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MEDICAL SURVEY OF THE PEOPLE OF RONGELAP AND UTIRIK ISLANDS NINE AND TEN YEARS AFTER EXPOSURE TO FALLOUT RADIATION (MARCH 1963 AND MARCH 1964)

NINE-YEAR SURVEY

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Introduction

The results of a medical survey of the people of Rongelap in the Marshall Islands, carried out in March 1963 and March 1964, 9 and 10 years after the accident, are presented in this report. These people had been accidentally exposed to fallout radiation following a detonation of a high yield thermonuclear device during experiments at Bikini in the Pacific Proving Grounds in March 1954. An unpredicted shift in winds caused a deposition of significant amounts of fallout on four inhabited Marshall Islands to the east of Bikini (see Figure 1) and also on 23 Japanese fishermen aboard their fishing vessel, the *Lucky Dragon*. Of the inhabitants of the island of Rongelap, 105 nautical miles away from the detonation, 64 received the largest fallout exposure: an estimated dose of 175 rads of whole-body gamma radiation, contamination of the skin sufficient to result in beta burns, and slight internal absorption of radioactive materials through inhalation and ingestion. Another 18 Rongelap people away on a nearby island (Ailingnae), where less fallout occurred, received only an external gamma dose of about 69 rads. There were 28 American servicemen on the island of Rongerik further to the east who received about the same amount of radiation as did the Rongelap people on Ailingnae. Finally, 157 Marshallese on Utirik Island, about 300 miles further east, received about an estimated 14 rads of whole-body radiation. The fallout was not visible on this island and no skin effects developed.

The exposed people were evacuated from these islands by plane and ship about two days after the accident and taken to Kwajalein Naval Base about 150 miles to the south, where they received extensive examinations for the following three months. In view of the generally negative findings on the American servicemen, they were later returned to their duty stations. The Utirik people were also allowed to return to their home island, where radioactive contamination was slight enough to allow safe habitation. Because Rongelap Atoll was considered to be too highly contaminated, a temporary village was constructed for the Rongelap people on Majuro Atoll several hundred miles to the south, where they lived for the following 3½ years and were examined at yearly intervals by a special medical team. In July 1957, after careful evaluation of the radioactive contamination situation, Rongelap Island was considered safe for habitation. A new village was constructed, and the Rongelap people were moved there by Navy ship. The annual medical surveys have since been carried out on Rongelap Island.

A group of more than 100 Rongelap people, who were relatives of the exposed people but had been away from the island at the time of the accident, moved back with the Rongelap people to their home island and have served as an ideal comparison population for the studies. This number has since increased to about 200. Following the initial survey of the Utirik people on Kwajalein in 1954, a repeat survey was carried out in March 1957. In addition, during the past survey,

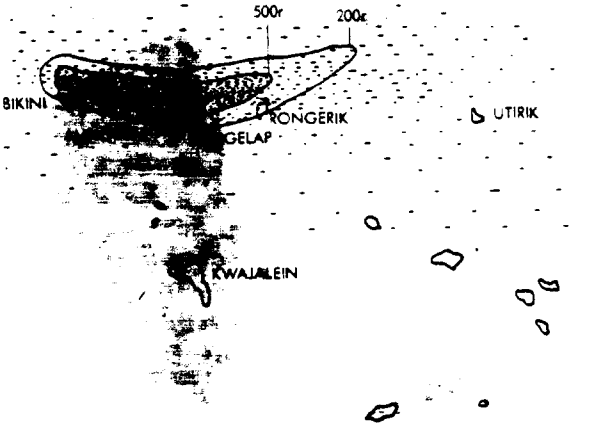

Figure 1. Map of Fallout Area (March 1, 1954), Marshall Islands.

Table 1

Summary of Marshallese Populations Examined Since 1954

	Group	No. in group	Series
		Comparison Populations	
1954 April	Majuro	115 (adults and children)	700–817
1956	Rita	57 " "	1009–1082
1957	Rongelap	100 " "	801–900
1958	Rongelap	170 " "	801–970
1964	Rongelap	170 (age >10 only)	801–1058
		Exposed Populations	
	Rongelap (175 r)	67 (includes 3 *in utero*; annual exams)	1–86
	Ailingnae (70 r)	19 (includes 1 *in utero*; annual exams)	1–86
	American servicemen	28 (examined 1954 only)	401–428
	Utirik (14 r)	157 (examined every 3 to 4 years)	2101-2257
		Unexposed Children (<10 years as of 1964)	
	Rongelap & Ailingnae	45 (exposed parents)	87–136
	Rongelap	75 (unexposed parents)	801–1058
	Utirik	20 (exposed parents)	2258–2278

as in the previous surveys, a visit was made to Kwajalein and Majuro Atolls for examination of a number of Rongelap people, now residing at these atolls, and also groups of children who represent part of the control group used for the growth and development studies of the exposed children.

Table 1 lists the various populations that have been examined since 1954.

The accumulation of data from these surveys is becoming increasingly voluminous. Since conditions have not been favorable for performance of extensive statistical analyses or use of electronic computing procedures to store and manipulate the data, the annual survey reports published by this Laboratory are made as complete as possible. This report, therefore, includes a considerable amount of raw data, much of it in appendices, so that others may have an opportunity to make further calculations if desired.

Summary of Past Findings

Reports have been published on the findings of surveys made at the following times after exposure: initial examination,[1] 6 months,[2] 1 year,[3] 2 years,[4] 3 years,[5] 4 years,[6] 5 and 6 years,[7] 7 years[8] and 8 years.[9] The following is a brief summary of the findings previously reported.

During the first 24 to 48 hr after exposure, about ⅔ of the Rongelap people experienced anorexia and nausea. A few vomited and had diarrhea. In appendix 10 the individual histories of nausea and vomiting are tabulated. Many also experienced itching and burning of the skin, and a few complained of lachrymation and burning of the eyes. Following this, the people remained asymptomatic until about 2 weeks after the accident, when cutaneous lesions and loss of hair developed, due largely to beta irradiation of the skin. It was apparent when the people were first examined, a few days after exposure, that the lymphocytes were considerably depressed and that significant doses of radiation had probably been received. In addition to the whole-body dose of radiation and the beta irradiation of the skin, radiochemical analyses of the urine showed that measurable amounts of radioactive material had also been absorbed internally. The effects of the radiation can best be summarized under three headings according to the mode of exposure: penetrating irradiation, skin irradiation, and internal irradiation.

PENETRATING RADIATION

One of the earliest findings indicative of significant exposure in these people was lowering of

levels of *leukocytes* and *platelets* of the peripheral blood. This was most marked in the 64 people on Rongelap who had received 175 rads, and was less marked in the other groups receiving less exposure. The hemopoietic depression was roughly proportional to the dose of radiation received. Even in the 157 Utirik people who received only an estimated 14 rads, it was possible to distinguish slight platelet depression in the group as a whole. The smaller group on Ailingnae and Rongerik showed peripheral blood levels between those of the high and low exposure groups. The chronological records of blood findings in the Rongelap and Ailingnae groups are presented in Figures 20, 27, and 32 and in Appendices 1 and 2, and in the Utirik group in Appendix 3.

Lymphopenia of about half the level of the comparison Marshallese population was evident when the Rongelap people were first examined on their arrival at Kwajalein 3 days after exposure. In children <5 years of age the lymphocytes dropped to 25% of the levels in the comparison children, but showed a slight rise during the following weeks. The depressed level was maintained with only slight increase noted by one year. In the following year, mean counts approached the levels of the comparison population and have generally remained slightly below.

Neutrophil levels fluctuated considerably during the first month; possibly this was related to the prevalence of beta burns of the skin during that period. Neutrophil depression became evident by 5 and 6 weeks post exposure with levels reaching about half that of the comparison population in the adults and slightly lower in the children <5 years of age. This degree of neutropenia was insufficient to result in any apparent increased infectious processes, and indeed it was noted that neutrophilic leukocytosis was possible in people showing casual infections at this time. Neutrophil levels recovered more rapidly than lymphocyte levels and reached near control levels by one year. Subsequent annual surveys have revealed that recovery does not appear to be complete, particularly in younger and older age groups.

Platelet counts showed less fluctuation than other blood counts and fairly consistently showed increasing depression, reaching levels of about 30% that of the comparison population by the 4th week. A spurt of recovery to about 75% of comparison levels occurred during the following few weeks, which was followed by slower recovery but with mean levels never reaching higher than 90 to 95% that of the comparison population during the 8 years post exposure.

Erythropoietic depression has not been a consistent finding as with the leukocytes and thrombocytes. Slight depression of red blood counts, hematocrits, and hemoglobin has been noted at times. No gross abnormalities of *bone marrow* smears were reported at 6 months post exposure. At 8 years, examination of 9 bone marrow aspirations from exposed people showed a reduced myeloid-erythroid ratio wth abnormalities of the erythroid and myeloid precursors in 5 cases.

Depression of peripheral blood elements in the Ailingnae and Rongerik groups was not so pronounced as in the Rongelap group. However, a slight lag in complete recovery in the Ailingnae peripheral blood count has also been noted.

The persistent depression of peripheral blood elements in the exposed people makes it appear likely that there is slight residual bone marrow damage.

A general *anemic* tendency has been evident in both exposed and unexposed Marshallese. Price-Jones curves, on the average, showed a slight microcytic tendency. Serum iron levels have generally been normal, and the cause of this anemic tendency has been undetermined.

Reticulocyte counts have been about the same in the exposed as in the unexposed people.

Except for radiation-induced lesions of the skin, patchy epilation, and early gastrointestinal symptoms, *clinical examinations* have revealed no disease processes or symptoms which could be related directly to radiation effects. No prophylactic or specific therapy of radiation effects was ever considered necessary or given. Epidemics of chicken pox and measles that occurred showed no greater incidence or severity in the exposed than in the unexposed Marshallese people.

During the first months post exposure about half of the exposed group exhibited *loss of weight* of several pounds. This may possibly have been related to their radiation exposure, although it is difficult to rule out effects possibly due to change of environment.

At 3 years post exposure the *immune response* to primary and secondary tetanus antitoxin was tested and found not to be significantly different in the exposed compared to the unexposed populations.

Five persons in the exposed population died of disease: (1) a 46-year-old man with hypertensive heart disease which had been present at the time of exposure, who died 2 years after the accident; (2) a 78-year-old man who died, 3 years after exposure, of coronary heart disease complicating diabetes; (3) a 35-year-old man who died of acute varicella, 4 years after exposure, who had received only 69 rads, having been on Ailingnae at the time of the fallout; (4) a 60-year-old woman who died of a cancer of the ovary at 5 years after exposure; and (5) a 78-year-old woman who died of traumatic vertebral fractures at 8 years after exposure. There was no apparent relationship between any of these deaths and radiation exposure. Four deaths have occurred in the comparison population. The five deaths that have occurred in the exposed people since exposure represent a *mortality rate* of 7.6 per 1000 population per annum, compared with 8.3 for the Marshall Islands as a whole.

Growth and development studies on the children (height, weight, anthropometric measurements, radiographic studies for bone age) have revealed that slight retardation in growth and development has occurred in the exposed boys who were under 12 years of age at the time of exposure, particularly those 12 to 18 months of age at exposure. Only slight immaturity was noted in the exposed female children. It was also noted that children born of exposed parents were slightly retarded and that they had slightly lower levels of neutrophils, lymphocytes, and platelets, compared with male children of unexposed parents. However, since the latter children were on the average 4 months older, the data did not justify a conclusion that the difference in stature was associated with the exposure of the parents.

It was difficult to evaluate the effects on fertility. However, a review of the *birth rate* of the exposed group over the past 8 years seems to indicate no noticeable effect of their exposure on fertility. The 35 births represent a rate of 53 per 1000 population per annum compared with 37.3 for the Marshall Islands (1957). The 25 births over a 5-year period for the comparison population represent a rate of 21.8 per 1000 population. A somewhat greater incidence of *miscarriages and stillbirths* was noted in the exposed women during the first 4 years after exposure, but because of the paucity of vital statistics on the Marshallese and the small number of people involved, the data are not readily amenable to statistical analysis.

A *cardiovascular survey* of the adults (1959)[7] showed no outstanding differences between the exposed and unexposed groups. The people appeared to have less hypertension on the whole than is noted in people in the continental United States.

An *arthritis survey* (1959)[7] showed no great differences between the exposed and the unexposed people, and about the same incidence as is seen in American populations.

Ophthalmological surveys showed no remarkable differences between the exposed and unexposed groups except possibly a slightly greater number of cases of pterygia, pingueculae, and corneal scars in the exposed group. It is not known whether this finding is of any significance in relation to their radiation exposure. Slit-lamp observations showed no opacities of the lens characteristic of radiation exposure. As a whole, visual and accommodation levels in the Marshallese appeared to be above the average in the U.S. population.

Dental surveys[7] showed no significant differences in caries rate between exposed and unexposed groups. However, the incidence and severity of peridontal disease was slightly greater in the exposed group. It is not known whether or not this finding is related to radiation effects. The poor oral hygiene generally observed in the Marshallese had its usual results, namely, high caries rate in teenage children, severe peridontal lesions in adults (heavy calculus and loss of alveolar bone), and edentulous mouths in the aged. Radiation exposure did not appear to have affected developing dentition in the exposed children.

Late effects of radiation. Various parameters usually associated with *aging* were measured or estimated on a 0 to 4+ scale (skin looseness, elasticity, and senile changes; greying of the hair and balding; accommodation, visual acuity, and arcus senilis; hearing; cardiovascular changes including blood pressure and degrees of peripheral and retinal arteriosclerosis; neuromuscular function; and hand strength). Comparison of these measurements in exposed and unexposed individuals of the same age groups showed no apparent differences. A biological age score was calculated for individuals and groups by use of an average percentage score. *Life shortening* effects of radiation have not been apparent. As noted, the mortality rate was about the same in the exposed as in the unexposed people.

The one case of *cancer* that developed in the exposed group occurred at 5 years after exposure, too soon, it is believed, to bear any particular relation to radiation exposure. *Leukemia* surveys including physical findings, studies of white cell counts and types, alkaline phosphatase staining, and basophil counts of 4000 white cells showed no evidence of leukemia or leukemic tendency. One child in the irradiated group has had slightly elevated basophils but no other positive findings. The *cardiovascular* and *arthritis* surveys, as well as the general results of the physical examinations, have not shown any apparent increased incidence of *degenerative diseases* in the exposed people. No radiation-induced *cataracts* have been observed in any of the exposed people.

Genetic effects have not been specifically studied because of the small number of people involved. No apparent radiation-induced genetic changes have been detected on routine physical examination in the first-generation children of exposed parents, with the possible exception of suggestive evidence of increased miscarriages and stillbirths in the exposed women and the slight retardation of growth noted in the male children of exposed parents.

BETA IRRADIATION OF THE SKIN

It was impossible to get an accurate estimate of the radiation dose to the skin. Beta burns of the skin and epilation appeared about 2 weeks after exposure, largely on parts of the body not covered by clothing. About 90% of the people had these burns, and a smaller number developed spotty epilation of the scalp. Most of the lesions were superficial; they exhibited pigmentation and dry, scaly desquamation, and were associated with little pain. Rapid healing and repigmentation followed. Some lesions were deeper, showed wet desquamation, and were more painful. A few burns became secondarily infected and had to be treated with antibiotics. Repigmentation of the lesions gradually took place in most instances, and the skin appeared normal within a few weeks. However, in about 15% of the people, deeper lesions, particularly noted on the dorsum of the feet, continued to show lack of repigmentation with varying degrees of scarring and atrophy of the skin. By 6 years the only residual effects of beta radiation of the skin were seen in 10 cases which showed varying degrees of pigment aberrations, scarring, and atrophy at the site of the former burns. During the past several years an increased number of pigmented maculae and moles have been noted in previously irradiated areas of the skin, but these have appeared to be quite benign.

Numerous histopathological studies have been made,[1,4,5] and the changes found have been consistent with radiation damage. At no time have changes been observed either grossly or microscopically indicative of malignant or premalignant change. Spotty epilation on the heads was short lived, regrowth of hair occurring about 3 months after exposure and complete regrowth of normal hair by 6 months. No further evidence of epilation has been seen.

An interesting observation noted during the first few months after exposure was the development of bluish-brown pigmentation of the semilunar areas of the fingernails and toenails in about 90% of the people. By 6 months this pigmentation had disappeared, having grown out with the nail. The cause of this phenomenon has not been explained.

INTERNAL IRRADIATION

Radiochemical analyses of numerous urine samples of the exposed population showed internal absorption of radioactive materials, probably brought about largely through eating and drinking contaminated food and water and to a lesser extent through inhalation. During the first few days when the body levels were at their highest, the maximum permissible concentrations were approached or slightly exceeded only in the case of strontium-89 and the isotopes of iodine. The concentrations were believed to be too low to result in any serious effects. Body levels fell rapidly, so that by 2 and 3 years post exposure, they were far below the accepted maximum permissible level; by 6 months activity in the urine was barely detectable

In 1958 analyses of bone samples on one of the men who died showed 3.7 strontium-90 units/g calcium. Beginning in 1957, gamma spectroscopy by use of a low-level counting chamber was added to the techniques of radiochemical analysis. The return of the Rongelapese to their home island (which after careful survey was considered safe for habitation, despite a persisting low level of radioactive contamination) was reflected in a rise in their body burdens and increased urinary excretion of certain radionuclides. During the years

since the original contaminating event, additional weapons tests held in the area have contributed to the fission products in the environment. Since the diet includes a variety of imported foods, the people are not living in a "closed" environment, and therefore may not be rapidly approaching equilibrium with the environmental fission products, as might be expected under other circumstances.

Body burdens of gamma-emitting fission products (such as Cs^{137} and Zn^{65}) were measured in a whole-body counter and checked by radiochemical analysis of urine specimens. The levels of internal contamination per unit weight appeared to be about the same for juveniles as for adults, male and female. Wide variations in levels of contamination in any group were found, apparently due to differences in diet and metabolism.

Body burdens of Sr^{90} were estimated from urinary excretion as determined by radiochemical analyses. Both the external dose measurements on Rongelap Island and the levels of radioactive isotopes in the food on the island indicated that some increase in Cs^{137}, Zn^{65}, and Sr^{90} body burdens was to be expected when the people returned there in 1957. The Cs^{137} body burden in 1958 was about 0.68 μC, about 60 times as great as in 1957, and the urinary Cs^{137} level rose by a factor of 140; the mean body burden for 1959 was 0.57 μC. The mean body burden of Zn^{65} estimated from whole-body counting data was, in 1958, after the return to Rongelap, 0.36 μC, 8 times as high as in 1957, and 0.44 μC in 1959. In 1961 the mean Cs^{137} body burden in adult males was 14.7 mμC/kg, which is not significantly different from the mean value of a similar group obtained in 1959; it was 300 times that of the medical team, who were measured at the same time for comparison. The Zn^{65} level in adult males (1.51 mμC/kg) dropped to 17% of the mean value measured in 1959. With a larger detector and a longer counting time than previously employed, it was possible to identify and quantify Co^{60} for the first time in these people; the mean level of Co^{60} was about 11% of the Zn^{65} level. A small amount of residual activity was still present after the subtraction of K^{40} and the above radionuclides from the total spectrum. The mean level of urinary excretion of Sr^{90} was 7.2 pC/l or 14% higher than measured in the 1959 medical survey. In 1962 the mean urinary Sr^{90} level was 114 pC/g Ca, giving an estimated body burden of 12.0 mμC. Analysis of bones from the deceased Rongelap woman (1962) gave an estimated body burden of 11.4 mμC. These levels represent about a sixfold increase in Sr^{90} over the 1958 levels.

Little of the body burden of the exposed group is apparently due to their initial exposure, since at present there is little difference between the levels of the exposed and unexposed populations living on Rongelap Island. The body burdens are of small significance in terms of radiation hazard.

OTHER STUDIES

Studies of genetically inherited characteristics. Blood grouping studies in the Marshallese showed a relatively high B gene frequency, a high N gene frequency, an extremely high R^1 gene frequency, and total absence of Kell and Diego factors.[10] These characteristics differ from those of Polynesians and suggest relationship with Southeast Asians and Indonesians. *Haptoglobin studies* showed the frequency of the Hp^1 gene to be higher than in European populations thus far tested and consistent with populations living near the equator. The distribution of haptoglobin types showed the population to be relatively homogeneous. *Transferrins* in all sera were type CC, the common European type. *β-Amino-*iso-*butyric acid* urinary levels showed the Marshallese to be the highest excreters of this acid of any population thus far reported. Levels in the exposed group were about the same as in the unexposed group, and no correlation was found with body burden level of radionuclides; this indicates that there is probably no correlation with radiation exposure. *Hemoglobin types* were considered normal (all had type AA_2). *Sickling tests* showed no sickling tendency in any of the people. *Glucose-6-phosphate dehydrogenase* of the red cells appeared to be normal in the Marshallese. Studies of Gm *phenotypes* showed the Marshallese to have 100% $Gm^{(a+)}$ and nearly 100% $Gm^{(b+)}$. There was a complete absence of Gm^x and a high frequency of Gm-like (Gm^c). Considerable caution must be exercised in evaluating the results of these studies on genetically inherited characteristics because of the small number of samples tested. The data do seem to indicate relative homogeneity of the population and closest kinship with people of Southeast Asia. These data also may be useful as a base line should genetic changes appear in later generations, possibly related to radiation exposure.

Results of other laboratory studies included the following: *Serum protein* levels were generally on the high side of normal; electrophoretic patterns

showed the increase in proteins was largely due to an increase in the gamma globulin fraction. The reason for this is not apparent. Numerous chronic infections may be an explanation.

Sodium levels in the urine and food indicated about the same consumption of NaCl as in Americans. The generally lower incidence of hypertension in the Marshallese might be related to the fact that the former native diet was probably lower in salt content than the present, more westernized diet. It will be interesting to see whether the incidence of hypertension will later increase.

Serum cholesterol levels (1957, 1959) were somewhat lower in the exposed population than in the comparison or Utirik populations, but were in the low normal range. No abnormally low readings were noted.

Serum creatinine levels (1957) were in the normal range with no abnormal levels noted.

Serum vitamin B_{12} concentrations (1958, 1959) were generally significantly higher than American levels. The possibility of contamination of the samples with bacteria producing vitamin B_{12} must be considered, since myeloproliferative and liver diseases were not seen.

Serum protein bound iodine levels (1957, 1959, 1962) were generally slightly elevated. Evidence for thyroid dysfunction was not apparent in the people.

Glucosuria and elevated blood sugar were found in 8 people (1 exposed and 7 unexposed). An increased incidence of diabetes is prevalent in the Marshallese people.

A survey for *intestinal parasites* (1958) showed 75% of the people to be infected with various types.[11] For the three major pathogens found, the over-all infection rates were, for *Entamoeba histolytica*, 18.2%; for hookworm, 5.5%; and for *Trichuris trichiura*, 34.3%.

Eosinophilia >5% has consistently been noted in about half the people. The fact that half the cases with eosinophilia showed no helminthic infections at all suggests that other factors besides parasitic infections must be responsible. The eosinophilia may be related to chronic fungus and other infections, particularly of the skin.

Complement fixation studies for parainfluenza 1, 2, and 3, respiratory syncitial, psittacosis, and Q fever showed antibodies to all groups of viruses except that for Asian influenza, which probably had not yet seriously involved the people of the Marshall Islands. The antibody titers appeared to be somewhat lower in the exposed people.

Immunoelectrophoretic analysis showed neither a paraproteinemia nor a typical picture of antibody-deficiency-syndrome, but a high frequency of increases of some of the immunoglobulins was noted.

Blood volume studies with Cr^{51}-labeled sodium chromate showed a significant reduction in red cell mass and/or plasma volume in 15 of 23 Marshallese.

DIFFICULTIES ASSOCIATED WITH THE EXAMINATIONS

As mentioned in previous reports, several difficulties were associated with carrying out the examinations as well as interpreting the findings.

1. The language barrier made examinations difficult, since very little English is spoken by the Marshallese. However, there were sufficient English-speaking Marshallese to assist the medical team in most instances.

2. The lack of vital statistics or demographic data on the Marshallese imposed a serious difficulty in interpretation and evaluation of the medical data. Records of births, deaths, etc., have been made by the health aides or magistrates of the villages and supposedly forwarded to the district administrator; however, such records have been incomplete or lost in most instances, and vital statistics are therefore inadequate. Trust Territory officials are now attempting to assemble such data.

3. There is uncertainty on the part of some of the Marshallese as to their exact ages, particularly among the older group. This imposes certain difficulties in interpreting some of the studies to be outlined.

COMPARISON POPULATIONS

During the first 2 years, two separate groups of Marshallese people were used for comparison, each of comparable size to the exposed Rongelap group and matched for age and sex. However, this population was found to be unstable, with a large attrition rate over the 2 years, which made it unsatisfactory. At the time of the 3-year survey, it was found that during the preceding 12 months the Rongelap population at Majuro Atoll had doubled because of the influx of relatives who had come back from other islands to live with them. These people had been away from Rongelap Atoll at the time of the accidental exposure. This group matched reasonably well for age and sex and was

Figure 2. Medical survey team for 1963 (upper picture) and 1964 (lower picture). Many members of the team are Micronesians of the Trust Territory who work with the AEC medical specialists in carrying out the survey.

Figure 3. Trust Territory ship bringing team and medical equipment at anchor off Utirik Island.

Table 2

Location of Rongelap People, 1964

	Exposed			Unexposed		
	Adults	Children	Children of exposed parents	Adults	Children	Total
Majuro	3	1	3	7	7	21
Kwajalein	9	6	11	37	40	103
Rongelap	34	20	29	72	49	204
Eniaetok	0	0	0	3	1	4
Other atolls	2	1	0	13	11	27
Total	48	28	43	132	108	359

of comparable size. Since the return of the people to Rongelap, however, this group has about doubled in size.

Organization

1963 SURVEY (9 YEARS POST EXPOSURE)

Examinations were conducted on the following Rongelap people: 70 exposed, 35 children of exposed parents, and 196 unexposed (adults and children of the comparison population). The majority of these people were examined on Rongelap Atoll, but about 100 of them were examined at Ebeye (Kwajalein Atoll) and a few at Majuro Atoll. In addition, Utirik Atoll was visited and 84 exposed people were examined there. The survey team consisted of 10 physicians and technicians from the United States and 6 from the Trust Territory of the Pacific Islands (see Figure 2). A Trust Territory ship, the M/V *Roque*, was used to transport the medical team to the Islands (Figure 3). The team lived ashore rather than on board ship

at Rongelap Village and also at Utirik Village while carrying out the examinations on these islands.

