Utric, probably due to an increased incidence of cataracts. None of the people from Utric that I spoke to told me that any physician examined their eyes in such a way as to be able to recognize cataracts. Instead I was told that two boxes of eyeglasses were shipped to the island being of various models and frames, and the people were to come in and choose whichever eyeglass seemed to help them. And this was the sum of the investigation and treatment of the eye problems, -- of what I think is a unique epidemic of cataracts.

The follow-up care of patients with total ablation of the thyroid also appears inadequate. Some had stopped their medicine because of side reactions and appear hypothyroid to my eyes. No regular follow-up has been pursued to allow change of thyroid medication, or increase or decrease of dosage. A general feeling of distrust of the Treaty Trust and Atomic Energy Commission physicians is wide-spread among the Marshallese. The people of the Marshall Islands I spoke to have no great faith in these physicians, do not consider them devoted to their interests, but instead representing the interests of the Atomic Energy Commission or the Trust Treaty authorities, and were reluctant to place their health in their hands, -- although they finally did so for want of any other adequate facilities supplied by the Treaty Trust Organization. I am also impressed with the failure of the physicians to communicate findings and prognosis to the people of these islands. Each patient is entitled to have his questions answered. He should be told the nature of the lesion discovered, and, if he asks for it, a prognosis should be given. The doctor should, when he can, inform the patient of the cause of his illness. These basic rights of a patient have been in large part ignored in the Marshall Islands, and I found very few Marshallese who were acquainted with the nature of their pathology. I reject firmly the thought that the people were too primitive or uneducated, to absorb such information, since I have found this not to be true. Among them are educated and intelligent leaders who would be able to digest such information and form their own conclusions about what the islands, its vegetation, its people, and its culture has suffered.

I have planned conversations with Americans in this area of various expertise who would be useful in understanding the course of food-chain radiation and its injuries, as well as the complex picture of fallout injury. Some of these conversations have been started, and some of the correspondence is already under way.

I am writing to you instead of delivering an oral report so that you may use this written report to demon-

strate my medical opinion of the hazards that the Marshallese people are facing and will continue to face in the future. I am hopeful that the statistical and medical studies which I have recommended will delineate more clearly the injury to the Marshallese, and allow the Marshallese leaders a better opportunity to understand the problem of their islands. This collection of information can well lead to an improvement in diagnosis of hitherto unrecognized food-chain radiation caused diseases, to the identification of the channels through which injury occurs, and ultimate result in better treatment and even prophylaxis of one type of another against the development of such disease, -- for example, the prophylactic use of inorganic iodine, lessening further absorption by radioactive iodine from food by blocking iodine uptake.

Very sincerely yours,



R.R. Merliss, M.D.

RRM:ls  
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