1964 SURVEY (10 YEARS POST EXPOSURE)

The 1964 survey did not include Utirik, since these islanders are examined only every 3 to 4 years in view of the small exposure they sustained from the fallout. Examinations were carried out as in 1963 at Rongelap, Ebeye, and Majuro, the majority being done at Rongelap. Table 2 shows the distribution of Rongelap people on the various atolls. Examinations were conducted on 70 of the exposed Rongelap people, the 43 children of exposed parents, and 208 of the adults and children of the comparison population. The survey team consisted of 8 physicians and technicians from the United States and 8 from the Trust Territory (see Figure 2). The Trust Territory ships M/V *Roque* and M/V *Ran Anim* both aided in transporting the team and equipment to and from Rongelap Atoll. The team lived at Rongelap Village for the examinations on that island.

Figure 4. Marshallese man carrying a sack of copra. Copra is the main product in the economy of the Islands.

Procedures

PHYSICAL EXAMINATIONS

Since both the 1963 and 1964 surveys were similar in scope and procedures, they will be described together. Histories were taken by a Marshallese practitioner with particular emphasis on the interval history during the past year. During the 1964 survey Mr. Byron Bender, anthropologist from the Trust Territory, accompanied the medical team and carried out exhaustive studies on the genealogical background of the Rongelap people. These data are not published in this report, but are available to those interested. The pediatrician on the 1963 survey (W.W.S.) carried out further interviews with the Rongelap people in order to establish more closely the ages of some of the children, which were questionable.

Complete physical examinations on both children and adults were carried out in both years. In addition, anthropometric measurements were done on adults >19 years of age in order to determine certain ethnic characteristics of the Marshallese. During the 1963 examination extensive anthropometric measurements were also carried out on the children as part of the growth and development studies, and radiographs of their wrists were taken for the same studies.

In 1963 an ophthalmologist carried out complete ophthalmological examinations including slit-lamp observations.

Cancer detection, emphasized during examinations for both years, included an evaluation of the history, special physical examinations, and certain laboratory tests.* The family history did not yield satisfactory information, since the incidence of familial diseases including cancer was generally unknown by the people. The history yielded some information on changes in weight, history of illness, and, in the case of women, menstrual, obstetric, and nursing history. In the physical examination particular emphasis was placed on examination of the skin, node-bearing areas, head and neck, chest, breast, abdomen, and external genitalia. Pelvic examinations were carried out on all mature females, and vaginal and cervical smears for Papanicolaou examinations were obtained.** Rec-

*Drs. E. Schackow and H.L. Atkins of Brookhaven National Laboratory interpreted the x-ray films.

**We wish to thank Dr. Genevieve Bader of Memorial Sloan Kettering Cancer Center, New York, N.Y., for interpretation of the Papanicolaou smears.

Figure 5. Rongelap people awaiting examinations.

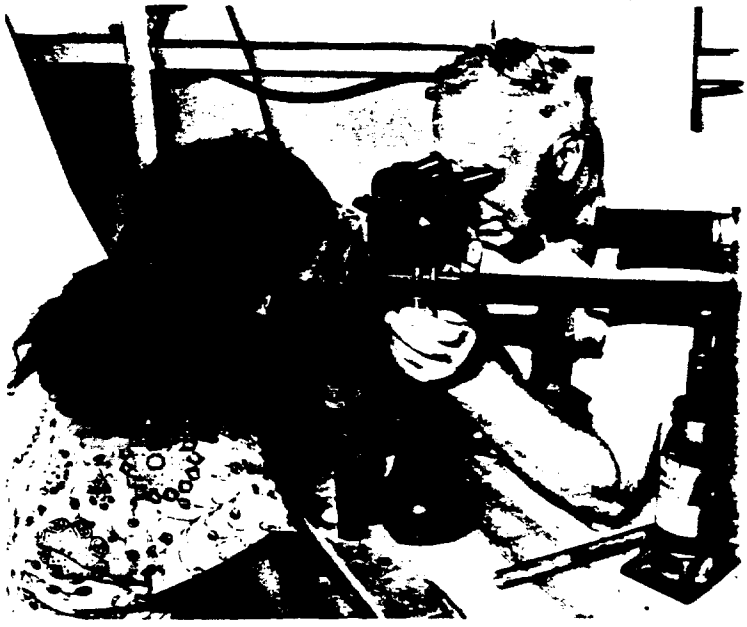

Figure 7. Slit-lamp examination of eyes for lens opacities.

ıre 6. Aged Rongelap women being carried in for examination.

Figure 8. Biopsy of the skin.

Figure 9. Typical Marshallese living conditions at Utirik.

tal examinations were carried out on all persons >40 years of age. This included in the case of men palpation of the prostate gland. Radiographs of the chest and other parts of the body were obtained as indicated. Hematological data were obtained and were available for evaluation.

In detection of possible leukemia (or preclinical evidence of incipient leukemia) the lymph nodes and spleen were carefully examined; hematological data were analyzed, including routine hemograms and percent basophils in 4000 white cell count; and alkaline phosphatase smears of the white blood cells where done were available for review.

LABORATORY PROCEDURES

Hematological studies included white cell counts with differentials, red blood counts, hematocrits, hemoglobins, platelet counts, serum proteins, blood smears for alkaline phosphatase, and basophil count studies. Techniques for these procedures have been described in previous reports.[1,2] Bone marrow aspirations for differential study were collected on 4 exposed and 2 unexposed individuals. Considerable effort was spent on chromosome studies in the past two surveys. Of particular interest was the possibility of studying the chromosomes of cells cultured from the "beta burn" areas of the skin. Some 50 skin biopsies were obtained and successfully grown in most cases. However, contamination of these cultures occurred under the field conditions of these studies, and unfortunately all were lost before they could be brought to the stage of chromosome preparations. Chromosome studies of peripheral blood cultures, however, have been considerably more successful. During 1963 a large number of bloods were cultured successfully. However, the final chromosome spreads in many cases were not completely satisfactory, and the study was repeated during the 1964 survey. At this time successful 2- and 3-day blood cultures were obtained on 64 exposed people and 11 unexposed. Excellent growth and chromosome spreads were obtained, and the slides are now being evaluated.*

Sera were collected both years on most individuals, and the following examinations were carried out in U.S. laboratories: protein-bound iodines on 9 exposed and 8 unexposed people and a few blood sugar determinations;** serum folic acid levels on 52 exposed and 85 unexposed people.***

During the 1963 survey 38 urine samples were collected, and during the 1964 survey 27 samples, for radiochemical analyses.† Most of these were 24-hour samples, though several pooled samples were obtained. Most were from people living on Rongelap Island, but some were obtained at Ebeye.

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*Assisting in these studies are Dr. Shields Warren and Dr. Hermann Lisco at the New England Deaconess Hospital, Miss Agnes Stroud at Argonne National Laboratory, and Miss Patricia Crumrine at the Women's Medical College, Philadelphia. We are grateful to Drs. Michael Bender and Carolyn Gooch of Oak Ridge, W.M. Court-Brown of Edinburgh, Scotland, and Kurt Hirshorn of New York University for advice.

**Dr L.V. Hankes and the Clinical Chemistry Group in the Medical Department of Brookhaven National Laboratory were responsible for these analyses.

***Dr. Thomas Lynch, Hackensack Hospital, Hackensack, N.J., did the folic acid determinations.

†Dr. Edward Hardy and others at the AEC Health and Safety Laboratory, New York, N.Y., carried out these analyses.

Findings

INTERVAL MEDICAL HISTORY

Illnesses

The outstanding medical event during the past 2 years on Rongelap was a poliomyelitis (type I) epidemic, which occurred early in 1963. The epidemic apparently was carried from atoll to atoll by the crew of a ship, since it broke out on each atoll within a week or two after that ship had departed. The epidemic occurred on Rongelap Atoll in January-February 1963 with 23 children and 3 adults stricken and one of the adults (an older exposed woman) succumbing. The children involved were all <7 years of age. Eleven were children of exposed and 12 of unexposed parents. Mild residual facial or limb paralysis was present in 8 and more severe paralysis in 2 children. These cases will be further described under the Pediatrics Section. This epidemic was brought under control within a few months by widespread use of oral Sabine vaccine by medical personnel of the Public Health Service, Trust Territory, and Navy. Fortunately Utirik Atoll was spared the epidemic.

Other than the poliomyelitis epidemic, the interval medical history, both on Rongelap during the past 2 years and on Utirik for the past 4 years, did not reveal any epidemics or unusual diseases. Upper respiratory infections, gastroenteritis, and fungus and other infections of the skin predominated in the sickness inventory of the health aide. Only a few cases of fish poisoning and sickness from eating improperly prepared arrowroot were reported.

Deaths

Four deaths had occurred in the exposed group during 1962 and early 1963: (1) No. 30, female, 60 years of age. Died, July 1962, with a stated diagnosis of cancer of the cervix. Previous examinations had shown progressive loss of weight and increasing hypertension. On the past survey, bleeding was noted from the cervical os and a gynecological checkup had been recommended but death occurred before this was carried out. No autopsy was obtained. (2) No. 46, male, 84 years of age. Died July 1962. Had history of arteriosclerotic heart disease, a stroke a number of years ago, and senility. No autopsy was obtained. (3) No. 26, male, 21 years of age. Died in December 1962, two months after a fall from a coconut tree. Death was preceded by disorientation and amnesia with convulsive seizures and finally coma. Autopsy showed meningeal damage grossly and histologically. Brain damage was the likely cause of death. Other findings were few, but of interest was notation of giant and multinucleated cells in the meninges area.* (4) No. 52, female, 55 years of age. Died, February 1963, with laryngeal paralysis during the poliomyelitis epidemic. Death appeared to be from poliomyelitis with bulbar involvement. No autopsy was obtained.

There was one death of a child of an exposed parent: No. 107, female, 4 years of age. Died in October 1962 of acute gastroenteritis and dehydration. Child had a history of malnutrition and weakness, skin infections, loss of pigment in hair. No autopsy was done.

During 1963 one death occurred in the exposed group: the oldest Rongelap woman, estimated to be around 107 years of age; death was reported as due to "old age." Unfortunately, no autopsy was obtained. She had been known to be quite feeble and had cataracts and a considerable degree of arteriosclerosis.

A 54-year-old man in the comparison population died of asthma. No autopsy was done.

During the 10-year period, 10 deaths have occurred in the exposed Rongelap group, and 8 deaths have occurred in the comparison population since 1957 (when this group was first examined). Table 3 lists the deaths with probable causes in the two groups. The annual mortality rate per 1000 for the exposed group is thus about 12.2 compared with about 8.4 for the comparison population and 8.3 for the Marshall Islands as a whole (1960).

Poorly kept records made it difficult to get accurate demographic data on the Utirik people. It appeared, however, that during the past 4 years since they were last examined, about 5 deaths had occurred in the older people and 6 infant deaths had been recorded. The deaths were due to various causes such as pneumonia, infant diarrhea, and infections.

Births

In 1962, 3 healthy babies were born to exposed parents and 5 to unexposed parents. In 1963, 5 babies were born to exposed parents and 5 to unexposed parents.

*Dr. Hans Cottier of Brookhaven National Laboratory reported on the histopathology.

Table 3

Mortality

Exposed				Unexposed			
Year	Subject No.	Age & sex	Probable cause	Year	Subject No.	Age & sex	Probable cause
1956	25	44 M	Hypertensive heart disease	1958	857	65 M	Cerebral thrombosis(?)
1957	38	76 M	Coronary heart disease, diabetes	1959	854	55 F	Infection urinary tract, diabetes
1958	31	35 M	Acute varicella	1960	933	56 M	Pneumonia secondary to influenza
1959	62	60 F	Ovarian cancer	1960	927	65 M	Pneumonia secondary to influenza
1962	30	60 F	Cancer of cervix	1960	861	68 F	Diabetes, cancer cervix(?)
1962	46	84 M	Arteriosclerotic heart disease	1962	953	48 M	Status asthmaticus
1962	28	21 M	Brain damage following fall from tree	1962	848	41 F	Neurosyphilis(?)
1962	56	75 F	Fractured vertebrae	1963	886	54 M	Asthma(?)
1963	52	55 F	Poliomyelitis, bulbar				
1963	57	107 F	"Old age"(?)				

*Not confirmed by autopsy or biopsy.

The birth rate for the past year was calculated as in the previous surveys from the number of births per woman of childbearing age (15 to 45 years). There were 23 such women in the exposed group and 39 in the unexposed group. (Not included in either group were 4 unexposed women whose spouses were exposed males.) For the 2-year period in the exposed group 8 babies were born, giving an average of 0.17 births per woman per year; in the unexposed group 10 babies were born, giving a slightly lower birth rate per woman (0.13 per year). The births were all full-term normal deliveries, except one case as noted below.

A review of the entire menstrual and obstetrical history of the women (examined in 1964) in the exposed and control groups is given in Table 4. In 20 exposed women there had been a total of 136 pregnancies, 19 women delivering 115 living children for an average of 4.8 babies per woman for the 24 women in the group. The same fecundity was noted in the control women, 32 of the 39 women having been pregnant 203 times and delivering 189 living babies, averaging 4.6 children per mother. The histories of the age of onset of menstruation and development of menarche were not too reliable, but the ages of onset for these events appear to be about the same in the exposed and the control women.

Table 5 lists the births and fetal deaths by year since 1954 of Rongelap people. Since it was uncertain whether the list of births on Utirik Atoll obtained during the 1963 survey was complete, it was not possible to calculate an accurate birth rate for that group. However, the birth rate seemed to be about the same as noted in other Marshall Island populations.

Congenital Anomalies

A full-term stillbirth with congenital anomalies (ectromelus) was born to exposed parents in 1962. This anomaly is not very uncommon, and in view of the statistical evaluation the question of radiation implication must be left open. One 24-year-old exposed woman (No. 49) was operated on for ectopic pregnancy in 1962. A case of congenital heart defect had been noted in a child born of exposed parents several years ago. This child died at 4 months of age. Specific genetic studies have not been conducted on this relatively small population, and only routine examination of new births has been done. No unusual incidence of defects has been noted in the newborn. Some of the defects noted in both exposed and unexposed children include patent ductus arteriosus, congenital deformity of the hip, and congenital hypoplasia of the middle phalanx of the 5th finger.

Miscarriages and Stillbirths

Except for the one ectopic pregnancy, no miscarriages were reported during the past 2-year period. One neonatal death (at 1 month of age) due to infant diarrhea occurred in a twin born to

Table 4

Menstrual and Obstetrical History, Adults, 1964

Exposed					Unexposed				
Subject No.	Age at men.	Age at meno.	No. preg.	No. live births	Subject No.	Age at men.	Age at meno.	No. preg.	No. live births
1		40	12	12	826	7		6	5
12	13		5	4	829	12		7	6
13		48	0	0	832	13		6	6
14			9	9	835	12		7	7
18	12		13	12	841	14		7	7
24	12		2	2	843	13		6	6
28		58	10	10	844	13		12	11
34		35*	14	10	851		54	10	10
43			4	4	852		40	0	0
45	13		11	9	858		49	3	3
49	13		6	3	859		50	9	6
51	17		2	0	865	13		10	9
58		64	12	10	867	18		9	9
59		41	2	1	893	15		13	11
60		45	0	0	894		45	0	0
61	12		2	2	895	17		-	-
63		44	13	10	896	13		3	3
64	12		10	9	898		45	4	4
66	13		0	0	908		54	15	14
67	13		0	0	916	14		14	8
70	14		2	2	922	14		11	11
71	16		1	1	928		47	1	1
78	13		5	4	929		46	0	0
81	15		1	1	932	14		3	3
					934	13		0	0
					936			3	3
					938	14		6	4
					941		53	11	10
					942	13		0	0
					945	13		1	1
					951	14		7	7
					956	12		-	-
					957		46	2	1
					965	15		0	0
					970		47	0	0
					982	14		3	2
					991		54	1	1
					1001	13		7	6
					1042	17		6	4
					1043	14		-	-
					1050	18		1	1
					1052	13		5	3
Av.	13.4	48.6	5.7	4.8		13.8	48.5	5.4	4.6
Total subs.	(14)	(7)	(24)	(24)		(28)	(13)	(39)	(39)

*Hysterectomy; not included in survey.

Table 5

Births and Fetal Deaths[a] by Year

Year	Women aged 15–45	Total pregnancies	Live births	Children		Miscarriages[a]	% Pregnancies terminating in miscarriage
				M	F		
			EXPOSED[b]				
1954[c]	19	1	0	0	0	1	100
1955	20	6	5	4	1	1	17
1956	20	6	4	0	4	2	33
1957	21	5	2	2	0	3	60
1958	22	14	8	4	4	6	43
1959	22	7	5	2	3	2	29
1960	24	10	9	5	4	1	10
1961	23	6	6	2	4	0	0
1962	24	4	3	0	3	1	25
1963	27	6	5	2	3	1	17
1964[d]	26	2	1	1	0	0	0
			UNEXPOSED				
1956	29	9	7	6	1	2	22
1957	30	11	9	4	5	2	18
1958	30	9	8	5	3	1	11
1959	29	10	9	4	5	1	10
1960	29	10	8	5	3	2	20
1961	29	8	8	6	2	0	0
1962	30	6	5	4	1	1	17
1963	32	2	2	1	1	0	0
1964[d]	32	3	3	2	1	0	0

[a]Includes stillbirths and neonatal deaths.
[b]Includes nonexposed females mated to exposed males.
[c]Includes only children conceived after March 1, 1954.
[d]Includes data only through March 1964.

Table 6

Summary of Pregnancy Termination Data
(women aged 15–45)

	1955[a]–1958				1959–1963			
	Exposed[b] (22 females)		Unexposed (31 females)		Exposed[b] (30 females)		Unexposed (36 females)	
	Incidence	%	Incidence	%	Incidence	%	Incidence	%
Women giving birth to living children	12	54	19	61	17	56	21	58
Women with miscarriages[c] but no live births	5	23	1	3	2	7	1	3
Women with no recorded pregnancies	5	23	11	36	11	37	14	39
Women with one or more miscarriages[c]	9	41	5	16	5	17	2	6
Women with two or more miscarriages[c]	3	14	2	6	0	0	1	3
Total miscarriages[c]	13	41	8	22	5	15	4	11

[a]Includes miscarriages occurring after March 1, 1954.
[b]Includes nonexposed females mated to exposed males.
[c]Includes stillbirths and neonatal deaths.

Table 7

Physical Findings in Rongelap and Utirik Adult Populations

	1963			1964	
	R[a]	C	U	R	C
No. examined	45	75	52	47	85
Adenopathy		1		3	10
Anemia, anemic tendency	4	2		3	6
Arteriosclerosis, peripheral, mild		14	1	6	12
Arteriosclerosis, peripheral, moderate to severe	12	10	3	6	5
Asthma	2				
Auricular fibrillation with myocardial damage	1			1	1
Bradycardia	1	1		1	
Bronchitis		4	3		4
Cardiac enlargement	3	3		1	
Cardiac murmur				4	4
Cervical erosion, bleeding	8	14	4	4	5
Cervical lacerations	4	5		5	3
Cervical and vaginal atrophy				2	2
Congenital defects					
a) dislocation of hip	1			1	
b) prominent head of ulna	2	4		2	4
c) bilateral shortening of 5th finger	2	3		2	3
d) polydactylism		1			1
e) shortened left thumb	1				
f) flexion deformity, fingers		1			1
g) small 4th toe					1
Cyst, Bartholin				1	
Cyst, ovarian					1
Cystocele		2		2	
Diabetes mellitus		7			7
Dupuytren's contracture		1			
Epididymitis					1
Furunculosis	1				
Gynecomastia	1			1	1
Hallux valgus	1			1	
Hemorrhoids	2	2	1		1

	1963			1964	
	R[a]	C	U	R	C
Hypertension (>140/90)	3	2	6	4	6
Inguinal hernia			1		
Intestinal parasites	3	7			
Kyphosis, scoliosis	4	3	2	5	1
Leiomyoma, uterus					1
Leprosy, arrested	1			1	1[b]
Leukoplakia	1				2
Liver, palpable	7		4	2	3
Myocardial damage or insufficiency (EKG)	1	10	1	1	10
Obesity	7	9	4	5	10
Osteoarthritis	10	15		10	13
Paralysis	1				1
Parotid enlargement	1				
Perirectal abscess	1			1	
Pharyngitis			2	8	20
Pleural thickening or adhesions	1	2			
Pregnancies	6	5	2	2	6
Prostatic hypertrophy	5	5		7	8
Proteinuria		4			1
Pyorrhea					2
Rheumatic heart disease	1			1	
Senility	4	1		3	
Syphilis(?) arrested	2	2		1	1
Thyroid enlargement		1			1
Tinea circinata or versicolor				1	5
Tonsilar hypertrophy, tonsilitis	1	3			
Tumor, benign	5	8	1	3	4
Ulcer, leg					1
Urethral caruncle	1	1	1		
Uterus enlargement, fibroids(?)			2		
Uterus retroversion		1			
Varicocele					1
Varicose veins	1				1
Vitiligo		1			

[a]R = Rongelap exposed, including Ailinginae; C = Rongelap unexposed; U = Utirik exposed.
[b]Suspect.

exposed parents in 1962. A stillborn (full term) with congenital anomalies which was born to exposed parents is described above. Tables 5 and 6 show the incidence of miscarriages and births in the exposed and comparison populations on a yearly basis and for the two 5-year periods.

The data on miscarriages and stillbirths in the Utirik population were not reliable.

PHYSICAL EXAMINATIONS

The major findings on physical examinations are listed in Table 7 for the adults and Table 13 for the children. Appendix 7 contains findings on each individual adult and Appendix 8 contains such information on each child.

Adult Examinations

Table 7 does not show any significant difference in the abnormalities recorded between the exposed and the comparison populations. The exposed group did show a higher incidence of severe arteriosclerosis, which may be a reflection of the greater percentage of older people in this group. There was a slightly increased occurrence of cervical erosion and laceration in the exposed women. The ex-

posed group also showed an increase in kyphoscoliosis, which is probably also due to the age factor. A slightly increased incidence of prostatic hypertrophy was found among the exposed males. This will be given particular attention in the next survey. The unexposed population slightly exceeded the exposed in incidence of inflammatory diseases such as adenopathy, bronchitis, and pharyngitis. There are no obvious reasons for this difference. No malignant lesions were detected in either the exposed or unexposed groups. Papanicolaou examinations on vaginal secretions revealed several that were suspicious of malignancy. These women will be checked carefully on the next survey.

Anthropometric Studies

During the 1963 and 1964 physical examinations, anthropometric measurements were obtained on Rongelap adults examined (>19 years of age). These measurements included height and weight, and circumferences of shoulder girth, biceps, forearm, wrist, chest, abdomen, buttocks, thigh, knee, calf, and ankle. Dr. Albert R. Behnke, Jr.* has been analyzing such data to provide information on body proportions and estimates of fat and muscle of various ethnic groups. His analysis of the Marshallese data compared with many individuals in other racial groups revealed that the young Marshallese adult male (age group 20 to 39) appeared outstanding in regard to muscle development. Table 8 shows a comparison of the anthropometric data on males of the Rongelap group and other groups. In contrast to the men, the data indicated that the women were either physically immature or had lost a considerable amount of lean tissue. These data as summarized by Dr. Behnke are presented in Appendix 9.

*The University of California Medical Center, San Francisco.

Pediatric Examinations

Children Examined 1963. During the 1963 survey, a total of 212 children were examined: 35 children exposed on Rongelap, 32 children exposed on Utirik, 35 children born after the fallout to exposed parents, and 120 controls.

In the Rongelap "exposed" group, two children examined in 1962 were not available in 1963. Three other children were transferred to the adult study (Table 9). The previous medical survey of children on Utirik had been done in 1959. Of the

Table 8

Anthropometric Data on Various Male Groups

Group	Number	Age,[a] years	Height, dm	Weight, kg	Factor, F, $\sqrt{W/h^{0.7}}$	Sum of 11 circumferences[b]	K, sum of 11 circumferences/F
Rongelap (1)	19	20–39	16.25	60.7	2.936	581	197.9
Rongelap (2)	27	41–68	16.11	66.0	3.071	603	196.4
Turks	915	19–32	16.93	64.6	2.986	592[c]	198.3
Greeks	1084	18–30	17.05	67.0	3.033	603[c]	198.8
Italians	1358	19–44	17.07	70.3	3.106	613[c]	197.4
Oregon students	100	18–22	18.03	78.3	3.220	627	194.7
Lankenau	34	20–40	17.71	75.3	3.171	616	194.3
Navy	31	20–50	17.83	78.3	3.228	626	193.9
Air Force trainees	3000	18–34	17.41	68.5	3.045	593[d]	194.8
Air Force flyers	4000	18–45	17.56	74.4	3.164	624[d]	197.2
Philadelphia YMCA	22	39–82	17.00	72.8	3.165	615	194.3
Baltimore indigents	20	57–93	16.47	60.9	2.927	578	197.5
Berkeley (1)	458	14.5	16.61	55.8	2.794	541	193.6
Berkeley (2)	454	15.3	17.11	61.1	2.893	561	193.9
Reference man			17.40	70.0	3.078	600	194.9

[a]More than 90% of subjects are included in age range.

[b]The 11 circumferences are girth of the shoulders, chest, abdomen (average of waist, omphalion perimeters), buttocks, thigh, biceps, forearm, wrist, knee, calf, and ankle. Note the small variation in the K values.

[c]Lower abdominal (omphalion) circumferences only were measured.

[d]Forearm and knee circumferences calculated.

Table 9

Exposed Rongelap Children Examined in 1963

Total number examined in 1962		30
Not seen in 1963 (Nos. 44, 84)	2	
Transferred to adult study (Nos. 61, 76, 81)	3	
Total number examined in 1963		25

Table 10

Utirik Pediatric Population Samples Examined in 1959 and 1963

Total number examined in 1959		60
Not exposed, not examined in 1963	10	
Not exposed, examined in 1963	2	
Exposed, not examined in 1963	14	
Exposed, graduated to adult study	7	
Exposed, not examined in 1959 but examined in 1963	3	
Total number examined in 1963		32

Table 11

Control Pediatric Population, 1963

Total number examined in 1962		96
Not seen in 1963	14	
Graduated to adult study	2	
Not seen in 1962, seen in 1963	5	
Total number old controls seen in 1963		85
New babies added	4	
New controls added (Ebeye)	29	
New controls added (Rongelap)	2	
Total number controls examined in 1963		120

Table 12

Children Born After Fallout to Exposed Parents

Total number examined in 1962		37
Not seen in 1963	3	
Died since 1962	1	
New babies added in 1962	2	
Total number examined in 1963		35

Table 13

Summary of Physical Findings in Children, 1963 and 1964

	Exposed			Control					
	Rongelap		Utirik	Born before 1 Jan 1955		Born after 1 Jan 1955		Nonexposed, born of exposed parents	
	1963	1964	1963	1963	1964	1963	1964	1963	1964
Number examined	25	22	30	38	44	51	57	35	41
Active skin lesions	1	1	0	2	3	13	8	4	3
Adenopathy	5	2	0	4	1	9	5	2	5
Palpable liver	0	4	0	0	5	1	4	1	11
Palpable spleen	0	0	0	0	0	2	0	0	2
Upper respiratory infection	8	0	1	4	8	8	3	5	4
Blood pressure taken	19	22	29	30	43	3	28	2	19
Hypertension	1	0	0	0	0	0	0	0	0
Acute otitis media	6	1	1	2	6	2	5	1	4
Chronic otitis media	0	0	0	0	0	1	1	1	1
Molluscum	1	0	0	1	0	7	6	3	2
Tinea versicolor	2	2	3	5	0	1	1	0	0
Vitiligo	0	1	0	2	0	0	1	0	0
Warts	3	0	2	1	2	4	2	2	5
Papilloma	1	0	1	1	0	0	0	0	0
Cheilosis	0	1	1	0	0	0	0	0	1
Excoriation of lip	0	0	1	0	0	1	0	2	0
Black spots on tongue	2	1	0	1	2	0	0	0	0
Geographic tongue	0	0	0	0	0	1	0	0	0
Conjunctivitis	0	0	0	0	0	1	1	1	0
Thyroid nodule*	1	3	0	0	0	0	0	0	0
Tracheostomy scar	1	1	0	0	0	0	0	0	0
Thoracotomy scar	1	1	0	0	0	0	0	0	0
Pes excavatus	0	0	0	1	0	0	0	0	0
Infantile eczema	0	0	0	0	0	0	1	0	0
Rales in lungs	0	0	0	0	0	1	0	3	0
Systolic murmur (grade 2)	0	0	0	2	0	2	1	0	3
Extrasystoles	0	0	0	1	0	0	0	0	0
Spotted enamel on permanent teeth	0	1	0	0	0	0	0	0	0
Anisocoria	0	0	0	0	0	0	0	0	1

*Subjects No. 17, 13 5/12-year-old female; No. 21, 13 9/12-year-old female; and No. 69, 13 8/12-year-old female.

potentially available total of 41 children from the 1959 survey, 29 were re-examined in 1963 (Table 10). In the group of 60 children examined in 1959, there were 12 who because of their ages could not have been exposed either directly or *in utero* to the fallout radiation; two of these 12 were re-examined in 1963. More than one-fourth of the exposed pediatric sample on Utirik was lost to follow-up between the two examinations.

The fluctuations between examinations in the numbers of control children and of offspring of exposed parents are shown in Tables 11 and 12. The 29 children added to the control group were randomly selected from the Ebeye school population to provide an additional group comparable in ages to those Rongelap children who were exposed during infancy and early childhood years to the fallout radiation. Unfortunately, a study of the biographical information on these new subjects indicated the existence of the same uncertainties regarding actual chronological ages that had been encountered before. Verification or correction of the birth date on each of the children will be required before the data can be utilized for comparative purposes.

Children Examined 1964. During the 1964 survey, 22 exposed children, 41 children of exposed parents, and 101 control children were examined. The decrease in the number of exposed children examined in the Rongelap series from 1958 through 1964 results from temporary movement of subjects to other atolls and to graduation of children from the pediatric to the adult study. The increase in number of children of exposed parents examined results from new births.

Results of Physical Examinations. The incidence of abnormal physical findings in the exposed and control groups of children is summarized in Table 13. In general the health of the children seen during both surveys was good. Respiratory infections and skin infections were infrequent. The nutritional status of all children was adequate, the growth patterns were consistent with those seen in previous years, and the height increments for the period were consistent with the previous group trends.

During the epidemic on these atolls, 24 children in the study developed poliomyelitis. Residual weakness of muscle groups was evident in 11 of these children at the time of the 1963 examination (Table 14). Seven children continued to show residual paralysis of varying degree at the time of the 1964 survey (Nos. 95, 96, 98, 106, 870, 901, 903). In several instances, the degree of involvement appeared less than in the previous year.

Table 14

History of Poliomyelitis Among Children of Study Population, Rongelap and Ebeye

Subjects with positive history but no residual involvement at time of examination*:
Nos. 102, 105, 113, 120, 126, 127, 930, 1012, 1025, 1031, 1040, 1504
Subjects with positive history and with residual involvement at time of examination:
Nos. 96, 98, 103, 106, 110, 870, 901, 903, 1030, 1037

*One subject, No. 84, who had a history of poliomyelitis was not examined.

The increase in palpable livers in exposed and control groups during the 1964 examinations is thought to result from variation between pediatric examiners. Liver enlargement exceeded 2 cm below the right costal margin in only two children, and in the remainder the liver was palpable at the costal margin only. In all but one additional category in Table 13, variation was considered to be within limits expected in sequential examinations of any pediatric age population.

Thyroid Nodules. Of particular interest was the development of thyroid nodules in three girls 9 and 10 years after exposure; two were 13 and one was 14 years of age at the time of detection. These girls were in the higher dose group in which there were 29 children (<18 years of age) exposed; 17 of the 29 were girls, with 6 girls in the 10 to 15-year range. Of 75 unexposed comparison children, 37 were girls, and 21 of the girls were in the age range of 10 to 15 years. No thyroid nodules were noted in this group (only one diffuse thyroid enlargement has been detected in an unexposed adult). A small nodule was first detected in one of the girls in 1963, and nodules in the other two were first detected in March 1964. No lymph node involvement was grossly evident. The individuals were hospitalized and two had complete thyroidectomies and the third a partial thyroidectomy.* Grossly the glands had a "bobblestone" appearance with multiple hard nodules and were at first

*Captain C.A. Broaddus (MC) U.S.N. at the U.S. Naval Hospital in Guam performed the surgery.

Figure 10. Gross picture of sectioned thyroid gland from 14-year-old Marshallese girl (No. 69) showing nodules.

Figure 11. Microscopic section (10×) of thyroid gland from same case as in Figure 10. These changes are characteristic of all three cases. Note the multiple, discrete nodules with wide variation in size and growth pattern. Some nodules consist of microfollicular tissue and others of colloid cysts, while still others show hyperplasia with papillary infolding of the epithelium.

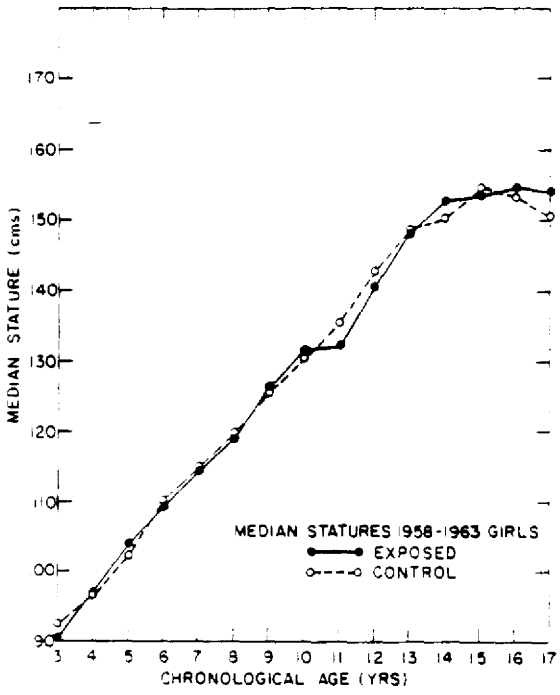

Figure 12.

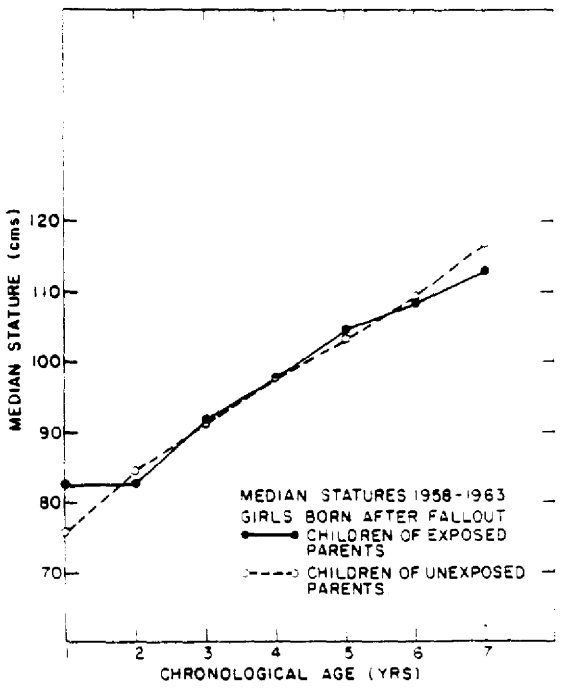

Figure 13.

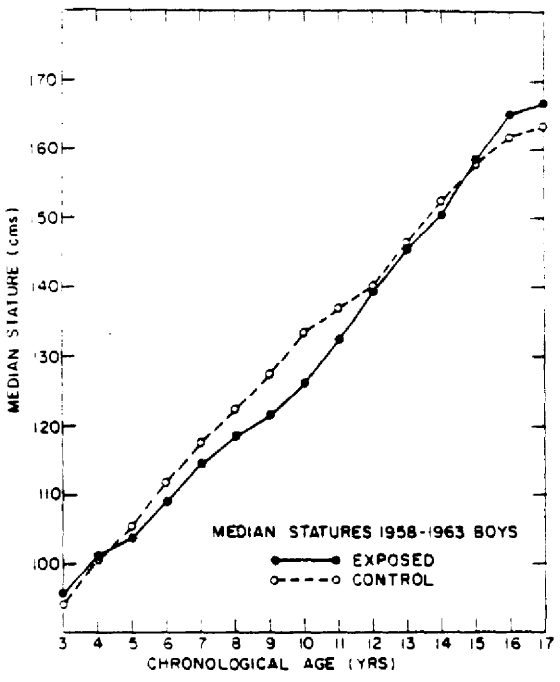

Figure 14.

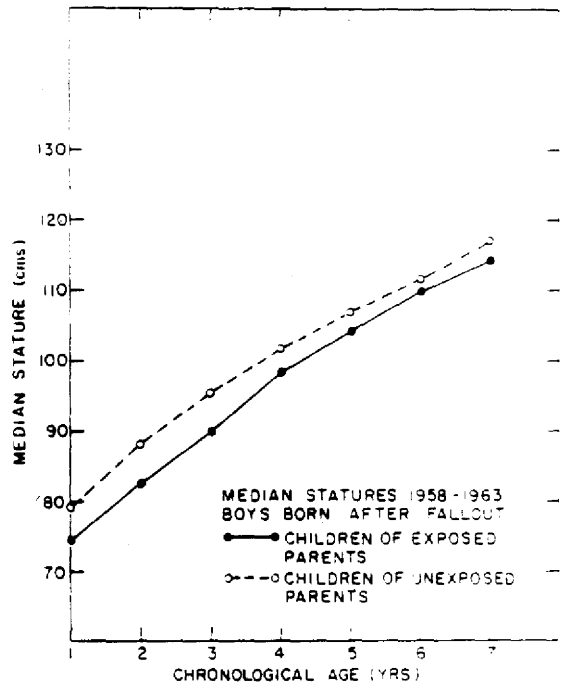

Figure 15.

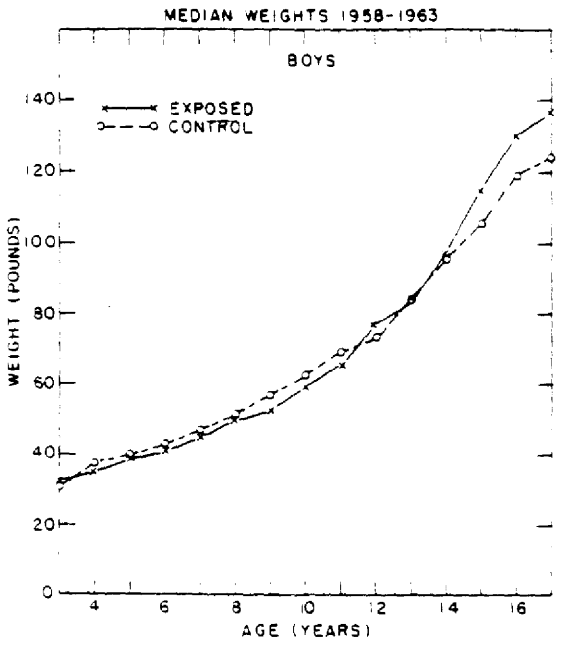

Figure 16.

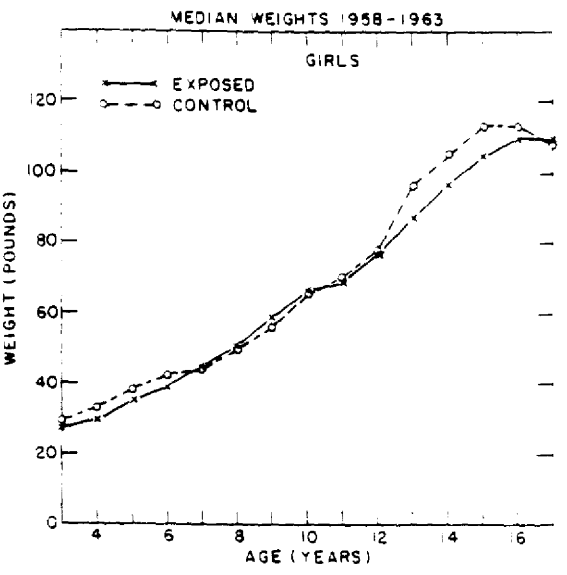

Figure 17.

thought to be malignant. Sections of the tissues were reviewed by a number of pathologists,* all of whom agreed that the nodules were not malignant and resembled in many respects adenomatoid goiters seen with iodine deficiency, with its characteristic regenerative rather than neoplastic proliferation. However, in the Marshall Islands, where fish and sea food are mainstays of the diet, iodine deficiency is not likely and goiters are rare. Figure 10 shows a picture of the gross appearance of the nodules and Figure 11 shows a microphotograph of one of the glands. The likelihood of these nodules being radiation induced is discussed in the Summarizing Discussion. The two girls who had complete thyroidectomies developed signs of hypoparathyroidism which responded to treatment. Parathyroid function returned in No. 17, but No. 21 still requires therapy including thyroid extract. In the third case (No. 69) only a partial thyroidectomy was done, and she requires no therapy.

NOTE: During the 11th-year survey now in progress (March 1965) 3 new cases of thyroid nodules in the exposed group have been detected. Two were in boys 12 and 17 years of age and one in an adult woman 41 years of age. The nodules appeared grossly similar to those described in the teen-age girls in this report, and these cases will receive study and treatment.

Growth and Development Studies. Analysis of the statural data from the 1963 survey indicated the persistence of the trends previously reported. As shown in Figures 12 and 13, no difference was apparent in median statures between the exposed and control groups among girls and between girls born to exposed and girls born to nonexposed parents.* Among the boys, however, retardation in statural growth of the exposed group between the ages of 5 and 12 years as compared with that of the control group was again noted (Figure 14). The difference in median statures between boys born to exposed parents and those with nonexposed parents was also evident in 1963 (Figure 15). This difference has been attributed to the fact that the boys in the group with exposed parents were, on the average, 4 months younger than the boys in the group with nonexposed parents.

No statistically significant differences were noted in body weight curves between exposed and control children (Figures 16 and 17). In skeletal maturation, the trends reported in the previous studies

*Sections of tissue were reviewed and reported on by Drs. S. Warren, New England Deaconess Hospital; G.H. Klink, Armed Forces Institute of Pathology; C. J. Stahl, U.S. Naval Hospital at Guam; H.A. Johnson, Brookhaven National Laboratory, and S. Lindsay, University of California Medical School.

*Dr. K.M. Griffith of the M.D. Anderson Hospital did the statistical analyses.

Figure 18. Brothers. Marked retardation in statural growth is shown by the older (shorter) brother (No. 3, on the right) who was exposed at age 18 months. The younger by 21 months (No. 83, on the left) is taller by 13 cm. The retarded boy shows no evidence of hyperthyroidism or skeletal disease clinically, other than markedly delayed osseous maturation.

(7-year and 8-year surveys) have persisted. In comparison with the Greulich and Pyle standards, the skeletal development of Marshallese children was retarded at the same chronological age levels. In addition, the exposed children were less mature than control children. The retardation was most prominent among those exposed during infancy to the fallout radiation (see Figure 18). Skeletal age values during successive examinations of this particular group of children are shown in Table 15. These data covering the period since 1958 are being published in detail elsewhere.[12] Complete tables of anthropometric measurements on the Marshallese children dating back to the early surveys are presented in Appendices 11 through 16.

Ophthalmological Findings

Ophthalmological examinations were carried out in 1964 on 68 exposed, 45 children of exposed, and 190 people in the comparison population; a total of 303 people.

As noted in previous surveys, there was an increased incidence of large corneas and enlarged tortuous retinal vessels and a lower incidence of myopia, strabismus, amblyopia ex anopsia, retinitis pigmentosa, retinoblastoma, and congenital glaucoma.

The incidence of arcus senilis is higher in the Marshallese than in similar age groups in the United States, which is in keeping with the gen-

Table 15

Skeletal Age Development in Children Born Between July 1952 and February 1953

Subject No.	Sex	Age at exposure, months	Skeletal age (S.A.) values at successive examinations, years				
			C.A.* = 4 yr	C.A. = 6 yr	C.A. = 8 yr	C.A. = 9 yr	C.A. = 10 yr
2	M	16	3½	4½	6	7¾	8½
3	M	17	2⅓	2⅔	3	3	3
5	M	16	3⅛	3½	3½	3¾	NE*
6	M	16	3	5½	6¾	8½	9
65	F	15	2½	3½	6	6⅔	8
33	F	20	5	6½	9¼	10	NE
54	M	12	3¾	NE	9½	10	11
955	F	C*	NE	NE	10	10	10¾
962	F	C	NE	NE	7⅓	7⅞	9¼
980	F	C	NE	6⅝	8⅓	NE	NE
996	F	C	NE	NE	8⅓	10	10¼
814	M	C	NE	5¾	8	9	10

*C.A. = chronological age; NE = not examined; C = not exposed (control).

eral observation that the Marshallese age faster than Americans. The incidence was higher in the exposed group (36%) than in the unexposed group (19%). However, recent analysis of aging criteria did not show any significant differences between exposed and unexposed groups.

Though diabetes mellitus has a moderately high incidence in the Marshall Islanders, only one case of diabetic retinopathy was noted. This is in keeping with the observation that the onset of diabetes in the Marshallese occurs largely in older individuals.

The incidence of pinguecula and pterygium is high in the Marshall Islands, and also slightly higher in the exposed group than in the unexposed (see Table 16). It has been postulated that the higher incidence in the exposed group may be related to contamination of the conjunctival sac with fallout material at the time of the accident.

The incidence of abnormalities of the crystalline lens is greater in the Marshall Islanders than in similar age groups in the United States. Furthermore, the incidence of such abnormalities was

Table 16

Ophthalmological Survey, 1964

	Exposed		Children of exposed		Controls	
	No.	%	No.	%	No.	%
Number examined	68		45		190	
Anisocoria	1	1.40			1	0.52
Anterior staphyloma	1	1.40				
Arcus senilis	25	36.70			37	19.46
Argyll Robertson pupil	1	1.40				
Chalazion					2	1.05
Choroiditis (old, healed with scars)	3	4.20			3	1.57
Conjunctivitis	1	1.40				
Corneal pigment	2	2.80				
Corneal scar	3	4.20			2	1.05
Drüsen	1	1.40				
Duane's syndrome					1	0.52
Lens: Polychromatic sheen	18	26.50			41	21.57
Opacities & cataract: presenile	1	1.40			3	1.57
senile	12	17.60			25	10.64
Aphakia	2	2.80			1	0.52
Leprosy, eye signs of	1	1.40			1	0.52
Macular degeneration	1	1.40			2	1.05
Molluscum contagiosum					1	0.52
Melanoma of iris					2	1.05
Melanoma of conjunctiva	1	1.40				
Nystagmus					2	1.05
Pinguecula	11	16.20			17	8.44
Pterygium	20	29.40			38	19.98
Proptosis					1	0.52
Phthisis bulbi					1	0.52
Positive Rhomberg	1	1.40			1	0.52
Retinal arteriosclerosis	4	6.00			9	4.68
Retinal scars	2	2.80			5	2.60
Retinal hemorrhage	1	1.40				
Strabismus: Internal					1	0.52
External	5	7.30			2	1.05
Seventh nerve weakness			1	2.2	1	0.52
Vitreous opacities					3	1.57

somewhat greater in the exposed group in 1964 than in the unexposed comparison population. These abnormalities consist of polychromatic sheen, lenticular opacities of all degrees, and cataracts. The polychromatic sheen was noted as the earliest lens change and varied from a few fine granules in the earlier cases to large granular plaques in the more advanced cases. These plaques were situated on the posterior lens capsule in the zone of specular reflection. The earliest cases showed yellowish granules which in some cases appeared slightly darker with a "beaten brass" color. As the granules coalesce into a plaque, greenish and bluish hues appear – hence the name polychromatic sheen.

Whether the polychromatic sheen seen following irradiation has unique and specific characteristics is still a debatable question. Some investigators contend that similar appearing changes can be detected in patients with retinitis pigmentosa and the early stages of cataracts which might be a complication of endogenous ocular or systemic disease or intoxication. Such polychromatic sheens were seen in 21% of the unirradiated Rongelap group and 26.5% of the exposed group. This difference is thought to be too small to implicate irradiation exposure with any degree of certainty, particularly in view of the slightly greater number of older people in the exposed group. The incidence of lenticular opacities was also slightly greater in the exposed group (19%) than in the unexposed group (12%).

Only one child (an 8-year-old female) complained of defective night vision. This was thought to be due to vitamin A deficiency, since there were no pathological changes in the fundus of either eye. Several years ago 12 children were encountered who had great difficulty in seeing at night. These children responded promptly with vitamin A treatment and dietary changes.

Only two cases were noted with corneal pigmentation, previously seen in three cases (1962). This pigmentation was characterized by a fine, dark, linear streak of pigment lying close to or on Bowman's membrane in the horizontal axis between the limbus and pupillary edge. It is believed that these changes may have been induced from beta radiation contaminating margins of the eyelids at the time of the accident.

There were several findings which may be residual to the poliomyelitis epidemic of 1963: two

Table 17

Residual "Beta Burns"

Subject No.	Age	Sex	Data
2	12	M	Roughening and pigment variation on front of neck. Several pigmented macules ACF.* Perianal depigmentation.
3	11	M	Mottled pigmentation both axillae. Pigmented area behind left ear.
11	60	M	Pigment changes left ACF, dorsum first right toe; pigmented nevi axilla.
17	13	F	Scarring and pigmentation left ACF.
20	17	M	Pigmented patch back of neck.
23	14	M	Pigmented macules left axilla, front of neck and chest. Depigmented spots shaft penis.
24	23	F	Slight pigment variation on front of neck; several pigmented macules dorsum left foot.
34	55	F	Slight roughening and pigmentation back of neck. Moles on front of neck.
39	25	F	Slight roughening and pigmentation back of neck; pigment variations and slight hyperpigmentation dorsum right foot.
49	25	F	Numerous pigmented macules both sides of neck and a few on arms and ACF.
54	11	M	Mottled pigmentation and depigmentation on front of neck.
59	44	F	Mottled pigmentation and depigmentation on back of neck.
63	46	F	Slight rugosity and pigmented ridges on back of neck.
64	40	F	Mole back of neck; slight pigment variation and a few macules front of neck.
65	11	F	Pigment variation and roughening front of neck.
67	24	F	Depigmented scars dorsum left foot.
75	22	F	Slight pigmented area dorsum right first toe.
78	47	F	Numerous pedunculated moles on sides and front of neck.
79	49	M	Pigmented and depigmented scar posterior surface left ear.

*ACF = antecubital fossa.

Figure 19. Residual "beta burn" showing scarring and pigmentation (No. 79).

Figure 20. Residual "beta burn" scarring and pigment aberration in antecubital fossa (No. 17).

Figure 21. Pigmented nevus-like lesions in previous "beta burn" area of neck (No. 78).

cases with 7th nerve weakness involving the lids; two cases of anisocoria (unequal pupils); and an increased incidence of strabismus.

Residual "Beta Burns"

Persisting residual effects of "beta burns" were found to be present in 19 people, 6 children and 13 adults. These are outlined in Table 17. The skin changes consisted of hyperkeratosis, and varying degrees of atrophy, scarring, and pigment aberrations (see Figures 19 and 20). These changes were slight in most of the people. The development of lentigo-like and papular pigmented nevus-like lesions in areas of previous "beta burns" was first observed several years ago, and these lesions appear to have been increasing slightly since that time (see Figure 21). Histological study of a biopsy of one of these lesions showed it to be a typical benign pigmented nevus.

The residual changes in the skin of the Marshallese who had sustained acute "beta burns" have shown neither fissure tissue breakdown in the affected areas as seen in chronic radiation dermatitis nor evidence of malignant change. Only one case showed a few spots of alopecia of the occipital area of the scalp as a residuum of epilation. Figure 22 shows histological residual changes in a lesion at 10 years after exposure.*

Figure 22. Section of skin from "beta burn" area on back of neck of 56-year-old woman (No. 34) at 10 years after exposure (100×). Note atrophy of epidermis with narrowing of stratum granulosum and finger-like projections of rete pegs. Slight atrophy of the sweat gland ducts is also present.

LABORATORY EXAMINATIONS

Hematological

Summary tables of hematological data are presented in the tables and graphs in the text, and raw data on the individuals are presented in the appendices. The more heavily exposed Rongelap

*Dr. David A. Wood of the University of California Medical Center, San Francisco, did the histological interpretations.

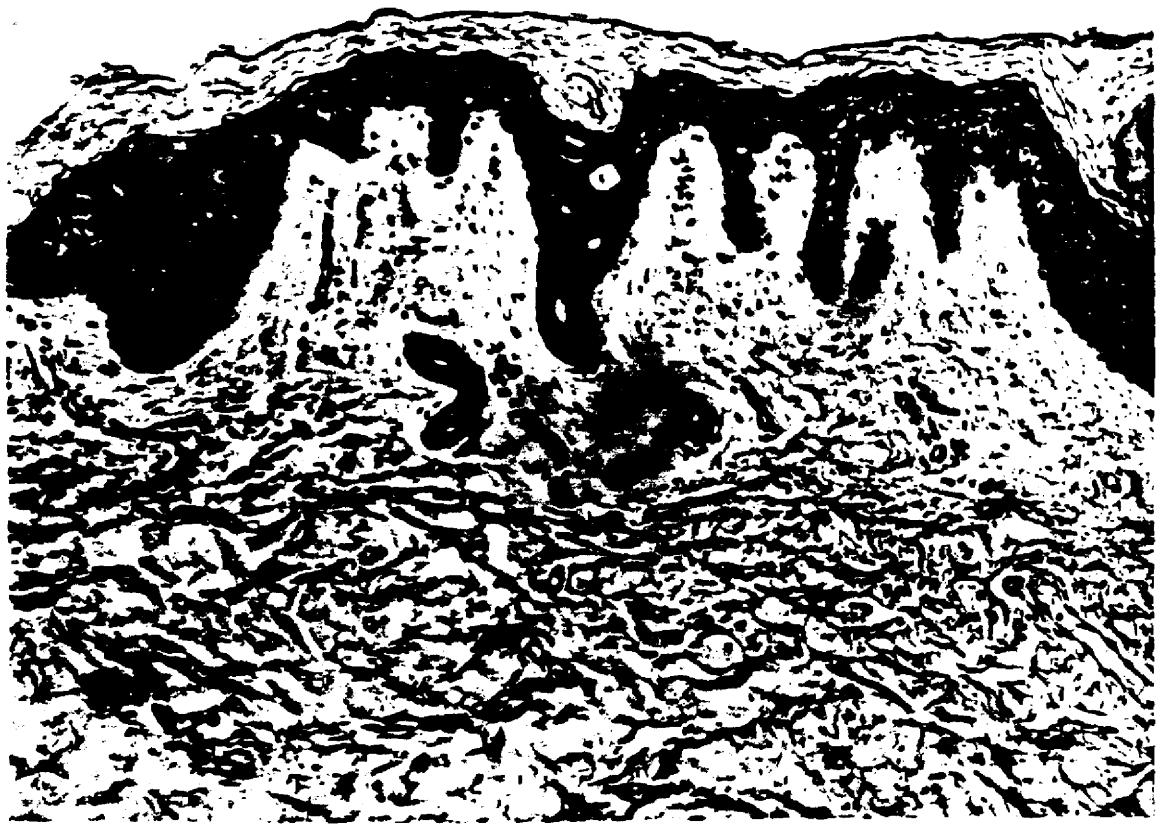

Table 18

Mean Levels of Rongelap Peripheral Blood Elements by Age and Sex, 1963

	Plate. ($\times 10^{-3}$)	WBC ($\times 10^{-3}$)	Neut. ($\times 10^{-3}$)	Lymph. ($\times 10^{-3}$)	Mono. ($\times 10^{-3}$)
Males 9-15 yr					
Rongelap exposed[a]	287± 66 (9)[b]	8.47±2.18 (9)	3.92±1.31 (9)	3.25±0.59 (9)	0.44 (9)
Ailingnae exposed	194 (1)	6.64 (1)	2.79 (1)	3.19 (1)	0.06 (1)
Utirik exposed	419± 93(12)	9.20±2.88(12)	4.57±1.83(11)	3.89±1.17(11)	0.24(11)
Rongelap unexposed	286± 78(14)	8.37±2.90(14)	4.07±1.96(14)	3.27±1.11(14)	0.30(14)
Females 9-15 yr					
Rongelap exposed[c]	300± 78 (8)	8.50±2.49 (8)	4.42±3.09 (8)	3.31±0.80 (8)	0.24 (8)
Ailingnae exposed	225 (2)	7.15 (2)	3.69 (2)	2.97 (2)	0.22 (2)
Utirik exposed	402±116(14)	9.01±2.66(15)	4.81±2.04(15)	3.33±0.94(15)	0.29(15)
Rongelap unexposed	373± 99(17)	8.82±2.29(17)	4.12±1.64(16)	3.86±0.77(16)	0.26(16)
Males >15-40 yr					
Rongelap exposed	198± 71(11)	6.58±1.49(11)	3.27±0.74(11)	2.82±0.89(11)	0.19(11)
Ailingnae exposed	—	—	—	—	—
Utirik exposed	342± 78(10)	6.55±1.47(10)	3.42±0.76(10)	2.55±0.85(10)	0.27(10)
Rongelap unexposed	294± 66(21)	7.77±1.44(21)	4.07±1.86(21)	2.96±0.90(21)	0.28(21)
Females >15-40 yr					
Rongelap exposed	297±127(14)	8.02±2.18(14)	4.35±1.33(14)	2.86±0.84(14)	0.29(14)
Ailingnae exposed	227 (4)	7.96 (4)	5.45 (4)	2.05 (4)	0.25 (4)
Utirik exposed	410± 97(16)	7.17±1.39(16)	3.96±1.35(16)	2.67±0.66(16)	0.21(16)
Rongelap unexposed	294± 66(23)	7.65±1.47(23)	4.23±1.34(23)	2.83±0.78(23)	0.22(23)
Males >40 yr					
Rongelap exposed	214± 87 (8)	6.33±1.24 (8)	2.88±0.59 (8)	2.99±1.04 (8)	0.15 (8)
Ailingnae exposed	245 (4)	6.38 (4)	3.23 (4)	2.46 (4)	0.27 (4)
Utirik exposed	344± 73(19)	6.88±1.85(19)	3.49±1.09(19)	2.80±0.91(19)	0.22(19)
Rongelap unexposed	294± 66(23)	6.65±1.40(23)	3.17±0.99(23)	2.85±0.67(23)	0.20(23)
Females >40 yr					
Rongelap exposed	238± 98 (7)	5.82±0.60 (7)	2.86±0.58 (7)	2.56±0.63 (7)	0.18 (7)
Ailingnae exposed	249± 47 (5)	7.20±1.60 (5)	3.83±0.57 (5)	2.37±1.20 (5)	0.35 (5)
Utirik exposed	356± 90(16)	7.08±1.30(16)	3.47±1.13(15)	3.07±0.92(15)	0.22(15)
Rongelap unexposed	318± 94(19)	7.21±1.40(19)	3.67±1.20(19)	2.98±0.94(19)	0.26(19)
Males <9 yr					
Of exposed parents	374± 95(15)	10.60±3.49(16)	4.49±1.19(16)	5.15±3.04(16)	0.39(16)
Of unexposed parents	375±119(29)	10.91±2.87(29)	4.40±1.82(29)	5.29±1.87(29)	0.40(29)
Females <9 yr					
Of exposed parents	386± 87(18)	12.20±1.92(18)	4.76±1.92(18)	6.07±3.00(18)	0.55(18)
Of unexposed parents	383±101(21)	10.15±2.50(22)	3.83±1.23(22)	5.31±1.60(22)	0.36(22)

	Eosin. ($\times 10^{-3}$)	Baso. ($\times 10^{-2}$)	Hct., %	RBC ($\times 10^{-4}$)	Hgb., g	Serum protein, g
Males 9-15 yr						
Rongelap exposed[a]	0.79 (9)	0.74 (9)	39.1±2.0 (9)	429±45 (9)	13.8±0.5 (9)	7.7±0.5 (9)
Ailingnae exposed	0.60 (1)	0.0 (1)	36.0 (1)	377 (1)	12.4 (1)	7.5 (1)
Utirik exposed	0.50(11)	0.38(11)	37.9±2.1(12)	442±23(12)	15.0±1.2(12)	7.6±0.3(12)
Rongelap unexposed	0.69(14)	0.44(14)	39.4±1.4(14)	433±34(14)	14.1±0.7(14)	7.8±0.4(12)
Females 9-15 yr						
Rongelap exposed[c]	0.48 (8)	0.46 (8)	39.5±2.0 (8)	449±34 (8)	13.9±0.9 (8)	8.0±0.4 (8)
Ailingnae exposed	0.28 (2)	0.0 (21)	41.0 (2)	435 (2)	15.0 (2)	8.0 (2)
Utirik exposed	0.53(15)	0.40(15)	38.0±2.1(15)	427±29(15)	14.0±1.0(15)	7.9±0.4(14)
Rongelap unexposed	0.48(16)	0.35(16)	38.3±2.7(17)	424±40(17)	13.7±1.6(17)	7.9±0.5(17)

Table 18 (cont'd)

Mean Levels of Rongelap Peripheral Blood Elements by Age and Sex, 1963

	Eosin. ($\times 10^{-3}$)	Baso. ($\times 10^{-2}$)	Hct., %	RBC ($\times 10^{-4}$)	Hgb., g	Serum protein, g
Males >15-40 yr						
Rongelap exposed	0.28(11)	0.25(11)	45.5±2.4(11)	458±47(11)	16.1±1.3(11)	7.6±0.3(10)
Ailingnae exposed	—	—	—	—	—	—
Utirik exposed	0.26(10)	0.48(10)	44.6±2.5(10)	460±34(10)	16.2±0.7(10)	7.6±0.4(10)
Rongelap unexposed	0.40(21)	0.30(21)	45.7±4.7(21)	473±32(21)	16.1±0.5(21)	8.0±0.4(21)
Females >15-40 yr						
Rongelap exposed	0.52(14)	0.25(14)	37.9±4.8(14)	409±64(14)	13.2±1.8(14)	7.8±0.5(14)
Ailingnae exposed	0.19 (4)	0.32 (4)	37.3 (4)	406 (4)	12.9 (4)	7.7 (4)
Utirik exposed	0.32(16)	0.17(16)	37.1±3.6(16)	405±41(16)	13.2±1.4(16)	7.6±0.4(16)
Rongelap unexposed	0.35(23)	0.23(23)	38.3±2.8(23)	421±39(23)	13.6±1.0(23)	7.9±0.6(23)
Males >40 yr						
Rongelap exposed	0.31 (8)	0.08 (8)	41.3±5.4 (8)	410±58 (8)	14.5±0.5 (8)	7.6±0.4 (7)
Ailingnae exposed	0.35 (4)	0.06 (4)	44.0 (4)	469 (4)	15.8 (4)	7.6 (4)
Utirik exposed	0.34(19)	0.28(19)	41.3±2.2(19)	428±36(19)	14.8±0.9(19)	7.8±0.4(19)
Rongelap unexposed	0.36(23)	0.37(23)	42.1±3.3(23)	429±47(23)	14.7±0.5(23)	7.9±0.5(23)
Females >40 yr						
Rongelap exposed	0.21 (7)	0.09 (7)	38.1±2.5 (7)	376±38 (7)	13.3±1.4 (7)	7.8±0.2 (6)
Ailingnae exposed	0.62 (5)	0.23 (5)	38.0±2.6 (5)	403±41 (5)	13.9±1.1 (5)	8.4±0.4 (5)
Utirik exposed	0.32(15)	0.25(15)	38.0±3.1(16)	405±28(16)	13.8±0.8(16)	8.1±0.6(16)
Rongelap unexposed	0.27(19)	0.37(19)	38.3±1.7(19)	393±29(19)	13.7±0.9(19)	8.0±0.5(19)
Males <9 yr						
Of exposed parents	0.56(16)	0.19(16)	36.5±3.0(16)	438±64(16)	12.6±1.1(16)	7.3±0.4 (6)
Of unexposed parents	0.79(29)	0.58(29)	36.9±2.4(29)	434±30(29)	12.5±1.0(29)	7.3±0.2 (5)
Females <9 yr						
Of exposed parents	0.79(18)	0.23(18)	36.8±2.2(18)	424±32(18)	12.8±1.0(18)	7.7 (3)
Of unexposed parents	0.64(22)	0.03(22)	37.6±1.7(22)	415±24(22)	13.0±0.9(22)	7.9±0.3 (5)

[a]Includes 2 children exposed *in utero*.
[b]Standard deviation and number of people in group.
[c]Includes 1 child exposed *in utero*.

Table 19

Mean Levels of Rongelap Peripheral Blood Elements by Age and Sex, 1964

	Plate. ($\times 10^{-1}$)	WBC ($\times 10^{-3}$)	Neut. ($\times 10^{-3}$)	Lymph. ($\times 10^{-3}$)
Males 10-15 yr				
Rongelap exposed[a]	374± 35 (9)[b]	8.01±2.10 (9)	3.31±1.27 (9)	3.78±1.17 (9)
Alingnae exposed	328 (1)	7.55 (1)	3.17 (1)	2.87 (1)
Rongelap unexposed	389±158(15)	11.13±4.70(15)	5.96±5.03(15)	4.17±1.22(15)
Females 10-15 yr				
Rongelap exposed	398±110 (6)	7.53±1.10 (6)	3.39±0.52 (6)	3.34±1.06 (6)
Ailingnae exposed	454 (1)	11.08 (1)	4.87 (1)	4.87 (1)
Rongelap unexposed	397±106(18)	9.87±3.00(18)	4.74±2.25(18)	4.00±0.94(18)
Males >15-40 yr				
Rongelap exposed	287± 78(11)	8.12±2.10(11)	3.90±1.44(11)	3.42±1.08(11)
Ailingnae exposed	—	—	—	—
Rongelap unexposed	337±104(24)	9.40±3.40(24)	5.10±2.73(23)	3.45±1.15(23)

Table 19 (cont'd)

Mean Levels of Rongelap Peripheral Blood Elements by Age and Sex, 1964

	Plate. ($\times 10^{-3}$)	WBC ($\times 10^{-3}$)	Neut. ($\times 10^{-3}$)	Lymph. ($\times 10^{-3}$)
Females >15-40 yr				
Rongelap exposed	372± 73(15)	8.25±1.90(15)	4.32±2.13(14)	3.31±0.96(14)
Ailingnae exposed	382± 95 (5)	6.80±1.60 (5)	3.04±1.18 (5)	3.19±0.77 (5)
Rongelap unexposed	382±110(29)	9.16±2.00(29)	5.29±1.87(29)	3.11±1.11(29)
Males >40 yr				
Rongelap exposed	331±126 (8)	7.83±2.00 (8)	3.60±1.20 (8)	3.48±1.22 (8)
Ailingnae exposed	323 (4)	6.59 (4)	3.03 (4)	3.03 (4)
Rongelap unexposed	348±114(19)	7.75±1.30(19)	3.93±1.14(19)	3.06±0.78(19)
Females >40 yr				
Rongelap exposed	346±159 (6)	8.06±2.20 (6)	3.74±2.02 (6)	3.53±1.18 (6)
Ailingnae exposed	441±148 (5)	8.06±2.00 (5)	4.32±0.91 (5)	2.80±1.15 (5)
Rongelap unexposed	360± 99(20)	8.29±1.9 (20)	4.01±1.41(20)	3.60±1.45(20)
Males <10 yr				
Of exposed parents	488±107(21)	10.33±2.20(21)	4.76±2.22(21)	4.65±1.38(21)
Of unexposed parents	470±134(33)	11.34±2.80(33)	5.03±1.98(33)	5.24±1.77(33)
Females <10 yr				
Of exposed parents	523±119(20)	10.96±1.90(20)	4.46±1.30(20)	5.38±1.31(20)
Of unexposed parents	468±133(24)	10.67±2.80(24)	4.28±2.10(24)	5.47±1.50(24)

	Mono. ($\times 10^{-3}$)	Eosin. ($\times 10^{-3}$)	Baso. ($\times 10^{-2}$)	Hct., %	Hgb., g
Males 10-15 yr					
Rongelap exposed[a]	0.19 (9)	0.68 (9)	0.76 (9)	40.4±6.1 (9)	12.5±0.4 (9)
Ailingnae exposed	0.45 (1)	0.98 (1)	0.80 (1)	37.0 (1)	12.1 (1)
Rongelap unexposed	0.31(15)	0.66(15)	0.26(15)	37.4±1.7(15)	12.5±0.8(15)
Females 10-15 yr					
Rongelap exposed	0.10 (6)	0.65 (6)	0.38 (6)	39.5±2.4 (6)	13.3±0.3 (6)
Ailingnae exposed	0.33 (1)	0.89 (1)	1.10 (1)	40.0 (1)	14.0 (1)
Rongelap unexposed	0.21(18)	0.88(18)	0.38(18)	38.3±2.5(18)	12.4±0.8(18)
Males >15-40 yr					
Rongelap exposed	0.25(11)	0.43(11)	0.46(11)	43.8±5.5(11)	14.7±1.0(11)
Ailingnae exposed	—	—	—	—	—
Rongelap unexposed	0.26(23)	0.57(23)	0.50(23)	46.1±3.1(24)	15.2±1.1(24)
Females >15-40 yr					
Rongelap exposed	0.24(14)	0.37(14)	0.35(14)	40.0±2.3(14)	13.1±0.7(14)
Ailingnae exposed	0.20 (5)	0.33 (5)	0.36 (5)	38.0±6.1 (5)	12.3±2.5 (5)
Rongelap unexposed	0.22(29)	0.49(29)	0.50(29)	37.3±4.5(29)	12.4±1.6(29)
Males >40 yr					
Rongelap exposed	0.26 (8)	0.48 (8)	0.39 (8)	43.0±2.7 (8)	13.5±1.9 (8)
Ailingnae exposed	0.13 (4)	0.39 (4)	0.30 (4)	43.0 (4)	14.5 (4)
Rongelap unexposed	0.20(19)	0.47(19)	0.48(19)	41.6±2.6(19)	14.0±1.0(19)
Females >40 yr					
Rongelap exposed	0.09 (6)	0.65 (6)	0.53 (6)	37.3±3.9 (6)	12.7±1.4 (6)
Ailingnae exposed	0.11 (5)	0.76 (5)	0.82 (5)	38.3±1.8 (5)	12.7±0.7 (5)
Rongelap unexposed	0.23(20)	0.40(20)	0.63(20)	39.6±1.0(20)	13.0±0.6(20)
Males <10 yr					
Of exposed parents	0.23(21)	0.73(21)	0.63(21)	36.6±2.5(21)	12.1±1.1(21)
Of unexposed parents	0.28(33)	0.66(33)	0.38(33)	37.3±2.4(33)	12.1±0.9(33)
Females <10 yr					
Of exposed parents	0.32(20)	0.76(20)	0.38(20)	34.9±3.7(20)	11.5±1.4(20)
Of unexposed parents	0.23(24)	0.62(24)	0.70(24)	36.8±2.4(24)	12.1±1.0(24)

[a]Includes 2 children exposed *in utero*.

[b]Standard deviation and number of people in group.

group who received 175 rads are designated as "Rongelap exposed," the Rongelap people who received a smaller exposure of 69 rads as "Ailingnae exposed," and the larger unexposed comparison population of Rongelap as "unexposed." Because of the small number of people in the Ailingnae group, their data were not treated as fully as those for the Rongelap groups, and are briefly summarized in a separate paragraph. The Utirik data are summarized separately also. Because of certain differences noted in age and sex groups between the exposed and the unexposed, in addition to the comparisons of mean levels for entire groups, comparisons are also made of age and sex groups. Ages 9 to 15, 16 to 40, and >40 years for each sex are compared.

The hematological data are summarized in Tables 18 and 19 and in Figures 23 through 49. In Appendices 1, 2, and 3 are presented summaries of the mean blood counts of the exposed populations and of the various comparison populations since exposure in March 1954. In Appendices 4 and 5 are listed the individual blood counts for 1963 and 1964. In Appendix 6 basophil counts are presented.

Rongelap Population. LEUKOCYTES. Mean levels of leukocytes in both exposed and comparison populations at 9 years post exposure were increased over the 8-year levels, and the 10-year levels were higher than those for either of the two preceding years. The exposed group had only slightly lower leukocytes than the unexposed (−4%) at 9 years, and at 10 years, lower by 9%. Most of the difference was due to lower neutrophil levels in the exposed group (see Figure 23).

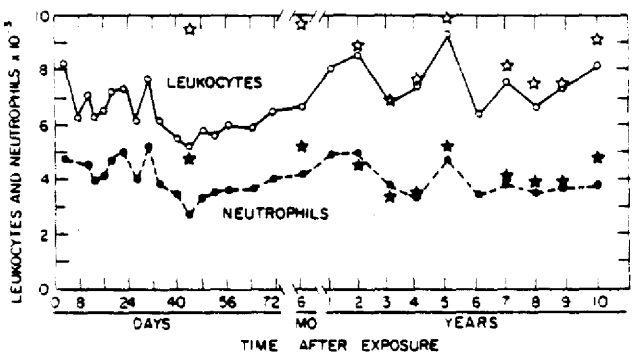

Figure 23. Mean neutrophil and white blood counts of exposed Rongelap people from time of exposure through 10 years post exposure. Stars represent mean values of comparison population.

NEUTROPHILS. The neutrophil levels increased slightly at the time of the 9 and 10-year surveys in both exposed and comparison populations. At 9 years the neutrophil levels were about 5% lower in the exposed than in the comparison group, but at 10 years they were about 20% lower. Neutrophil levels are shown in Figures 23 through 29. The neutrophil deficit was greater in the exposed younger age groups (<40 years). The exposed older age groups (>40 years) did not share the deficit as much as has been noted in the past (Figures 26 through 29).

LYMPHOCYTES. Lymphocyte levels were slightly higher in the exposed and unexposed groups during the 9 and 10-year surveys. In contrast to the 8-year survey results, the lymphocyte mean levels showed little difference between the exposed and unexposed groups during the 9 and 10-year surveys; however, some individual lymphocyte counts were lower in the exposed group. Lymphocyte levels are shown in Figures 24, 25, and 30 through 34.

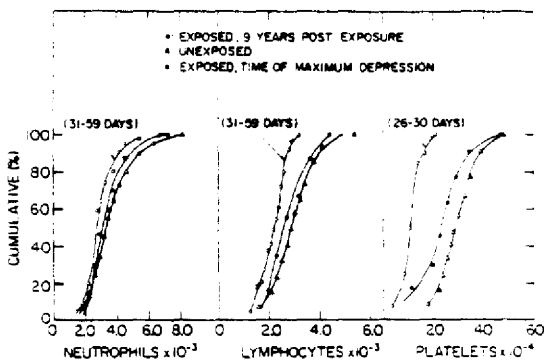

Figure 24. Cumulative percent distribution curves for neutrophils, lymphocytes, and platelets, 1963.

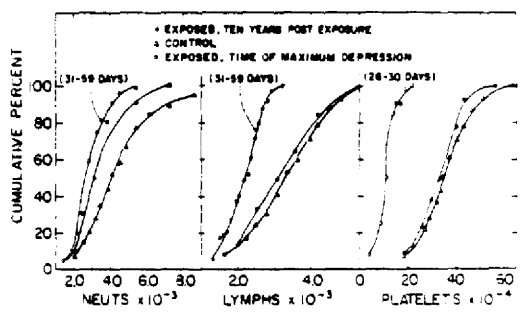

Figure 25. Cumulative percent distribution curves for neutrophils, lymphocytes, and platelets, 1964.

EOSINOPHILS, MONOCYTES, AND BASOPHILS. The levels of these cells were not remarkably different between the exposed and unexposed groups and were similar to the levels in past surveys.

PLATELETS. -The platelet levels in the 9 and 10-year surveys both revealed greater deficit in exposed males than in exposed females. Compared with the unexposed groups the males had 20% less in 1963 and 12% less in 1964, and the females 7% less in 1963 and 2% less in 1964 (see Figure 35). In the scattergrams (Figures 36 through 39) and the accumulative distribution curves (Figures 24 and 25) the differences are clearly shown.

ERYTHROPOIETIC ELEMENTS. As in the past surveys no significant differences were noted in the red blood counts, hemoglobins, or hematocrits between the exposed and unexposed groups. Figures 40 through 49 demonstrate this point.

STATISTICAL ANALYSIS OF RONGELAP BLOOD DATA OVER PAST FOUR YEARS. These analyses are in progress, and the following represents a preliminary report by Mr. Keith Thompson of Brookhaven National Laboratory.

"A factorial analysis of variance of unweighted means was made for each of four blood components: platelets, white blood cells, neutrophils, and lymphocytes. For these preliminary analyses, the population was stratified into four factors: years (1961, 1962, 1963, and 1964), sex, exposed Rongelap versus nonexposed, and age (5 to 15, >15 to 40, >40). Thus, for each of the blood components, main effects and interaction effects were

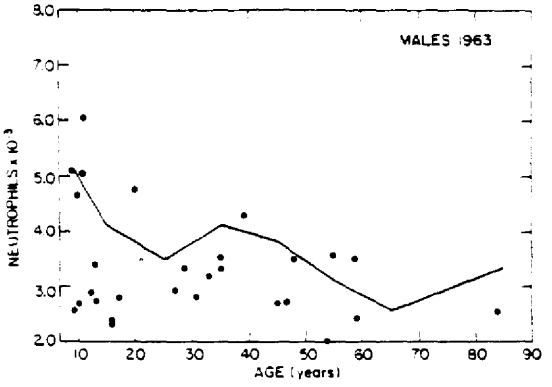

Figure 26. Neutrophil counts of exposed Rongelap males plotted against age. Solid line represents mean level of unexposed male population, 1963.

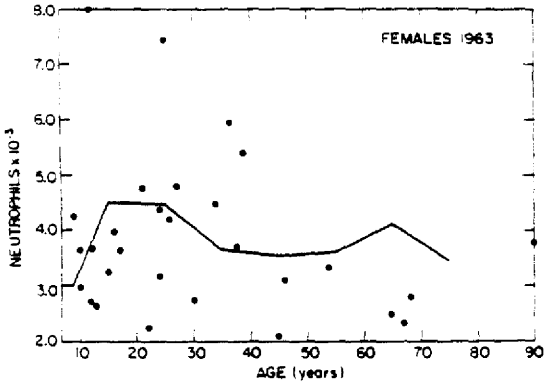

Figure 27. Neutrophil counts of exposed Rongelap females plotted against age. Solid line represents mean level of unexposed female population, 1963.

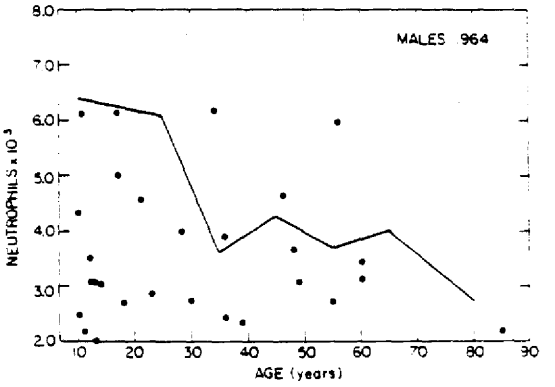

Figure 28. Neutrophil counts of exposed Rongelap males plotted against age. Solid line represents mean level of unexposed male population, 1964.

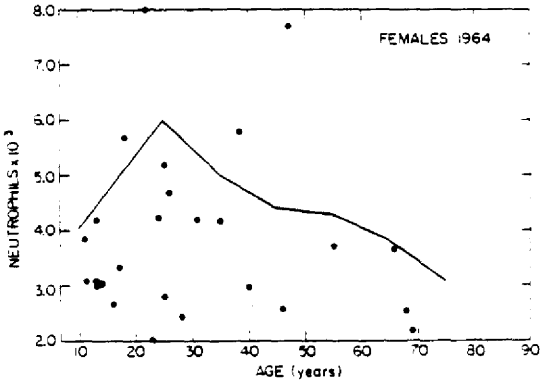

Figure 29. Neutrophil counts of exposed Rongelap females plotted against age. Solid line represents mean level of unexposed female population, 1964.

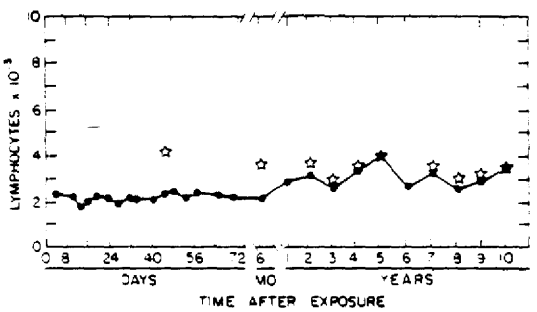

Figure 30. Mean lymphocyte counts of exposed Rongelap people from time of exposure through 10 years post exposure. Stars represent mean values of comparison population.

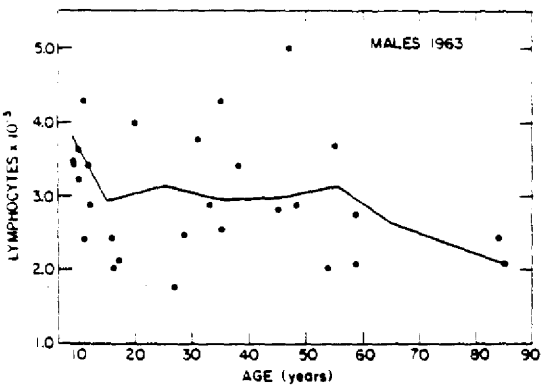

Figure 31. Lymphocyte counts of exposed Rongelap males plotted against age. Solid line represents mean level of unexposed male population, 1963.

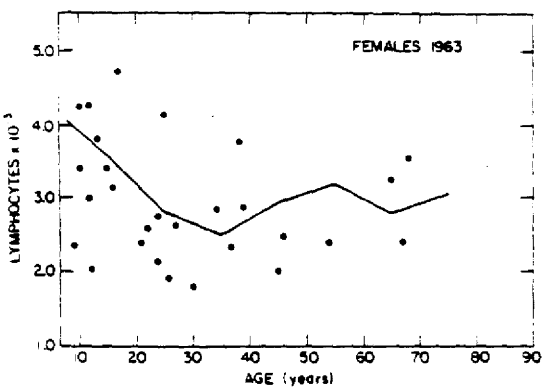

Figure 32. Lymphocyte counts of exposed Rongelap females plotted against age. Solid line represents mean level of unexposed female population, 1963.

computed to obtain information about the effect of radiation over time in relation to sex, exposure, and age.

"A generally similar pattern was observed in these analyses for all four components. The variation among years was always highly significant, largely because of an increased count in all four components in 1964. This annual difference has been commented on in previous reports. Differences existed in 1961, 1962, and 1963, but these were not chronologically consistent among the components.

"A clear-cut and highly significant decrease in all four blood components was observed for the exposed population compared to the nonexposed. There was also a highly significant decrease in

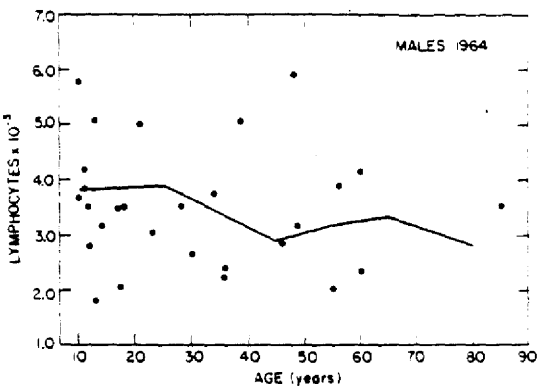

Figure 33. Lymphocyte counts of exposed Rongelap males plotted against age. Solid line represents mean level of unexposed male population, 1964.

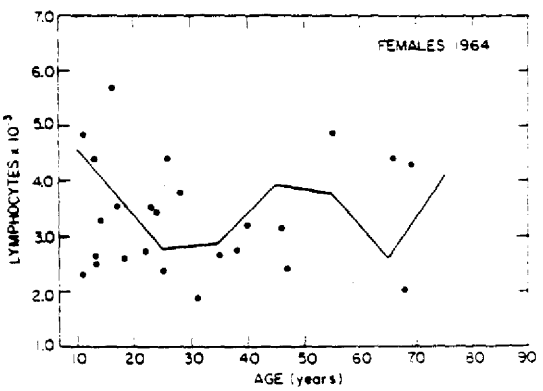

Figure 34. Lymphocyte counts of exposed Rongelap females plotted against age. Solid line represents mean level of unexposed female population, 1964.

counts of all four components with increasing age at the time of radiation. There was no evidence at the 5% level of any sex difference for any of the blood components except platelets, for which the male count was significantly lower (1% level) than the female count.

"There was no evidence at the 1% level that any of the two- or three-factor interactions (years, sex, exposed versus nonexposed, age groups) were significant. For lymphocytes there was evidence at the 5% level of an interaction between exposure and sex, and for neutrophils there was evidence at the 5% level of an interaction between exposure and year. The four-factor interaction was treated as error, an assumption which appeared justified upon examination of the variances. Since these data are being further analyzed, no interpretation as to biological significance of the above interactions is justified at present."

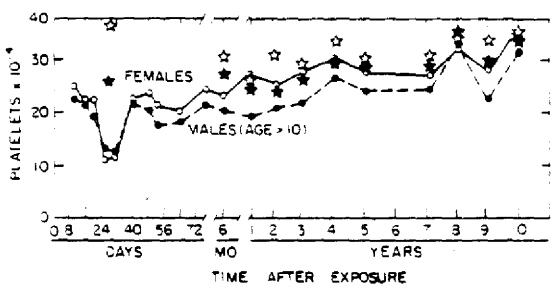

Figure 35. Mean platelet values of exposed Rongelap people from time of exposure through 10 years post exposure. Stars represent mean values of unexposed comparison population.

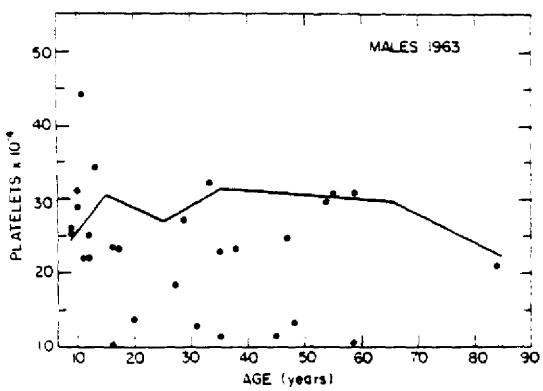

Figure 36. Platelet counts of exposed Rongelap males plotted against age. Solid line represents mean level of unexposed male population, 1963.

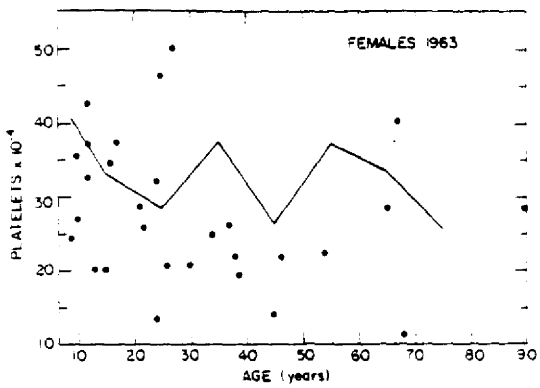

Figure 37. Platelet counts of exposed Rongelap females plotted against age. Solid line represents mean level of unexposed female population, 1963.

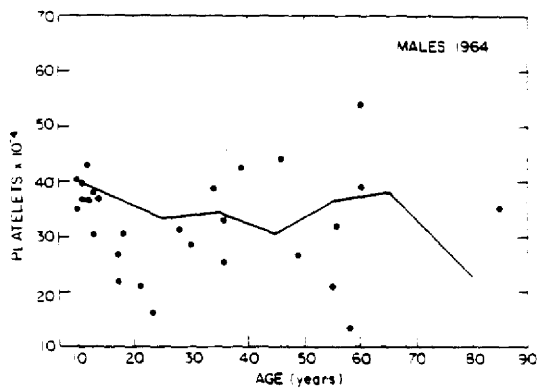

Figure 38. Platelet counts of exposed Rongelap males plotted against age. Solid line represents mean level of unexposed male population, 1964.

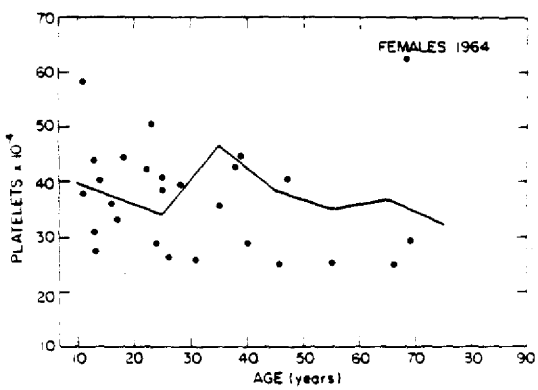

Figure 39. Platelet counts of exposed Rongelap females plotted against age. Solid line represents mean level of unexposed female population, 1964.

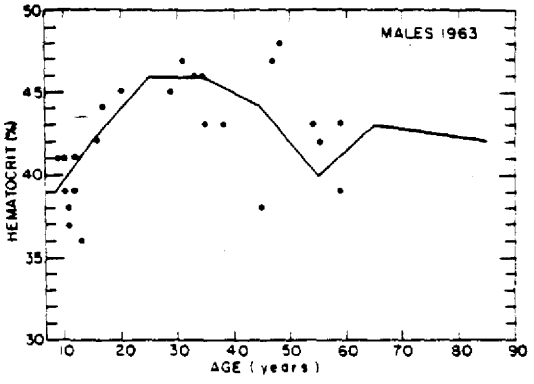

Figure 40. Hematocrit values of exposed males plotted against age. Solid line represents mean level of unexposed male population, 1963.

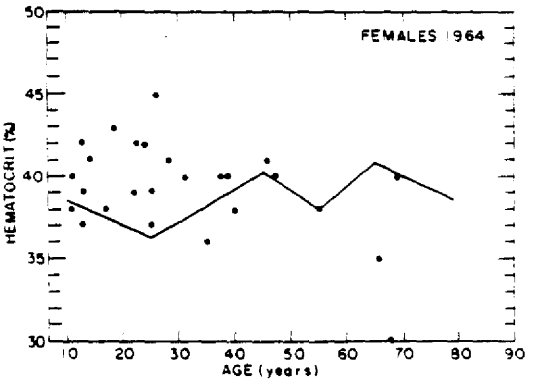

Figure 43. Hematocrit values of exposed females plotted against age. Solid line represents mean level of unexposed female population, 1964.

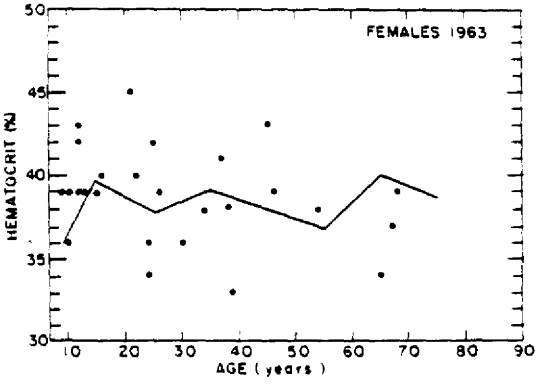

Figure 41. Hematocrit values of exposed females plotted against age. Solid line represents mean level of unexposed female population, 1963.

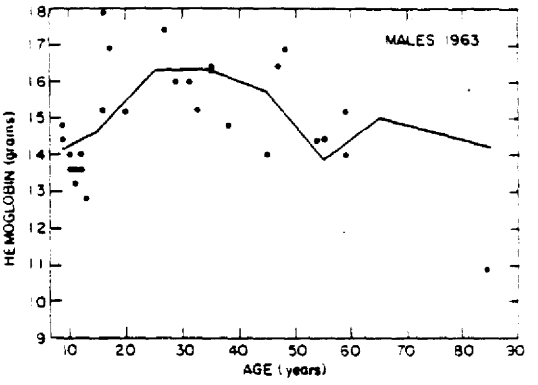

Figure 44. Hemoglobin values of exposed males plotted against age. Solid line represents mean level of unexposed male population, 1963.

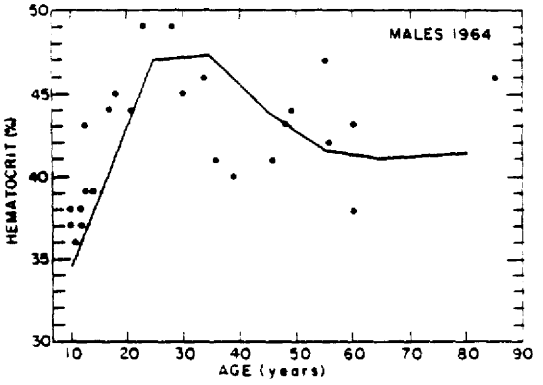

Figure 42. Hematocrit values of exposed males plotted against age. Solid line represents mean level of unexposed male population, 1964.

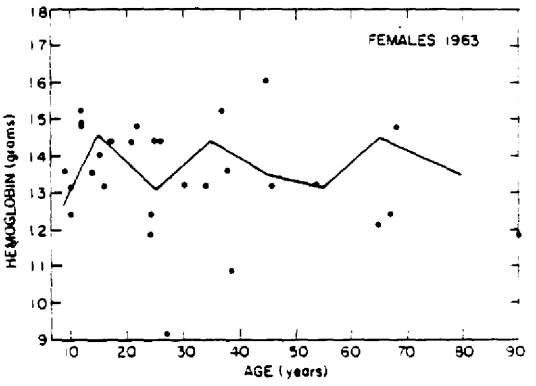

Figure 45. Hemoglobin values of exposed females plotted against age. Solid line represents mean level of unexposed female population, 1963.

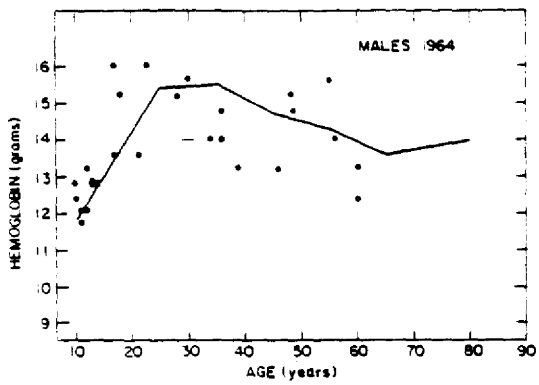

Figure 46. Hemoglobin values of exposed males plotted against age. Solid line represents mean level of unexposed male population, 1964.

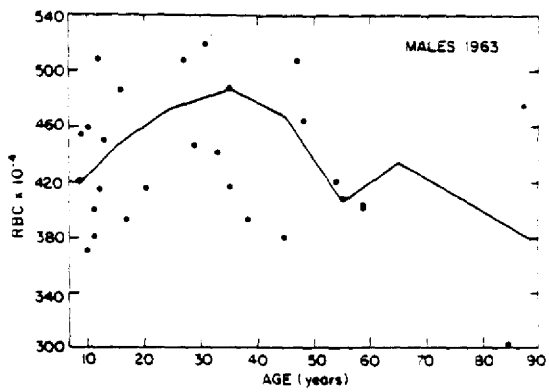

Figure 48. RBC values of exposed males plotted against age. Solid line represents mean level of unexposed male population, 1963.

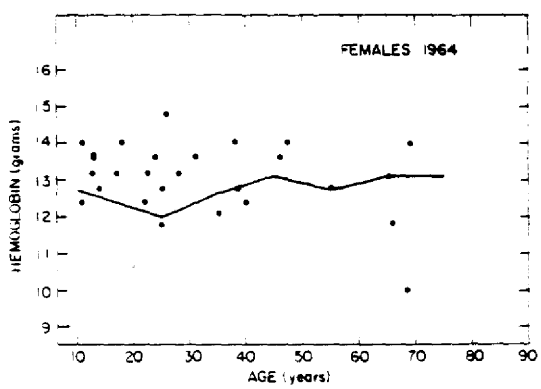

Figure 47. Hemoglobin values of exposed females plotted against age. Solid line represents mean level of unexposed female population, 1964.

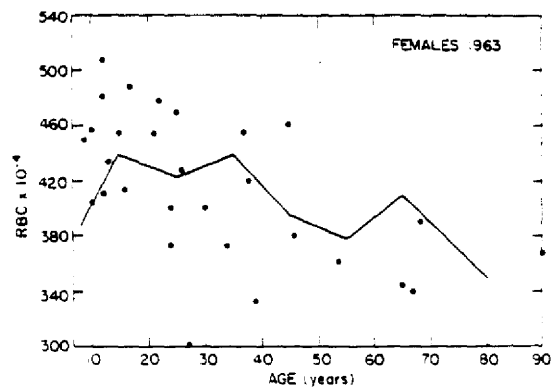

Figure 49. RBC values of exposed females plotted against age. Solid line represents mean level of unexposed female population, 1963.

Ailingnae Population. The 16 people in the Ailingnae population that were examined during these two years showed blood counts similar to those of the higher dose Rongelap group. The 10-year platelet counts in the Ailingnae women were considerably higher than the previous counts; the reason for this is not apparent. The blood data on this group of people are summarized in Tables 18 and 19 and Appendix 2.

Utirik Population. The people of Utirik Atoll who had been exposed to a very low dose of radiation (an estimated 14 rads of whole-body gamma radiation) had leukocyte, neutrophil, and lymphocyte counts of about the same levels as seen in the unexposed comparison population of Rongelap (Table 18 and Appendices 3 and 4). However, it was of interest that the platelet counts for all age groups averaged considerably higher in the Utirik people than in the Rongelap unexposed population. The explanation for this is not apparent. The erythrocytes, hemoglobin, and hematocrit levels were about the same as in the unexposed Rongelap people.

Children of Exposed Parents. Blood counts of children of exposed parents compared with those of the children of parents in the comparison population showed no significant differences. These data are tabulated in Tables 18 and 19 and Appendices 4 and 5. During the 7th and 8th-year surveys these children had shown slightly lower levels of leukocytes and platelets compared with children of unexposed parents. This difference is not apparent at this time.

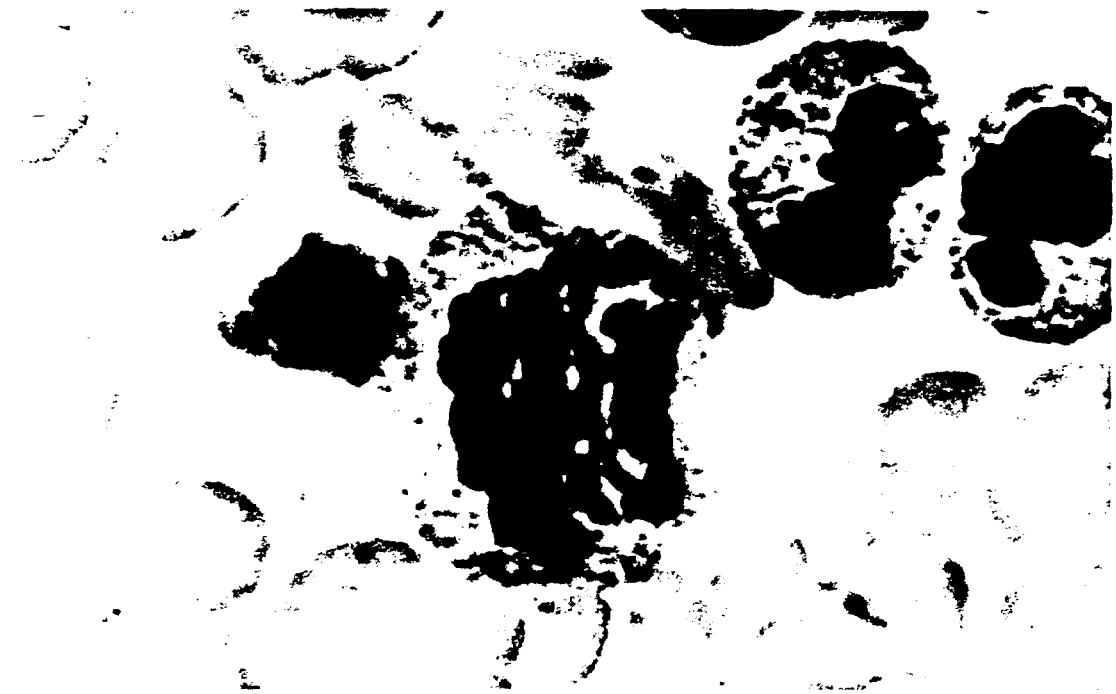

Figure 50. Bizarre mitosis in a myelocyte.

Figure 51. Binucleated normoblast.

Bone Marrow Examinations

The differential counts of bone marrow aspirations on 6 individuals, 4 exposed and 2 unexposed, are listed in Appendix 18. The differential counts showed that in 3 of 4 exposed persons there was an alteration in the myeloid-erythroid ratio manifested by an increased number of red cell precursors. In addition to hyperplasia, abnormalities of chromatin material with double nuclei and increased numbers of mitotic figures were seen in the normoblastic series (Figures 50 and 51). One of the exposed (No. 63) and one of the unexposed (No. 948) showed increased lymphocytosis of 33% and 27% respectively. This was reflected in the peripheral blood counts in which the total number of leukocytes was normal but the lymphocytes were increased to 51% and 56%. The significance of this finding remains obscure, but repeat bone marrow examinations will be carried out in both these cases during the 1965 survey.

Red Cell Mass and Plasma Volume Studies

During the 1961 and 1962 surveys blood volume studies were performed on a group of Marshallese subjects and on a small number of Caucasians who had been living on the islands for one year or longer. Sodium chromate labeled with Cr^{51} was used to tag the erythrocytes. With body weight as a criterion, it appeared that 15 of 23 subjects, both Marshallese and Caucasian, showed a significant reduction in red cell mass and/or plasma volume.

In order to establish the relationship of blood volume to lean body mass tritiated water was administered orally to each of 21 Marshallese subjects during the 1963 survey. In addition, determinations were made of red cell mass and blood volume by using Cr^{51}-labeled sodium chromate.

Table 20

Total Blood and Red Cell Volume Data
(WT. = gross weight; TBW = total body water; FAT = fat as % gross weight; LBM = lean body mass; RCV = red cell volume; BV = blood volume)

Subject No.	WT., kg	TBW, l	TBW, %	FAT, %	LBM, kg	RCV, l	BV, l	RCV/LBM, ml/kg	BV/LBM, ml/kg
822	54.54	38.1	68.8	4.4	52.1	1.402	3.260	26.9	62.6
832	46.36	25.0	53.0	26.4	34.1	0.849	2.358	24.9	69.2
836	56.36	35.3	61.7	14.3	48.3	1.428	3.320	29.6	68.7
838	66.13	41.7	62.2	13.6	57.1	2.108	4.053	36.9	71.0
841	66.81	31.9	47.0	34.7	43.6	1.150	3.196	26.4	73.3
873	61.36	43.2	69.4	3.6	59.1	1.670	3.631	28.3	61.4
881	68.63	32.8	47.1	34.6	44.7	1.996	4.247	44.7	95.0
882	54.77	39.9	71.8	0.3	54.6	1.131	3.426	20.7	62.7
885	61.81	41.0	65.3	9.3	56.1	1.760	3.825	31.4	68.2
895	55.90	29.0	51.5	28.5	40.0	1.070	2.488	26.8	62.2
916	63.63	32.6	50.4	30.0	44.5	1.091	3.031	24.5	68.1
928	57.27	29.4	50.5	29.9	40.2	0.927	2.505	23.1	62.3
932	46.30	26.2	55.7	22.6	35.8	1.274	2.963	35.6	82.8
938	40.00	22.0	54.1	24.9	30.1	0.886	2.331	29.4	77.4
942	57.72	27.6	47.1	34.6	37.8	0.860	2.150	22.8	56.9
959	60.00	32.2	52.8	26.7	44.0	1.151	2.877	26.2	65.4
960	38.63	24.8	63.1	12.4	33.9	0.774	2.150	22.8	63.4
1007	71.36	41.2	56.9	21.0	56.4	1.620	4.155	28.7	73.7
1043	41.81	26.4	62.3	13.5	36.2	1.066	2.664	29.4	73.6
1501	66.81	43.3	64.0	11.2	59.3	1.843	3.840	31.1	64.8
Jeton	63.18	39.8	61.9	14.0	54.4	1.310	2.675	24.1	49.2
Av		33.5				1.303	3.102	28.3	68.2

$\frac{\text{Av RCV (l)}}{\text{Av TBW (l)}} = 0.039$; $\frac{\text{Av BV (l)}}{\text{Av TBW (l)}} = 0.092$

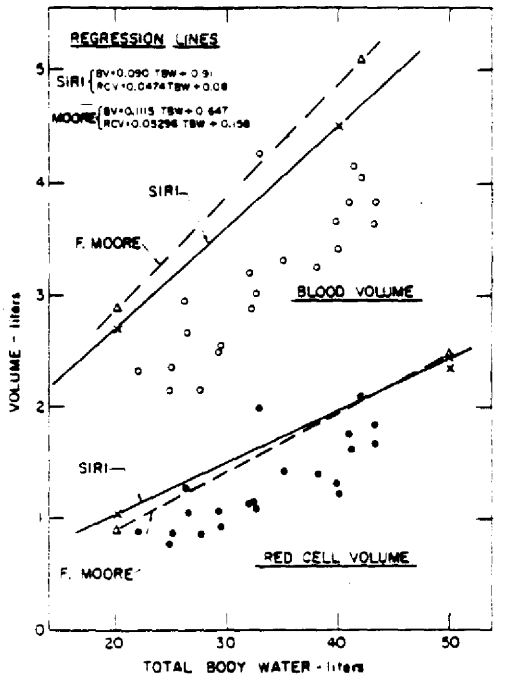

Figure 52.

After 4 hours, urine samples were collected and lyophilized, and tritium in the water portion was counted in a Nuclear-Chicago liquid scintillation counter. From these values of total body water, fat was estimated by the formula % fat $= 100 - (\%\ \text{TBW}/0.72)$. The % TBW is total body water (in kg) as percent of gross weight. Lean body mass (LBM) was taken as the difference between gross weight and fat (kg).

The data are shown in Table 20. According to Siri (personal communication) the values for total body water, fat, or lean body mass are not different from averages for Caucasian subjects in the San Francisco area. Figure 52 shows the values of blood volume (liters) and red cell volume (liters) plotted against total body water. Regression lines drawn for Caucasians by Moore[13] and Siri (unpublished) disclose that with the exception of one case the values of Marshallese fall far below those described by the authors. The average red cell volume for Marshallese is 28.3 ml per kg LBM as compared to 35 ml/kg (Siri, unpublished).

Whether these findings represent a genetic difference or are the result of environment and/or diet cannot be stated at present. It is hoped that studies will be continued in 1965 with examinations of blood volume and total body water in Caucasians living in this area for one year or more.

Table 21

Protein Bound Iodine, 1963 and 1964

Subject No.	PBI, γ %
Marshallese Residing on Rongelap	
1	9.4
6	7.9
10	12.0
14	8.2
86	8.2
17	6.8
21	8.1
69	10.2
865	8.2
Av	8.8
Marshallese Residing on Ebeye	
12	8.8
829	7.1
944	2.0
938	5.6
982	6.3
950	6.7
1005	7.9
1043	5.8
Av	6.3
Americans Residing in Marshall Islands at Least 1 Year	
F.B.	6.2
G.B.D.	5.5
R.L.	5.0
W.R.	5.6
R.C.	6.1
G.S.B.	5.5
W.N.C.	4.4
Av	5.5
Medical Team	
D.C.	4.7
R.C.	4.7
L.C.	5.1
R.H.	5.5
E.L.	5.2
L.M.	2.5
W.M.	6.0
I.J.	4.5
W.S.	4.2
W.W.S.	6.9
Av	4.9

Other Laboratory Studies

Chromosome Studies. Microscopic examination of smears from peripheral blood cultures is in

progress, including chromosome counts, enumeration of aberrations, and karyotype analysis by paste-ups of photographs. A few dicentric chromosomes and certain other aberrations have been noted in the examined group, but insufficient control material has been analyzed for any positive statements to be made at this time.

Diabetic Survey. Based on blood sugar determinations as part of the routine urine analyses and fasting blood sugar determinations, it was found that 6 people had a diabetic tendency. The following had elevated fasting blood sugars (mg %): No. 853, 247; No. 893, 279; No. 936, 187; No. 991, 248; No. 1042, 180; No. 835 had a 3+ urine sugar but no blood sugar determination was done. As has been noted, the incidence of diabetes is fairly high in the Marshallese. It is, however, of the type that develops in older people since no cases have been seen in younger people.

Serological Studies. PROTEIN BOUND IODINE DETERMINATIONS. Protein bound iodine levels were determined in several groups of people during the past two surveys. The groups included 9 Marshallese living on Rongelap Atoll, 8 Marshallese living on Ebeye Island (Kwajalein Atoll), 10 members of the medical team, and 7 Americans who had been residing in the Marshall Islands for at least a year. The results are presented in Table 21. Again the Marshallese values are higher than the Caucasian values. Though the number of samples involved is too small for any positive statement to be made, the lower levels of the Marshallese living on Ebeye may have some meaning, since their environment is quite different from that of the Rongelap residents (more westernized in food, etc.). A difference between the medical team who had only been in the Islands a few weeks and the Americans who had resided there for at least a year is probably not significant. It is anticipated that this aspect of the problem will be further investigated on the next survey.

FOLIC ACID DETERMINATIONS. Folic acid levels were below or in the low range of normal in 29% of the 129 Rongelap people tested. Fifteen percent were below 4 mμg/ml and 16% in the borderline range of 4 to 7 mμg/ml. The unexposed comparison population had slightly lower values than the exposed population. The generally low level of these Island people is attributed to a dietary deficiency of foods containing folic acid, mainly leafy vegetables. The levels were not sufficiently low to result in any hematological changes or apparent clinical effects. The individual values for folic acid are presented in Appendix 17.

THE AG SYSTEM. The following statements were made by Dr. B.S. Blumberg*: "The sera of patients who have received multiple transfusions may contain antibodies against normal human serum components.[14] The first example of such antibodies was reported in a patient (C.deB.) who had received ≈50 transfusions for the treatment of a refractory anemia of unknown etiology.[15] By means of the Ouchterlony double-diffusion technique, it was shown that the antibody formed a precipitin with ≈55% of normal U.S. white and Negro sera. By twin, family, and population studies[16] it was shown that the presence or absence

*Associate Director for Clinical Research, Institute for Cancer Research, Philadelphia, Pa.

Table 22

Serum Tests

Population	Location	Antisera reactors			
		C.deB.		New York	
		Total No.	% Pos.	Total No.	% Pos.
Micronesian	Rongelap Atoll	187	98	181	38
U.S. White	Maryland	120	59	120	97
U.S. Negro	Georgia	149	68	149	99
Greek	Greece	203	72	203	93
Quechua Indian	Peru	102	70	102	86
Sioux Indian	South Dakota	143	91	143	78

of the reacting antigen was under genetic control. Individuals with a dominant gene designated Ag^A in single or double dose (genotypes Ag^A/Ag^A, Ag^A/Ag) were reactors [phenotype Ag(a+)] and those homozygous for the recessive allele Ag nonreactors [Ag(a−)]. The antigen or antigens that react with the antibodies present in the serum of the frequently transfused patient are serum low density β-lipoproteins.[17] A serum from a second patient (I.M.), the New York antiserum, was also found to react with a low density β-lipoprotein. Preliminary family studies indicated that reactors were homozygous or heterozygous for a second gene, while nonreactors were homozygous for the alternate recessive allele. Immunologic, genetic, and population studies showed that the lipoproteins selected by the two antisera were antigenically distinct and controlled by different genes.[18]

"Sera collected from the inhabitants of Rongelap Atoll in 1962 were tested with both the C.deB. [anti-Ag(a+)] and the New York antisera. The total results compared with those on several other populations are shown in Table 22. There is a much higher frequency of C.deB. antiserum reactors and a much lower frequency of New York antiserum reactors in the Rongelap population than in U.S. whites and Negroes. The reasons for these differences are not known, but may depend on differences in past or present selective forces which affect the balance of the polymorphisms.

"Because of the lower frequency of New York antiserum reactors, the Rongelap population was useful for family studies. From these studies it was tentatively concluded that reactors with the New York antiserum were either homozygous or heterozygous for a dormant gene, and nonreactors were homozygous for its alternate allele."

Radiochemical Analyses of the Urine. Determinations of body burdens of gamma emitting isotopes (principally Cs^{137} and Zn^{65}) by whole-body gamma spectroscopy were not done during the past two surveys. Data in 1961, by that technique, indicated that the body burdens of Cs^{137} were not significantly different from those of two years before, and Zn^{65} levels had dropped by a factor of about 10. It was decided, therefore, to defer whole-body counts until the 1965 survey.

Results of radiochemical urine analyses for Cs^{137} and Sr^{90} on 38 urine samples for 1963 and 27 samples for 1964 are presented in Tables 23 and 24. The data are divided into the following groups: exposed and unexposed of ages <15 and >15 years, living on Rongelap, Ebeye, and Utirik.

Sr^{90} urine levels for 1963 and 1964 have not increased over the 1962 levels. In 1962, the mean Sr^{90} values from the individual adult 24-hr samples were 12.45 pC/l or 114 pC/g Ca. From these values, on the basis of previous calculations,[6,19] the body burden was estimated as 12.0 mμC for adults and 28.4 mμC for children. On the same basis, the estimates for 1963 body burden levels of Sr^{90} are 11.3 mμC (adults) and 21.8 mμC (children); and for 1964, 10.7 mμC (adults) and 23.1 mμC (children). As shown in Table 23, the levels of both Cs^{137} and Sr^{90} are lower for the people living on the uncontaminated island Ebeye at Kwajalein Atoll.

Thus the return of the Rongelap people to their home island was reflected in annual increases to 1962 in estimated body burdens of Sr^{90} based on urinary excretion values. The annual estimates in mμC for adults were as follows: 2.0 in 1958; 6.0 in 1959; 6.9 in 1961; 12.0 in 1962; 11.3 in 1963; and 10.7 in 1964. The present body burdens are about 5 to 6% (adults) to about 10% (children) of the maximum permissible concentration (MPC) of Sr^{90} (200 mμC) for non-industrial populations. It appears now that equilibrium with the environmental contamination of Sr^{90} has been reached in the people living on Rongelap Island, and the previously estimated equilibrium value of 23 mμC will not be reached.

No bone samples were obtained from autopsy material during the past two years for Sr^{90} analysis. Estimates of body burdens from previous analyses of bone samples had shown fairly good correlation with those obtained from urine analyses.

In view of the paucity of the previous data on Cs^{137} urinary levels, it is difficult to interpret the present levels in terms of body burden. However, the levels are generally less than the mean 1958 Cs^{137} urinary level of about 4 nC/l. This is in accord with the finding by gamma spectrographic determinations that the whole-body burdens of Cs^{137} in 1961 had not increased.

Analyses of three coconut crabs for Sr^{90} and Cs^{137} are shown in Table 25. Though the levels of Sr^{90} (pC/g Ca) are lower than in the crabs analyzed in 1962, they are still sufficiently high to necessitate continuation of the ban on their consumption by the people of Rongelap. It is interesting that the Cs^{137} levels are also quite high in these crabs.

Table 23

Radiochemical Urine Analysis for Sr^{90} and Cs^{137}, 1963

Group	Subject No.	Age	Sex	Sample vol., ml	Sr^{90}, pC/l	Ca, g/l	Sr^{90}, pC/g Ca	Cs^{137}, nC/l
RONGELAP								
Unexposed, age <15	818	12	M	790	19.3	0.072	268	6.73
	820	14	M	1180	6.4	.020	320	3.32
	814	11	M	1490	12.0	.168	71	2.60
	913	12	M	590	17.1	.188	91	1.52
	912	10	M	1630	11.4	.117	98	2.68
	815	13	M	550	4.9	.012	408	4.69
	911	10	F	1050	5.9	.046	137	1.54
	955	10	F	465	4.1	.022	186	3.14
	816	13	F	1050	6.3	.035	180	2.12
	821	14	F	705	12.5	.172	73	4.69
Mean				950	10.0	0.085	183	3.31
Exposed, age <15	19	12	M	1160	4.8	0.031	155	1.81
	23	13	M	987	5.6	.046	122	2.24
	69	13	F	987	9.6	.031	310	6.11
	42	12	F	1060	17.5	.076	230	2.84
	17	12	F	340	33.6	.076	442	3.08
	8	11	F	1150	16.8	.074	227	1.10
Mean				947	14.6	0.056	248	2.86
Unexposed, age >15	822	16	M	1280	6.4	0.069	93	2.02
	865	30	F	795	11.8	.072	164	2.41
Mean				1037	9.1	0.070	128	2.21
Exposed, age >15	40	38	M	700	14.6	0.167	88	7.33
	7	45	M	875	9.1	.218	42	1.73
	41	53	M	1500	2.0	.040	50	0.57
	27	35	M	1400	6.3	.177	36	1.67
	14	34	F	990	6.9	.038	182	0.48
	66	38	F	650	8.9	.137	65	2.58
	39	24	F	530	4.0	.015	267	4.45
	18	30	F	725	7.2	.171	42	7.96
	61	17	F	1025	15.3	.104	147	2.68
Mean				933	8.3	0.118	102	3.27
Pool	A			2060	4.5	0.051	88	1.58
	B			1820	3.5	.071	49	1.62
	C			1990	4.7	.065	73	1.49
Mean				1956	4.2	0.062	70	1.56
EBEYE								
Pooled				1400	5.9	0.073	75	0.65
UTIRIK (EXPOSED)								
Age <15	2256	14	F	625	8.5	0.149	57	0.95
	2251	12	F	350	1.9	.031	52	0.15
Mean				487	5.2	0.090	55	0.55
Age >15	2168	28	M	730	2.6	0.363	7	1.26
	2137	24	M	800	3.2	.178	15	0.70
Mean				765	2.9	0.271	11	0.98
SUMMARY								
Rongelap, all <15					11.8	0.074	207	3.14
Rongelap, all >15					8.3	.114	107	3.08
Ebeye					5.9	.073	75	0.65
Utirik, all <15					5.2	.090	55	0.55
Utirik, all >15					2.9	.271	11	0.98

Table 24

Radiochemical Urine Analysis for Sr^{90} and Cs^{137}, 1964

Group	Subject No.	Age	Sex	Sample vol., ml	Sr^{90}, pC/l	Ca, g/l	Sr^{90}, pC/g Ca	Cs^{137}, nC/l
RONGELAP								
Unexposed, age <15	818	13	M	2000	22.4	0.165	136	6.90
Exposed, age <15	19	13	M	1280	4.5	0.020	225	4.12
	69	14	F	490	21.1	.071	297	12.0
Mean				885	12.8	0.046	261	8.06
Unexposed, age >15	822	17	M	2880	9.0	0.114	79	2.97
	865	31	F	3260	6.7	.077	87	2.96
	896	24	F	2180	7.4	.040	185	3.62
Mean				2773	7.7	0.077	117	3.18
Exposed, age >15	15	17	F	1100	6.6	0.028	236	2.94
	41	54	M	1940	3.5	.035	100	2.34
	40	39	M	2000	9.5	.230	41	4.59
	7	46	M	1890	11.1	.206	54	4.33
	16	49	M	1880	4.6	.069	67	3.55
	50	44	M	2100	6.0	.122	49	3.14
	14	35	F	1580	8.7	.032	271	4.52
	18	31	F	860	14.5	.181	80	6.40
	27	36	M	1340	3.6	.083	43	2.95
	59	44	F	1000	7.2	.200	35	3.60
Mean				1569	7.5	0.119	98	3.84
Pooled	A			8920	3.7	0.080	46	0.96
	B			2050	9.3	.107	87	2.94
Mean				5480	6.5	0.093	66	1.95
EBEYE								
Unexposed, age <15	909	14	F	770	4.4	0.130	34	0.15
Exposed, age <15	32	13	M	1160	9.0	0.083	108	1.49
	23	14	M	285	16.3	.189	86	3.34
Mean				722	12.6	0.136	98	2.41
Unexposed, age >15	895	34	F	1180	3.5	0.030	117	0.08
	843	35	F	2000	8.6	.130	66	2.80
	893	46	F	3680	5.3	.052	102	1.25
Mean				2287	5.8	0.071	95	1.37
Exposed, age >15	28	78	F	1200	2.4	0.092	26	1.17
	39	25	F	740	7.6	.078	97	1.86
Mean				970	5.0	0.085	61	1.51
SUMMARY								
Rongelap, all <15				1257	16.0	0.085	219	7.67
Rongelap, all >15				1846	7.5	.101	102	3.69
Ebeye, all <15				738	9.9	.134	76	1.99
Ebeye, all >15				1760	5.5	.077	81	1.45

Table 25

Analysis of Coconut Crabs for Sr^{90} and Cs^{137}

Crab No.	Tissue	Per kg			Total			
		Sr^{90}, pC	Cs^{137}, pC	Ca, g	Sr^{90}, pC	Cs^{137}, pC	Ca, g	Sr^{90}, pC/g Ca
1	Liver	4,400	2,679	6.88	999	608	1.56	639
	Exoskeleton	172,502	94,074	198.39	68,285	37,239	78.53	869
	Muscle (edible)	5,757	4,994	6.57	1,708	1,482	1.95	876
	Remaining soft parts	5,631	4,470	6.56	516	410	0.60	858
	Total crab	70,703	39,292	81.71	71,508	39,739	82.64	865
2	Liver	4,428	2,287	5.80	571	295	0.75	764
	Exoskeleton	123,318	95,724	197.75	45,287	35,154	72.62	623
	Muscle (edible)	3,980	5,757	5.50	937	1,355	1.30	723
	Remaining soft parts	5,711	3,414	6.92	497	297	0.60	825
	Total crab	57,766	45,318	91.94	47,292	37,101	75.27	628
3	Liver	8,650	5,431	10.21	335	502	0.48	847
	Exoskeleton	146,956	143,758	187.90	30,817	30,146	39.40	782
	Muscle (edible)	6,010	12,716	7.74	978	2,069	1.26	776
	Remaining soft parts	4,316	6,475	6.23	211	316	0.30	692
	Total crab	64,847	66,234	83.09	32,341	33,033	41.44	780

Summarizing Discussion

HEALTH STATUS

Medical evaluation of the health status of the exposed Rongelap people over the years since the accident has revealed about the same incidence of illness and disease as in the unexposed population with the exceptions noted below. General health and nutrition has continued to be satisfactory and comparable to that of the unexposed comparison population. Annual hematological follow-up studies have revealed that the levels of white cells and platelets of the peripheral blood in the exposed group have never quite reached the levels of the unexposed comparison population. This was again demonstrated in the 9 and 10-year surveys and can be readily seen in the accumulative distribution curves (Figures 23 and 35).

Bone marrow examinations of a few individuals at 9 and 10 years post exposure showed a reduced myeloid-erythroid ratio with slight increase of immature red and white cells in some cases. There has been no indication that these findings have impaired the general health or response to disease in the exposed people.

MORTALITY

There were 10 deaths in the exposed population over the 10-year period. Of these, two deaths were due to malignancies. Neither of these could be ascribed reasonably to radiation exposure. The somewhat higher death rate in the exposed group is partly offset by the higher proportion of older people, those >65 years of age being 20% in the exposed group and only 7% in the unexposed group. This mortality rate is also higher than in the Marshallese as a whole, but not significantly so. Evaluation of effects of exposure on longevity in this group must await future findings.

AGING

No specific aging studies were carried out during the past two surveys, but attempts were made during several previous surveys to put on a quantitative basis various criteria of aging (skin elasticity, skin looseness, hand strength, blood pressure, arteriosclerosis, accommodation and arcus senilis of the eyes, greyness of hair, degree of baldness, etc.). No detectable radiation-induced aging effects have been noted. Aging scores evaluated at 6

and 7 years after the accident were about the same for exposed and unexposed persons of comparable age.[20]

FERTILITY, MISCARRIAGES, STILLBIRTHS, AND GENETIC EFFECTS

Effects on fertility were not apparent as judged by comparison of birth rates for the exposed and unexposed populations. During the first 4 years after exposure an increase in miscarriages and stillbirths was noted in the exposed women, 41% of the births (13 in 32 births) in this group terminating in nonviable offspring compared with 21% (8 in 38 births) in the unexposed women. Since that time, the incidence has been about the same in the two groups. One cannot be certain that this effect is actually due to radiation exposure because of the small number of women involved.

No specific genetic studies have been carried out, but differences in incidences of abnormalities in children of exposed compared with those of unexposed women have not been observed. The generally negative results of large-scale genetic studies on the offspring of exposed Japanese[21] indicated that detailed studies on the Marshallese would not be fruitful.

GROWTH AND DEVELOPMENT STUDIES

Comparison of exposed with unexposed children of the same ages indicated slight retardation effects in the exposed males. The boys exposed at ages 1 to 5 showed retardation of statural growth as well as bone age. This was most marked in those exposed at 15 to 18 months of age. The average skeletal maturation in the exposed boys was about 7 months behind that of their unexposed peers. Though weight gain also appeared slightly retarded in this group, it was not statistically significant. The exposed girls showed no significant differences compared with unexposed girls.

The slight retardation of growth in the male children who were exposed when <5 years of age as compared with unexposed males of the same age suggests that radiation may be a causal factor although possible mechanisms are not clear. The dose to bones from internally absorbed isotopes is believed to have been too small to have affected bone growth. Adverse effects on growth and development of Japanese children exposed to the atomic bomb have been reported by Greulich,[22] Reynolds,[23] and Nehemias.[24] However, the evaluation of such effects in these Japanese children was complicated by physical and psychic trauma and by malnutrition factors not operative in the case of the Marshallese children. The 175-rad gamma dose would seem to be too small to cause any direct effect on bone growth, and the estimated dose to the bones from internally absorbed isotopes probably can also be disregarded since this source contributed only about 3 to 4 rads over a 10-year period. Bone growth studies in weanling rats given sublethal exposures have shown an indirect effect on subsequent growth of shielded legs, but this appears to be based largely on a radiation-induced lowered food consumption.[25] It is of interest that 25 of 31 exposed children were noted to lose several pounds of weight during the first 6 to 8 weeks following exposure. However, the influence of change in environment in producing this effect cannot be ruled out.

DEVELOPMENT OF THYROID NODULES

Thyroid nodules were removed from 3 teen-age exposed girls after the 10-year survey. Most pathologists consulted did not feel that radiation could be implicated as the etiologic agent on the basis of the pathological findings alone, though some considered the findings typical of the lesions seen in children treated medically with radioactive iodine. However, the evidence is strong that the thyroid nodules in the Marshallese girls were induced by radiation. Correlation of the thyroid nodules with radiation exposure was substantiated by statistical analysis which showed the difference in thyroid nodule incidence between the exposed and the unexposed children to be significant at the 1% level.* Moreover, Sheline et al.[26] and Lindsay et al.[27] have reported the development of thyroid nodules 5 to 11 years after treatment of children with radioiodine for thyrotoxicosis. Dr. Lindsay reported that the sections of the glands removed from the Marshallese girls were similar to the glands of children who had been given I^{131} therapy. On the basis of a calculated dose of $\simeq 150$ rads[1] to the adult thyroids from isotopes of iodine, it was estimated that the smaller thyroid glands of the girls exposed at 3 to 4 years of age received a total dose of the order of 1000 rads** (probable

*Mr. Keith Thompson of Brookhaven National Laboratory carried out the χ^2 test.

**Mr. Ralph James and Dr. John Gofman, Lawrence Radiation Laboratory, Livermore, California, re-examined the early data and recalculated the thyroid doses.

range 700 to 1400 rads). The fact that a part of the total dose to the thyroid (175 rads) was due to whole-body gamma exposure (including the pituitary gland) may be of some significance.

The fact that all three Marshallese developing the thyroid nodules were girls is in accord with the experience of others that thyroid neoplasia and goiters predominate in females. In the report by Sheline et al.[26] referred to above, 8 cases among 256 patients treated with I^{131} developed thyroid nodules. All 8 cases were females: the ages at the time of treatment in 6 were <18 (4 aged <10 and 2 between 20 and 30). In the Marshallese girls, the stress of puberty may have been a factor in the development of the nodules.

NOTE: During the 11th-year survey now in progress (March 1965) 3 new cases of thyroid nodules in the exposed group have been detected. Two were in boys 12 and 17 years of age and one in an adult woman 41 years of age. The nodules appeared grossly similar to those described in the teen-age girls in this report, and these cases will receive study and treatment.

MALIGNANCY

Two older women who had been exposed died with a diagnosis of cancer, one at 67 years of age of ovarian malignancy at 5 years post exposure and the other at 60 years of age of probable cancer of the cervix at 8 years post exposure. The diagnosis in the latter case was not confirmed by autopsy or biopsy. One unexposed older woman died possibly of cancer of the cervix, but the diagnosis was not confirmed. No other cases of malignancy have been noted in the unexposed population.

No cases of leukemia have been detected in either the exposed or unexposed Rongelapese. Peripheral blood smears were studied closely for leukemic cells, including examinations for alkaline phosphatase and basophil counts.

The three cases of thyroid nodules plus the two earlier cases of cancer in older exposed women raise the question whether an increased frequency of cancer may be expected in future years. However, in evaluating the role of radiation, it must be kept in mind that one case of cancer in the exposed group occurred at 5 years after exposure – too soon, it is believed, to be related to radiation exposure – and in the second case it was not possible to obtain autopsy or biopsy material for confirmation of the diagnosis. Atomic Bomb Casualty Commission studies have conclusively demonstrated an increased incidence of leukemia in Japanese exposed to the atom bomb radiation.[28–30] An increased incidence has also been noted in patients who had received radiation therapy for ankylosing spondylitis.[31] There are many reports of the late development of neoplasia, particularly cancer of the thyroid gland, following radiation exposure of infants and children.[32–36] Increased instances of cancer of the thyroid gland and adenomata have been reported in the Japanese heavily exposed to ionizing radiation from the atomic bombs.[37–39] The Marshallese will be carefully observed for such a possibility in future surveys. The question of increased incidence of malignancy in the irradiated Marshallese must be left open for the present.

"BETA BURNS"

During the past several years, increased numbers of pigmented nevus-like lesions have been noted in previously irradiated areas of the skin, but these have appeared to be quite benign. Neither chronic radiation dermatitis nor cancers of the skin have been noted.

INTERNALLY ABSORBED ISOTOPES

Radiochemical urine analyses and whole-body gamma spectrometric analyses revealed that the level of body burdens of radioisotopes in the exposed Rongelapese fell rapidly, so that by 2 and 3 years post exposure the levels were far below the stated maximum permissible level.[4,5] The return of the Rongelapese to their home island was associated with a rise in their body burdens of Cs^{137}, Zn^{65}, and Sr^{90}. By 1961, the whole-body content of Cs^{137} had apparently reached an equilibrium with the environment at a value of about 14.7 mμC/kg body weight or about 300 times the mean of the medical team measured at the same time. Zn^{65}, which had risen to about 9.9 mμC in 1959, fell by 1961 to 1.5 mμC/kg body weight, or about 100 times that measured in members of the medical team. The levels of Sr^{90} in 1962 and 1963 hovered around the 12.0-mμC level in adults and about 22 mμC in children, about 5 and 10% of the maximum permissible level (for members of the population at large). It thus appears that body

burdens of Sr^{90} have reached equilibrium with the environmental Sr^{90}. Little or none of the present body burden of the exposed group can be considered residual from their initial exposure, since little difference has been noted between the body burdens in exposed and unexposed populations living on Rongelap Island. The possible relation of internal absorption of radioiodines initially in the fallout to the recent development of thyroid nodules has been referred to above. No other effects of such exposure have been detected.

OTHER EXAMINATIONS

Ophthalmological examinations showed no clear-cut evidence of radiation-induced changes in the eyes. Slit-lamp studies revealed no increase in incidence of lens opacities which might be attributed to radiation. Cytogenetic studies of the chromosomes of leukocytes and peripheral blood cultures obtained in 1964 are in progress and will be reported at a later date. Anthropometric studies revealed that young adult Rongelap males were superior in muscular development compared with many populations. This was not true, however, for the young adult females. Blood volume and red cell mass determinations using tritiated water and Cr^{51} revealed values in the Marshallese which were considerably lower than found in American Caucasians. However, there is some indication that Americans living in the Islands for more than one year may also have slightly lower values. This finding will be further investigated on future surveys. Protein bound iodine studies during the past two years confirmed the previous findings of levels higher in the Marshallese than generally found elsewhere. No explanation is apparent. Folic acid levels were found to be somewhat low in the Rongelap population and probably reflected low dietary folic acid. Serum studies for the Ag system reveal that the Rongelapese compared with other world populations have a high frequency of C.deB. antiserum reactors and a low frequency of New York antiserum reactors.

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APPENDIX 1

Rongelap Group and Control Mean Blood Counts at Various Times After Exposure

Postexposure day	WBC ($\times 10^{-3}$)		Neutrophils ($\times 10^{-3}$)		Lymphocytes ($\times 10^{-3}$)		Platelets ($\times 10^{-4}$)				Hematocrit, %			RBC ($\times 10^{-6}$)		
	<5	>5	<5	>5	<5	>5	Male <10	Male >10	Female all ages	Total group	Male <15	Male >15	Female all ages	Male <15	Male >15	Female all ages
3	9.0	8.2	6.4	4.7	1.8	2.2	----	----	----	----	----	----	----	----	----	----
7	4.9	6.2	----	---	---	---	----	----	----	----	----	----	----	----	----	----
10	6.6	7.1	3.5	4.5	2.6	2.1	28.2	22.7	24.9	24.8	----	----	----	----	----	----
12	5.9	6.3	3.5	3.9	2.1	1.7	----	----	----	----	----	----	----	----	----	----
15	5.9	6.5	3.2	4.1	2.4	1.9	27.1	21.3	21.7	22.5	----	----	----	----	----	----
18	6.7	7.2	3.4	4.7	2.4	2.1	21.8	19.1	21.8	21.0	----	----	----	----	----	----
22	7.0	7.4	4.3	5.0	2.6	2.1	16.8	14.6	15.2	15.3	37.5	43.9	39.0	----	----	----
26	5.7	6.1	3.0	3.9	2.3	1.8	13.2	12.9	10.9	11.9	36.3	41.6	37.5	----	----	----
30	7.6	7.8	4.0	5.3	3.2	2.1	14.1	12.3	11.8	12.3	37.9	42.2	37.1	----	----	----
33	6.5	6.2	3.1	3.8	3.2	2.0	17.9	16.6	15.1	16.0	37.4	42.2	36.8	----	----	----
39	5.7	5.5	3.0	3.3	2.6	2.0	25.5	22.0	22.4	22.8	37.8	42.4	37.4	----	----	----
43	5.2	5.2	2.0	2.6	2.9	2.3	26.8	20.9	23.2	23.2	37.3	41.8	37.6	----	----	----
47	5.9	5.8	2.6	3.3	3.1	2.4	24.6	20.6	23.9	23.1	39.0	43.4	38.3	----	----	----
51	6.7	5.6	2.6	3.5	3.4	2.1	22.1	17.5	21.2	20.3	----	----	----	----	----	----
56	7.0	6.0	3.5	3.5	3.7	2.4	----	----	----	----	----	----	----	----	----	----
63	7.7	6.0	3.9	3.6	3.7	2.3	23.1	18.2	20.2	20.1	----	----	----	----	----	----
70	7.6	6.5	3.8	4.0	3.3	2.2	----	----	----	----	----	----	----	----	----	----
74	-----	---	---	---	---	---	26.2	21.7	24.7	24.1	----	----	----	----	----	----
6-mo survey	8.5	6.6	4.6	4.2	3.6	2.2	24.4	20.3	23.2	22.6	38.0	41.7	38.2	----	----	----
1-yr survey	10.1	8.1	4.7	4.8	4.6	2.8	26.6	19.5	27.6	24.9	37.5	41.1	36.9	----	----	----
2-yr survey	11.8	8.6	5.9	4.8	4.7	3.1	30.0	21.4	25.5	24.7	38.7	41.2	38.1	----	----	----
3-yr survey	8.6	6.9	4.1	3.7	3.7	2.7	32.0	22.1	28.1	----	35.6	38.7	35.4	----	----	----
4-yr survey	8.9	7.5	3.3	3.4	4.6	3.6	32.5	27.1	30.8	----	35.6	41.0	35.8	----	----	----
5-yr survey	13.5	9.5	6.9	4.8	6.0	4.0	32.3	24.4	27.6	----	----	----	----	4.45	4.71	4.21
6-yr survey	----	6.5	---	3.5	---	2.7	----	----	----	----	----	----	----	----	----	----
7-yr survey	----	7.4	---	3.9	---	2.9	----	24.6[a]	27.3	----	37.6	41.7	37.0	4.54	4.45	4.11
8-yr survey	----	6.9	---	3.6	---	2.6	----	32.8[b]	32.1	----	38.5	43.0	39.3	4.68	4.67	4.44
9-yr survey	----	7.4	---	3.7	---	3.0	----	23.1[c]	28.4	----	39.1	43.7	38.4	4.29	4.38	4.12
10-yr survey	----	8.2	---	3.8	---	3.5	----	32.8	37.2	----	40.4	43.5	39.3	----	----	----
Majuro controls	13.2	9.7	4.8	4.8	7.4	4.1	41.2	25.8	36.5	33.4	39.6	46.0	39.9	----	----	----
Rita cont. 6 mo	10.7	7.6	5.4	5.2	4.7	3.7	35.0	27.3	30.9	30.4	----	----	----	----	----	----
Rita cont. 1 yr	----	----	---	---	---	---	37.5	24.5	29.4	27.6	----	----	----	----	----	----
Rita cont. 2 yr	14.0	8.9	7.0	4.4	5.6	3.6	35.5	24.2	31.2	29.5	38.9	42.1	39.8	----	----	----
Rong.cont. 3 yr	9.8	6.9	4.0	3.4	4.7	2.9	32.6	26.9	30.0	----	35.6	41.0	35.9	----	----	----
Rong.cont. 4 yr	11.2	8.0	4.0	3.6	6.2	3.7	38.8	30.7	34.0	----	35.5	42.8	35.1	----	----	----
Rong.cont. 5 yr	13.7	10.1	6.2	5.2	6.2	4.1	35.8	28.0	33.6	----	----	----	----	4.60	4.80	4.40
Rong.cont. 7 yr	----	7.8	---	4.2	---	3.1	----	28.5[a]	31.4	----	37.2	44.4	37.0	4.52	4.68	4.12
Rong.cont. 8 yr	----	7.7	---	4.2	---	2.9	----	34.8[b]	34.5	----	38.3	44.1	39.0	4.60	4.90	4.47
Rong.cont. 9 yr	----	7.7	---	3.9	---	3.1	----	29.1[c]	32.5	----	39.4	43.8	38.3	4.33	4.50	4.13
Rong.cont.10 yr	----	9.1	---	4.8	---	3.5	----	35.4	37.9	----	37.4	44.1	38.3	----	----	----

[a] Includes all males >7.

[b] Includes all males >8.

[c] Includes all males >9.

APPENDIX 2

Ailingnae Group and Control Mean Blood Counts at Various Times After Exposure

Postexposure day	WBC ($\times10^{-3}$)		Neutrophils ($\times10^{-3}$)		Lymphocytes ($\times10^{-3}$)		Platelets ($\times10^{-4}$)				Hematocrit, %			RBC ($\times10^{-6}$)		
							Male	Male	Female	Total	Male	Male	Female	Male	Male	Female
	<5	>5	<5	>5	<5	>5	<10	>10	all ages	group	<15	>15	all ages	<15	>15	all ages
3	6.0	7.0	3.0	5.0	2.8	2.2	----	----	----	----	----	----	----	----	----	----
7	5.5	6.8	---	---	---	---	----	----	----	----	----	----	----	----	----	----
10	6.3	7.3	4.2	4.2	1.9	2.2	22.5	22.6	20.9	21.5	----	----	----	----	----	----
12	6.3	7.6	1.8	4.7	3.1	2.2	----	----	----	----	----	----	----	----	----	----
15	7.1	7.0	2.3	4.5	4.2	2.2	29.0	20.2	24.6	23.9	----	----	----	----	----	----
18	6.8	7.8	2.9	5.0	3.5	2.4	27.5	21.7	24.9	24.3	----	----	----	----	----	----
22	8.9	8.7	5.3	5.4	2.7	2.9	23.5	17.0	22.9	21.3	37.5	43.7	39.2	----	----	----
26	8.4	7.0	4.8	4.4	3.2	2.2	20.0	13.8	17.4	16.7	36.5	43.2	36.8	----	----	----
30	9.6	8.6	5.3	6.2	3.7	2.0	19.5	12.8	18.2	16.8	36.0	44.6	36.7	----	----	----
33	7.7	7.8	3.3	5.2	3.5	2.2	24.0	15.8	22.7	17.6	35.5	43.8	37.3	----	----	----
39	7.5	6.2	2.9	4.2	4.7	1.9	26.5	20.8	27.0	25.2	35.0	45.6	37.4	----	----	----
43	6.9	6.5	2.7	3.6	3.9	2.7	28.0	19.6	25.3	24.0	36.0	45.2	36.8	----	----	----
47	7.3	6.7	3.5	3.8	3.4	2.7	27.0	20.0	26.1	24.5	----	46.5	40.2	----	----	----
51	8.4	6.3	3.8	3.6	4.0	2.2	32.0	18.2	25.0	23.9	----	----	----	----	----	----
54	4.6	6.3	2.8	3.5	3.2	2.5	37.0	19.8	23.8	24.2	----	----	----	----	----	----
6-mo survey	7.7	6.5	4.8	3.9	2.7	2.2	25.2	19.2	23.9	22.7	37.5	40.1	37.3	----	----	----
1-yr survey	11.1	7.8	4.2	4.7	6.5	5.6	38.7	21.4	28.3	27.5	33.0	44.6	36.2	----	----	----
2-yr survey	11.0	9.1	4.9	5.1	4.8	3.2	51.2	17.4	26.4	26.7	35.7	44.4	37.5	----	----	----
3-yr survey	12.1	7.0	5.5	3.9	5.6	2.6	40.8	22.4	31.2	----	37.5	40.6	35.6	----	----	----
4-yr survey	11.5	7.5	2.8	3.7	7.0	3.3	33.2	24.7	33.6	----	36.1	43.1	35.7	----	----	----
5-yr survey	----	9.7	---	5.1	---	3.7	40.9	26.3	26.8	----	----	----	----	4.46	5.15	4.31
6-yr survey	----	7.3	---	3.6	---	3.0	----	----	----	----	----	----	----	----	----	----
7-yr survey	----	7.7	---	4.1	---	3.1	----	25.6[a]	28.1	----	36.0	44.2	37.0	4.56	5.11	4.19
8-yr survey	----	6.5	---	3.4	---	2.6	----	33.4[b]	32.7	----	37.0	42.5	37.8	4.51	5.12	4.35
9-yr survey	----	7.1	---	4.0	---	2.4	----	23.5[c]	23.6	----	36.0	44.0	38.3	3.77	4.69	4.10
10-yr survey	----	7.5	---	3.6	---	3.1	----	32.4	41.5	----	37.0	43.0	38.3	----	----	----
Majuro controls	13.2	9.7	4.8	4.8	7.4	4.1	41.2	25.8	36.5	33.4	39.6	46.0	39.9	----	----	----
Rita cont. 6 mo	10.7	7.6	5.4	5.2	4.7	3.7	35.0	27.3	30.9	30.4	----	----	----	----	----	----
Rita cont. 1 yr	----	----	---	---	---	---	37.5	24.5	29.4	27.6	----	----	----	----	----	----
Rita cont. 2 yr	14.0	8.9	7.0	4.4	5.6	3.6	35.5	24.2	31.2	29.5	38.9	42.1	39.8	----	----	----
Rong. cont. 3 yr	9.8	6.9	4.0	3.4	4.7	2.9	32.6	26.9	30.0	----	35.6	41.0	35.9	----	----	----
Rong. cont. 4 yr	11.2	8.0	4.0	3.6	6.2	3.7	38.8	30.7	34.0	----	35.5	42.8	35.1	----	----	----
Rong. cont. 5 yr	13.7	10.1	6.2	5.2	6.2	4.1	35.8	28.0	33.6	----	----	----	----	4.60	4.80	4.40
Rong. cont. 7 yr	----	7.8	---	4.2	---	3.1	----	28.5[a]	31.4	----	37.2	44.4	37.0	4.52	4.68	4.12
Rong. cont. 8 yr	----	7.7	---	4.2	---	2.9	----	34.8[b]	34.5	----	38.3	44.1	39.0	4.60	4.90	4.47
Rong. cont. 9 yr	----	7.7	---	3.9	---	3.1	----	29.1[c]	32.5	----	39.4	43.8	38.3	4.33	4.50	4.13
Rong. cont.10 yr	----	9.1	---	4.8	---	3.5	----	35.4	37.9	----	37.4	44.1	38.3	----	----	----

[a] Includes all males >7.

[b] Includes all males >8.

[c] Includes all males >9.

APPENDIX 3

Utirik Group Mean Blood Counts at Various Times After Exposure

	WBC ($x10^{-3}$)		Neutrophils ($x10^{-3}$)		Lymphocytes ($x10^{-3}$)		Platelets ($x10^{-4}$)			Hematocrit, %			RBC ($x10^{-6}$)		
Postexposure day	<5	>5	<5	>5	<5	>5	Male <10	Male >10	Female all ages	Male <15	Male >15	Female all ages	Male <15	Male >15	Female all ages
4	9.4	8.2	4.7	4.2	4.9	3.2									
14	10.0	8.6	4.1	3.2	5.1	2.9									
19							38.9	28.1	35.6						
29	10.1	9.7	4.9	5.8	4.8	3.2	34.5	25.6	31.7	39.9	45.1	39.4			
3-yr survey	9.8	6.9	4.0	3.4	4.7	2.9	32.6	26.9	30.0	35.6	41.0	35.9			
9-yr survey	---	7.0	---	3.9	---	3.0	----	36.5*	38.9	37.9	42.4	37.7	4.42	4.39	4.12

*Includes all males >9.

APPENDIX 4

Individual Hematological Findings, 1963

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb., g	Serum protein, g
		Rongelap Exposed Males, Age 9-15									
2	224	8.03	5.06	2.41	0.16	0.24	1.60	37	402	13.2	8.0
3	285	9.71	4.66	3.20	0.48	1.16	1.94	39	370	13.6	8.8
5	440	11.90	6.07	4.28	0.95	0.36	2.38	38	381	13.6	7.8
19	251	6.03	2.89	2.41	0.30	0.42	0.0	41	508	13.6	7.3
23	344	7.12	2.71	3.34	0.07	1.00	0.0	36	449	12.8	7.4
32	222	7.29	3.43	3.06	0.07	0.66	0.70	39	413	14.0	6.8
54	307	6.97	2.72	3.69	0.28	0.28	0.0	41	459	14.0	7.6
83*	253	11.90	5.12	3.45	0.95	2.38	0.0	41	422	14.8	7.8
85*	257	7.29	2.62	3.43	0.66	0.58	0.0	40	456	14.4	7.6
Mean	287 ±66**	8.47 ±2.18	3.92 ±1.31	3.25 ±0.59	0.44	0.79	0.74	39.1 ±2.0	429 ± 45	13.8 ± 0.5	7.7 ±0.5
		Ailingnae Exposed Males, Age 9-15									
6	194	6.64	2.79	3.19	0.06	0.60	0.0	36	377	12.4	7.5
mean	194	6.64	2.79	3.19	0.06	0.60	0.0	36.0	377	12.4	7.5
		Rongelap Exposed Females, Age 9-15									
17	427	14.70	12.20	2.06	0.15	0.29	0.0	43	481	15.2	8.3
21	370	7.15	2.72	3.00	0.21	1.14	0.70	42	507	14.8	7.4
33	355	8.25	2.97	4.21	0.08	0.91	0.80	39	457	13.2	8.8
42	328	8.31	3.66	4.24	0.25	0.17	0.0	39	409	14.8	8.0
65	268	7.92	3.64	3.41	0.32	0.48	0.80	36	403	12.4	7.5
69	203	7.05	2.61	3.81	0.21	0.35	0.70	39	432	13.6	7.8
72	203	7.27	3.27	3.42	0.44	0.07	0.70	39	456	14.0	8.5
86*	247	7.33	4.25	2.35	0.29	0.44	0.0	39	448	13.6	7.5
mean	300 ±78	8.50 ± 2.49	4.42 ± 3.09	3.31 ± 0.80	0.24	0.48	0.46	39.5 ± 2.0	449 ± 34	13.9 ± 0.9	8.0 ± 0.4
		Ailingnae Exposed Females, Age 9-15									
8	203	7.05	3.38	3.03	0.21	0.42	0.0	40	415	14.4	8.0
48	248	7.25	3.99	2.90	0.22	0.15	0.0	42	456	15.6	8.0
mean	225	7.15	3.69	2.97	0.22	0.28	0	41.0	435	15.0	8.0

*Exposed in utero.
**Standard deviation.

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb., g	Serum protein, g
		Rongelap Exposed Males, Age >15-40									
9	128	7.25	3.26	3.77	0.15	0.07	0.0	47	518	16.0	8.0
10	320	5.91	2.84	2.54	0.18	0.30	0.60	46	442	15.2	8.0
20	102	4.91	2.41	2.06	0.25	0.20	0.0	50	531	17.9	8.0
27	113	7.82	3.36	4.30	0.0	0.16	0.0	43	416	16.4	
36	231	5.00	2.35	2.05	0.15	0.45	0.0	42	486	15.2	7.5
37	270	6.47	3.36	2.46	0.13	0.52	0.0	45	446	16.0	7.4
40	231	7.98	4.31	3.43	0.16	0.08	0.0	43	392	14.8	7.1
47	232	5.45	2.83	2.13	0.16	0.33	0.0	44	395	16.9	7.7
73	183	5.17	2.95	1.76	0.26	0.16	0.50	50	508	17.4	7.1
76	138	9.73	4.77	3.99	0.29	0.58	1.00	45	416	15.2	7.6
77	230	6.71	3.56	2.55	0.34	0.20	0.70	46	487	16.4	8.0
mean	198 ±71	6.58 ±1.49	3.27 ±0.74	2.82 ±0.89	0.19	0.28	0.25	45.5 ±2.4	458 ±47	16.1 ±1.3	7.6 ±0.3
		Rongelap Exposed Females, Age >15-40									
12	625	7.80	4.76	2.65	0.39	0.0	0.0	25	240	9.1	7.1
14	250	7.70	4.47	2.85	0.23	0.15	0.0	38	373	13.2	8.4
15	345	7.66	3.98	3.14	0.38	0.15	0.0	40	415	13.2	7.7
18	208	4.88	2.78	1.81	0.20	0.10	0.0	36	401	13.2	7.3
22	208	7.14	4.21	1.93	0.07	0.93	0.0	39	426	14.4	7.7
24	260	5.78	2.25	2.59	0.35	0.52	0.60	40	477	14.8	7.8
39	133	7.40	4.37	2.15	0.22	0.67	0.0	34	400	11.8	7.5
49	322	6.39	3.20	2.75	0.13	0.26	0.60	36	374	12.4	7.8
61	373	8.87	3.64	4.70	0.0	0.44	0.90	43	489	14.4	8.5
64	193	8.87	5.41	2.84	0.44	0.18	0.0	33	331	10.9	7.1
66	219	8.39	3.69	3.78	0.59	0.34	0.0	38	419	13.6	7.3
71	265	9.26	5.93	2.32	0.37	0.65	0.0	41	456	15.2	8.0
74	465	14.30	7.44	4.15	0.14	2.43	1.40	42	469	14.4	8.8
75	288	7.97	4.78	2.39	0.32	0.48	0.0	45	456	14.4	8.5
mean	297 ±122	8.02 ± 2.18	4.35 ±1.33	2.86 ±0.84	0.29	0.52	0.25	37.9 ±4.8	409 ±64	13.2 ±1.8	7.8 ±0.5
		Ailingnae Exposed Females, Age >15-40									
51	241	6.55	4.00	2.29	0.13	0.0	1.30	42	390	15.2	7.3
53	291	7.53	3.54	3.77	0.15	0.15	0.0	41	445	14.4	8.8
70	243	8.82	7.23	1.06	0.26	0.26	0.0	30	442	9.4	7.4
81	131	8.94	7.06	1.07	0.45	0.36	0.0	35	346	12.4	7.3
mean	227	7.96	5.45	2.05	0.25	0.19	0.32	37.3	406	12.9	7.7

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb., g	Serum protein, g
		Rongelap Exposed Males, Age > 40									
4	245	8.02	2.73	5.21	0.08	0.0	0.0	47	507	16.4	8.4
7	113	5.86	2.70	2.81	0.0	0.29	0.60	38	381	14.0	7.8
11	103	5.34	2.40	2.78	0.05	0.11	0.0	43	403	15.2	7.1
55	208	5.36	2.57	2.41	0.16	0.21	0.0	30	291	10.9	7.0
68	293	4.75	2.00	2.04	0.29	0.43	0.0	43	420	14.4	
79	133	7.01	3.51	2.87	0.21	0.42	0.0	48	464	16.9	8.1
80	306	8.00	3.60	3.68	0.08	0.64	0.0	42	408	14.4	7.3
82	307	6.29	3.52	2.08	0.31	0.38	0.0	39	402	14.0	7.7
mean	214 ±87	6.33 ±1.24	2.88 ±0.59	2.99 ±1.04	0.15	0.31	0.08	41.3 ±5.4	410 ±58	14.5 ±0.5	7.6 ±0.4
		Ailingnae Exposed Males, Age > 40									
16	203	4.78	1.96	2.53	0.0	0.29	0.0	44	543	14.4	7.4
29	356	9.10	5.55	2.46	0.55	0.36	0.18	42	419	15.2	7.8
41	104	4.70	1.97	2.07	0.19	0.47	0.0	44	453	16.0	7.7
50	318	6.94	3.47	2.78	0.35	0.28	0.07	46	461	17.4	7.4
mean	245	6.38	3.23	2.46	0.27	0.35	0.06	44.0	469	15.8	7.6
		Rongelap Exposed Females, Age > 40									
13	404	5.37	2.36	2.42	0.21	0.38	0.0	37	340	12.4	8.0
34	226	6.31	3.34	2.40	0.25	0.32	0.0	38	362	13.2	8.1
57	286	5.69	3.76	1.82	0.11	0.0	0.0	37	358	11.8	7.5
58	115	6.71	2.82	3.56	0.20	0.14	0.0	39	389	14.8	
60	284	6.36	2.48	3.24	0.25	0.32	0.64	34	343	12.1	7.5
63	135	4.66	2.14	2.00	0.23	0.28	0.0	43	459	16.0	7.8
78	219	5.62	3.09	2.47	0.0	0.06	0.0	39	381	13.2	7.9
mean	238 ±98	5.82 ±0.60	2.86 ±0.58	2.56 ±0.63	0.18	0.21	0.09	38.1 ±2.5	376 ±38	13.3 ±1.4	7.8 ±0.2
		Ailingnae Exposed Females, Age > 40									
1	206	8.20	4.42	3.28	0.08	0.41	0.0	40	402	14.4	8.3
28	204	6.40	2.94	2.43	0.26	0.70	0.64	35	459	15.2	9.2
43	268	5.34	4.17	0.64	0.21	0.27	0.53	42	428	13.6	8.4
45	330	7.11	3.98	1.85	0.21	1.07	0.0	36	363	13.6	8.0
59	235	8.96	3.67	3.67	0.99	0.63	0.0	37	365	12.8	7.9
mean	249 ±47	7.20 ±1.60	3.83 ±0.57	2.37 ±1.20	0.35	0.62	0.23	38.0 ±2.6	403 ±41	13.9 ±1.1	8.4 ±0.4

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb., g	Serum protein, g
		Male Children of Exposed Parents, Age <9									
88	323	10.30	4.22	5.46	0.0	0.52	1.03	35	403	12.2	7.2
89	358	9.78	4.60	3.81	0.20	1.17	0.0	38	438	14.4	7.0
90	347	11.70	5.15	3.74	0.35	2.46	0.0	36	428	12.8	7.2
91	293	9.51	6.09	2.76	0.19	0.38	0.95	37	395	12.4	7.5
93	310	10.90	6.00	4.14	0.44	0.33	0.0	36	398	12.8	
98	202	7.18	3.09	2.87	0.72	0.50	0.0	35	429	12.4	7.2
102		8.23	3.79	3.79	0.33	0.33	0.0	41	454	13.2	
104	392	8.00	3.28	4.32	0.16	0.24	0.0	38	483	13.6	7.8
109	478	19.20	4.99	12.29	0.77	1.15	0.0	32	434	10.6	
110	283	7.93	5.00	2.62	0.32	0.0	0.0	39	510	12.8	
111	574	7.65	2.91	4.13	0.30	0.30	0.0	39	428	12.8	
113	423	10.50	5.67	4.41	0.21	0.11	1.05	41	489	13.2	
115	453	17.80	3.92	12.82	0.71	0.36	0.0	31	369	11.2	
116	490	9.31	2.89	5.96	0.19	0.28	0.0	37	459	13.6	
118	272	13.60	6.53	5.44	0.95	0.68	0.0	38	419	12.8	
126	417	8.03	3.69	3.85	0.32	0.16	0.0	31	472	10.0	
mean	374 ±95	10.60 ±3.49	4.49 ±1.19	5.15 ±3.04	0.39	0.56	0.19	36.5 ±3.0	438 ±64	12.6 ±1.1	7.3 ±0.4
		Female Children of Exposed Parents, Age <9									
87	352	9.79	4.41	4.60	0.49	0.29	0.0	37	414	13.2	7.9
92	258	7.73	4.02	2.40	0.62	0.70	0.0	37	445	12.4	7.8
94	485	13.80	7.45	4.69	0.69	0.97	0.0	39	478	14.4	
95	414	12.50	7.25	4.63	0.50	0.13	0.0	37	456	13.2	7.3
101	438	25.80	7.74	16.00	1.03	1.03	0.0	40	444	14.0	
103	268	11.10	5.88	4.00	0.22	1.00	0.0	36	412	13.2	
105	386	11.50	5.64	5.41	0.23	0.23	0.0	40	436	13.2	
106	307	8.52	3.07	4.60	0.51	0.26	0.0	35	432	12.1	
108	423	19.40	8.15	5.24	0.58	5.24	1.94	36	442	12.1	
112	458	9.08	4.99	3.54	0.36	0.09	0.91	36	405	12.8	
117	343	8.78	4.04	3.95	0.53	0.26	0.0	35	341	10.9	
119	508	13.70	5.62	5.89	0.69	1.51	0.0	36	435	12.1	
120	305	10.30	2.37	6.59	0.72	0.62	0.0	40	448	12.8	
122	419	12.20	2.56	8.42	0.61	0.61	0.0	36	413	13.2	
124	468	12.90	3.23	8.64	0.13	0.90	0.0	38	398	11.8	
125	220	9.35	3.18	5.89	0.28	0.0	0.0	36	401	12.8	
127	520	12.50	3.75	7.50	1.00	0.13	1.25	30	398	10.6	
128	379	10.70	2.35	7.28	0.75	0.32	0.0	38	438	14.8	
mean	386 ±87	12.20 ±4.29	4.76 ±1.92	6.07 ±3.00	0.55	0.79	0.23	36.8 ±2.2	424 ±32	12.8 ±1.0	7.7

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb., g	Serum protein, g
		Control Males, Age 9-15									
813	254	8.24	3.71	3.46	0.49	0.49	0.82	37	376	13.2	7.4
814	252	11.20	4.59	5.38	0.34	0.78	1.12	39	415	14.0	8.4
815	218	5.69	2.22	3.07	0.11	0.28	0.0	37	362	13.6	8.4
818	307	11.60	6.50	3.94	0.81	0.35	0.0	40	441	13.2	7.5
819	460	4.57	1.69	2.24	0.05	0.59	0.0	38	420	140	7.5
820	283	6.91	2.21	3.11	0.14	1.38	0.69	42	460	144	7.5
863	209	11.30	7.35	3.16	0.0	0.79	0.0	42	448	15.2	7.7
913	370	7.78	5.45	1.95	0.31	0.08	0.0	38	472	14.0	7.8
919	284	5.25	2.78	1.68	0.31	0.37	1.05	40	419	14.0	7.8
921	133	8.10	4.21	2.92	0.32	0.56	0.81	39	451	13.2	7.3
931	355	11.90	5.83	3.09	0.48	2.38	1.19	39	420	14.4	
981	258	13.60	6.39	5.58	0.54	1.09	0.0	41	429	15.6	
1033	275	5.29	2.01	2.86	0.11	0.26	0.54	41	486	14.4	8.3
1036	352	5.81	2.03	3.37	0.12	0.29	0.0	39	469	14.8	8.1
mean	286	8.37	4.07	3.27	0.30	0.69	0.44	39.4	433	14.1	7.8
	±78	±2.90	±1.96	±1.11				±1.4	±34	±0.7	±0.4
		Control Females, Age 9-15									
811	527	10.60	3.82	5.62	0.21	0.95	0.0	35	355	12.4	7.5
812	310	6.68	2.81	2.81	0.27	0.73	0.67	38	405	12.7	7.8
816	318	7.38	2.80	4.06	0.37	0.15	0.0	40	462	14.0	7.6
821	234	9.65	5.50	3.76	0.10	0.19	0.97	37	389	12.1	7.4
891	243	13.60	8.30	4.08	1.22	0.0	0.0	40	429	15.6	7.2
909	560	8.83	3.62	2.91	0.35	1.85	0.89	39	441	14.0	7.5
911	361	6.03	1.69	3.98	0.0	0.36	0.0	37	415	13.2	7.6
925	513	7.41	3.41	3.56	0.22	0.22	0.0	39	470	13.6	8.4
926	383	13.60	7.48	4.08	0.14	0.54	0.0	41	520	16.4	9.0
937	410	8.66						37	405	12.8	7.7
946	428	9.43	5.66	3.68	0.0	0.0	0.94	43	461	16.0	7.6
955	318	8.59	3.26	4.90	0.09	0.34	0.0	38	399	14.4	8.2
959	335	7.64	3.51	3.13	0.22	0.69	0.76	40	433	14.4	7.9
960	250	8.92	4.28	4.37	0.0	0.27	0.0	36	395	12.4	8.0
962	429	5.51	1.98	2.76	0.49	0.22	0.55	34	408	11.5	8.1
996	466	9.68	4.65	4.45	0.19	0.39	0.0	34	367	11.5	7.8
1035	263	7.77	3.11	3.57	0.23	0.78	0.78	43	453	15.2	8.5
mean	373	8.82	4.12	3.86	0.26	0.48	0.35	38.3	424	13.7	7.9
	±99	±2.20	±1.64	±0.77				±2.7	±40	±1.6	±0.5

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb., g	Serum protein, g
		Control Males, Age >15-40									
822	286	6.04	2.78	2.96	0.18	0.12	0.0	44	436	14.0	8.0
823	195	5.68	3.24	2.10	0.06	0.23	0.60	42	425	14.8	7.4
830	293	7.66	5.06	1.23	0.31	1.07	0.0	48	424	16.4	7.4
831	327	7.60	3.50	2.74	0.30	1.06	0.0	51	509	17.9	8.0
833	249	5.66	2.66	2.89	0.0	0.11	0.0	47	513	16.0	7.4
834	381	7.24	2.24	3.69	0.22	1.01	0.72	44	448	15.2	8.0
836	233	8.73	4.19	3.75	0.35	0.44	0.0	45	430	14.8	8.5
838	224	8.79	2.55	5.71	0.18	0.35	0.0	51	509	18.9	8.3
840	244	6.74	3.37	2.97	0.40	0.0	0.0	44	501	16.0	8.0
842	400	8.82	2.82	4.15	0.53	1.15	1.76	49	499	18.4	8.0
872	345	7.38	4.50	2.66	0.22	0.0	0.0	47	486	16.4	8.4
874	293	13.40	10.59	2.68	0.0	0.13	0.0	37	434	13.2	7.8
881	282	8.63	5.78	2.24	0.35	0.26	0.0	47	459	15.6	8.2
882	179	5.72	2.35	2.97	0.23	0.17	0.0	33	454	15.2	7.1
885	225	9.26	6.11	2.41	0.65	0.0	0.93	46	483	16.0	8.0
944	310	7.89	3.55	3.16	0.24	0.16	0.0	47	523	16.4	8.8
958	358	8.67	5.20	2.51	0.35	0.43	1.73	41	436	14.0	7.7
967	340	8.54	3.84	3.59	0.34	0.77	0.0	52	484	17.4	7.8
971	413	7.20	4.46	2.16	0.43	0.14	0.0	47	469	16.9	8.6
1500	283	7.38	3.91	2.66	0.15	0.67	0.0	50	505	17.4	7.8
1501	283	6.16	2.83	2.90	0.31	0.06	0.60	48	499	16.4	8.0
mean	294 ±66	7.77 ±1.44	4.07 ±1.86	2.96 ±0.90	0.28	0.40	0.30	45.7 ± 4.7	473 ±32	16.1 ±0.5	8.0 ±0.4
		Control Females, Age >15-40									
825	355	8.02	3.93	3.69	0.40	0.0	0.0	40	466	12.8	8.9
826	358	5.39	3.56	1.35	0.16	0.32	0.0	34	408	12.4	8.2
829	330	7.23	3.98	2.89	0.07	0.29	0.0	33	355	12.1	8.0
832	240	6.06	2.85	2.97	0.12	0.12	0.0	37	451	14.0	8.3
841	264	6.34	2.98	3.04	0.13	0.19	0.0	36	424	12.8	8.0
843	253	6.43	2.96	2.96	0.19	0.32	0.0	35	376	13.6	7.0
865	263	6.17	3.58	2.34	0.06	0.12	0.60	38	396	12.8	7.2
895	320	6.69	2.54	3.48	0.20	0.47	0.0	45	487	16.4	8.5
896	393	7.35	3.68	2.87	0.29	0.44	0.70	42	474	14.8	8.7
914	268	7.88	4.33	2.84	0.32	0.16	2.36	37	407	13.6	7.2
916	378	4.84	2.47	1.79	0.15	0.39	0.48	36	425	13.6	7.5
922	411	9.73	7.01	1.85	0.39	0.49	0.0	41	467	14.0	8.7
932	198	9.21	6.45	2.30	0.0	0.46	0.0	43	330	12.1	7.1
934	246	7.39	3.99	2.73	0.30	0.37	0.0	37	414	12.8	7.9
938	170	10.80	5.40	3.13	0.54	1.73	0.0	39	402	14.0	8.7
950	280	8.83	3.36	5.03	0.0	0.44	0.0	38	428	14.0	7.8
951	264	9.75	6.34	2.44	0.59	0.39	0.0	36	396	12.4	7.1
965	288	7.16	4.80	1.93	0.07	0.36	0.0	39	367	14.0	7.8
993	308	7.51	3.76	3.38	0.15	0.23	0.0	43	462	15.6	7.8
998	245	6.29	3.46	2.45	0.19	0.06	1.26	38	419	14.8	8.9
1001	258	9.24	5.82	3.05	0.18	0.18	0.0	37	420	12.4	70
1043	414	9.78	6.26	2.64	0.39	0.49	0.0	40	455	13.2	7.5
1502	265	7.88	3.78	3.86	0.16	0.08	0.0	38	451	13.6	8.8
mean	294 ±66	7.65 ±1.47	4.23 ±1.34	2.83 ±0.78	0.22	0.35	0.23	38.3 ±2.8	421 ±39	13.6 ±1.0	7.9 ±0.6

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb. g	Serum protein, g
		Control Males, Age >40									
849	375	8.58	4.12	3.86	0.17	0.43	0.0	46	461	16.9	8.0
853	328	6.84	3.15	3.21	0.14	0.34	0.0	38	389	13.6	8.5
855	253	6.38	3.32	2.55	0.13	0.32	0.64	41	362	14.0	8.0
856	293	5.52	2.21	2.70	0.06	0.55	0.0	39	410	14.0	7.8
862	240	7.02	4.21	2.39	0.28	0.07	0.70	44	400	14.4	7.5
873	363	10.70	5.89	3.96	0.32	0.54	0.0	46	440	16.0	7.2
875	196	5.16	2.73	2.17	0.10	0.10	0.52	48	483	17.4	7.4
878	232	5.65	2.49	2.77	0.34	0.06	0.0	40	418	14.0	8.0
880	308	7.66	3.75	3.29	0.38	0.23	0.0	47	487	16.4	8.0
883	238	5.86	1.88	3.05	0.29	0.06	0.0	43	406	14.8	7.5
884	418	8.29	4.06	3.48	0.33	0.33	0.83	41	406	14.0	8.5
886	388	8.13	4.47	3.41	0.0	0.24	0.0	38	401	13.2	8.8
915	292	4.86	2.09	1.75	0.05	0.97	0.0	42	386	14.8	7.8
917	183	6.25	3.50	2.44	0.19	0.13	0.0		553		8.2
918	260	7.32	2.78	3.44	0.15	0.73	2.20	47	456	16.4	7.8
935	324	5.12	2.15	2.46	0.41	0.10	0.0	47	489	16.4	8.4
947	338	7.77	4.04	2.72	0.16	0.78	0.78	38	359	12.8	7.9
948	177	6.88	3.23	3.23	0.14	0.21	0.69	43	461	15.2	7.6
961	245	5.77	2.37	2.02	0.23	1.04	1.15	45	471	15.6	7.2
964	198	5.18	2.49	1.76	0.21	0.67	0.52	40	376	14.0	7.5
969	417	5.58	3.07	2.12	0.11	0.11	0.56	35	376	11.8	7.1
1007	333	5.87	2.64	2.88	0.18	0.18	0.0	38	428	13.2	8.1
1041	358	6.51	2.08	3.97	0.26	0.20	0.0	41	442	14.4	8.6
mean	294 ±66	6.65 ±1.40	3.17 ±0.99	2.85 ±0.67	0.20	0.36	0.37	42.1 ±3.3	428.7 ±47	14.7 ±0.5	7.9 ±0.5
		Control Females, Age >40									
844	234	6.43	3.60	2.70	0.06	0.0	0.64	38	366	12.8	8.7
846	518	7.19	3.24	2.88	0.50	0.50	0.72	41	421	14.4	8.5
851	241	6.49	2.53	3.37	0.32	0.19	0.65	35	350	12.8	7.4
852	457	10.80	5.94	3.89	0.65	0.32	0.0	38	383	12.8	7.8
859	410	5.88	2.94	2.65	0.0	0.29	0.0	39	379	14.0	7.7
871	343	5.86	3.34	1.99	0.35	0.18	0.0	36	341	12.4	8.0
893	317	9.60	6.43	2.11	0.29	0.77	0.0	39	398	15.2	8.7
894	298	7.32	4.61	2.27	0.15	0.0	2.93	42	424	14.0	8.4
898	333	8.65	4.41	3.81	0.09	0.35	0.0	40	393	15.2	8.6
908	260	6.12	3.18	2.26	0.31	0.31	0.61	40	361	14.0	7.5
928	268	5.97	1.49	3.82	0.36	0.30	0.0	38	373	13.2	8.7
929	343	6.01	3.37	2.16	0.06	0.36	0.60	40	448	15.2	8.5
936	253	8.26	3.72	3.88	0.41	0.25	0.0	37	379	13.6	8.1
941	283	8.90	5.16	3.12	0.36	0.18	0.89	38	413	14.0	7.5
942	160	6.42	4.11	1.73	0.26	0.39	0.0	39	392	13.2	7.4
956	315	5.78	3.01	2.25	0.36	0.17	0.0	37	370	12.8	7.5
957	473	6.59	2.90	3.30	0.13	0.26	0.0	37	410	14.0	7.8
970	197	8.44	2.70	5.57	0.08	0.08	0.0	36	419	12.8	7.5
1042	338	6.32	3.16	2.78	0.19	0.19	0.0	37	440	13.6	8.0
mean	318 ±94	7.21 ±1.40	3.67 ±1.20	2.98 ±0.94	0.26	0.27	0.37	38.3 ±1.7	393 ±29	13.7 ±0.9	8.0 ±0.5

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb., g	Serum protein, g
		Control Males, Age <9									
801	552	10.30	3.09	5.46	0.41	1.34	0.0	39	453	13.2	7.4
802	459	8.61	4.82	3.01	0.34	0.34	0.86	38	440	14.0	6.8
803	388	9.21	4.88	3.50	0.55	0.28	0.0	35	382	12.8	7.5
806	450	12.60	6.30	3.40	0.38	2.52	0.0	38	424	14.0	
807	307	11.10	4.55	5.00	0.44	1.00	1.10	38	412	12.2	7.3
809	400	12.90	6.19	4.77	0.26	1.68	0.0	37	455	14.0	
870	336	10.50	5.78	3.57	0.63	1.26	1.05	38	445	14.0	7.3
904	452	14.40	10.80	2.30	0.0	1.30	0.0	39	405	12.4	
905	208	12.90	6.32	5.55	0.65	0.39	0.0	39	426	12.1	
952	583	12.30	4.92	4.80	0.86	1.72	0.0	39	424	12.4	
1002	428	19.30	6.37	8.49	0.0	4.25	1.93	36	462	12.1	
1004	155	16.30	4.89	9.94	0.65	0.0	8.15	37	439	11.8	
1006	330	8.27	2.56	4.88	0.08	0.74	0.0	39	419	13.4	
1009	447	8.14	3.26	4.23	0.24	0.41	0.0	38	438	12.8	
1010	545	10.70	5.46	4.71	0.32	0.21	0.0	37	398	13.6	
1014	313	12.80	4.74	6.66	0.38	1.02	0.0	36	444	12.4	
1015	167	12.20	2.81	7.81	0.85	0.61	1.22	41	520	14.4	
1017	416	9.62	4.62	4.62	0.38	0.0	0.0	33	433	11.8	
1024	223	6.09	2.19	3.41	0.18	0.18	1.21	33	413	11.8	
1027	311	9.15	4.21	4.76	0.09	0.09	0.0	39	419	12.1	
1030	466	14.00	5.04	8.26	0.56	0.0	1.40	40	493	12.1	
1037	235	7.87	2.51	4.09	0.16	1.10	0.0	35	425	12.1	
1038	376	9.66	2.41	6.67	0.39	0.19	0.0	33	438	9.7	
1040	258	8.64	3.71	4.23	0.35	0.35	0.0	34	413	11.5	
1045	545	12.70	3.43	8.26	0.76	0.25	0.0	35	439	10.6	
1046	508	10.70	2.89	6.74	0.64	0.86	0.0	35	442	11.5	
1047	435	7.22	2.96	3.61	0.29	0.29	0.0	32	368	11.8	
1503	251	8.59	2.15	5.50	0.60	0.34	0.0	39	448	12.8	
1504	348	9.53	3.81	5.15	0.29	0.29	0.0	39	456	13.2	
mean	375 ±119	10.91 ±2.87	4.40 ±1.82	5.29 ±1.87	0.40	0.79	0.58	36.9 ±2.4	434 ±30	12.5 ±1.0	7.3 ±0.2
		Control Females, Age <9									
808	520	9.74	5.06	4.09	0.29	0.29	0.0	40	396	14.0	8.5
810	283	10.30	5.25	4.02	0.62	0.41	0.0	39	439	14.0	7.7
866	368	6.12	2.02	3.55	0.06	0.49	0.0	40	403	14.4	7.7
900		8.60	3.61	4.30	0.34	0.34	0.0	40	413	13.6	8.0
901	392	12.60	3.91	7.43	0.38	0.76	0.0	37	446	13.2	
902	298	10.40	3.54	4.78	0.10	1.98	0.0	33	382	10.9	
903	348	8.71	4.18	3.48	0.0	1.05	0.0	37	390	14.0	
906	269	7.67	3.22	4.07	0.08	0.31	0.0	40	389	12.8	
923	493	8.88	4.44	3.29	0.18	0.98	0.0	37	438	12.2	7.5
930	414	10.40	5.51	4.26	0.21	0.42	0.0	37	436	13.2	
995	293	9.37	2.34	5.90	0.19	0.94	0.0	39	454	12.4	
1012	368	7.52	2.33	3.99	0.23	0.83	0.75	37	394	12.8	
1020	433	11.70	3.74	7.25	0.47	0.23	0.0	39	382	12.4	
1021	420	15.40	5.08	7.24	0.46	2.62	0.0	35	419	12.8	
1022	297	7.34	1.47	5.06	0.37	0.44	0.0	38	393	13.6	
1025	378	16.20	6.64	8.59	0.65	0.32	0.0	38	439	12.8	
1026	296	8.12	2.92	4.47	0.41	0.34	0.0	34	392	12.1	
1028	347	12.50	3.75	7.75	0.63	0.38	0.0	36	402	12.1	
1029	293	11.10	3.55	6.77	0.56	0.22	0.0	37	446	12.1	
1031	318	11.30	4.41	6.10	0.45	0.34	0.0	39	456	13.2	
1034	624	8.66	3.90	4.30	0.43	0.0	0.0	40	403	14.8	
1044	591	10.70	3.32	6.21	0.75	0.43	0.0	35	424	11.8	
mean	383 ±101	10.15 ±2.50	3.83 ±1.23	5.31 ±1.60	0.36	0.64	0.03	37.6 ±1.7	415 ±24	13.0 ±0.9	7.9

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb., g	Serum protein, g
		Utirik Males, Age 9-15									
2102	419	9.84	3.54	5.93	0.10	0.30	0.0	38	419	14.8	7.9
2106	303	15.10	7.55	5.74	0.45	1.36	0.0	39	449	14.4	7.9
2115	543	13.40	7.37	4.96	0.40	0.40	2.68	40	455	15.2	7.2
2124	363	7.57	4.39	2.73	0.23	0.15	0.76	35	425	13.6	8.0
2136	280	6.18	2.90	2.72	0.19	0.37	0.0	38	424	14.4	7.1
2142	326	7.87	3.70	3.78	0.08	0.24	0.79	41	428	15.2	7.5
2151	568	7.20	3.02	3.46	0.14	0.58	0.0	36	472	17.4	7.7
2155	418	7.89	3.95	2.76	0.32	0.87	0.0	33	418	17.4	7.7
2174	488	12.10	6.78	4.11	0.36	0.85	0.0	39	456	14.8	7.5
2179	374	8.30	4.65	3.32	0.08	0.25	0.0	39	494	14.0	7.0
2188	458	6.10	2.44	3.23	0.24	0.18	0.0	40	446	14.8	7.9
2242	492	8.86						37	419	14.0	7.2
mean	419 ±93	9.20 ±2.88	4.57 ±1.83	3.89 ±1.17	0.24	0.50	0.38	37.9 ±2.1	442 ±23	15.0 ±1.2	7.6 ±0.3
		Utirik Females, Age 9-15									
2111	291	11.60	6.84	3.60	0.35	0.70	1.16	39	418	14.0	8.2
2113	411	9.65	7.04	1.83	0.48	0.29	0.0	39	471	14.0	8.2
2126	395	8.01	3.68	3.68	0.32	0.32	0.0	39	424	15.2	8.7
2130	360	13.40	7.91	4.42	0.54	0.40	0.0	37	416	14.0	8.0
2160	460	8.35	4.68	2.67	0.17	0.75	0.84	39	398	14.0	7.6
2197	255	6.42	2.63	3.27	0.19	0.26	0.0	32	369	12.1	7.3
2210		7.56	3.48	2.80	0.38	0.76	1.66	39	472	14.4	7.3
2213	526	8.70	4.70	3.05	0.35	0.61	0.0	39	453	14.4	8.3
2218	712	9.31	3.72	4.19	0.19	1.11	0.93	40	475	16.0	7.8
2225	325	9.69	3.78	5.33	0.29	0.29	0.0	36	390	13.3	7.8
2226	259	5.89	2.81	2.81	0.24	0.12	0.0	36	410	12.4	7.6
2227	424	5.75	2.88	2.30	0.29	0.29	0.0	38	450	14.0	8.0
2228	393	15.20	9.73	4.41	0.15	0.91	0.0	39	436	14.4	8.1
2251	326	7.77	4.27	2.72	0.31	0.39	0.78	37	410	14.0	7.7
2255	413	10.40	5.10	3.85	0.31	1.04	1.04	37	433	14.4	7.8
2256	481	6.48	3.76	2.40	0.13	0.19	0.0	42	409	14.0	
mean	402 ±116	9.01 ±2.66	4.81 ±2.04	3.33 ±0.94	0.29	0.53	0.40	38.0 ±2.1	427 ±29	14.0 ±1.0	7.9 ±0.4

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb., g	Serum protein, g
		Utirik Males, Age >15-40									
2108	398	6.23	2.36	2.36	0.50	0.75	2.49	43	449	16.4	7.7
2135	468	9.20	5.06	3.13	0.46	0.46	0.92	45	396	16.0	8.4
2137	310	5.61	2.75	2.52	0.17	0.11	0.56	42	467	14.8	8.0
2150	257	6.97	3.83	2.65	0.28	0.21	0.0	44	492	16.4	7.4
2156	318	4.80	3.07	1.30	0.24	0.19	0.0	45	455	16.4	7.2
2157	415	5.81	2.91	2.56	0.23	0.12	0.0	43	409	15.2	7.4
2167	283	7.68	3.69	3.53	0.23	0.23	0.0	43	487	16.4	7.1
2176	420	6.44	3.35	2.64	0.39	0.06	0.0	51	512	17.4	7.7
2235	307	8.14	3.91	3.74	0.08	0.33	0.81	45	470	16.4	7.5
2152	240	4.60	3.22	1.10	0.09	0.18	0.0	45	459	16.4	7.8
mean	342 ±78	6.55 ±1.47	3.42 ±0.76	2.55 ±0.85	0.27	0.26	0.48	44.6 ±2.5	460 ±34	16.2 ±0.7	7.6 ±0.4
		Utirik Females, Age >15-40									
2104	375	5.84	3.85	1.69	0.06	0.23	0.0	36	396	12.8	7.8
2119	385	5.79	2.55	2.84	0.06	0.35	0.0	40	444	13.2	8.1
2128	573	8.31	3.91	3.99	0.08	0.33	0.0	30	418	10.0	8.0
2129	412	8.59	4.81	3.09	0.43	0.26	0.0	37	408	13.6	7.6
2149	400	6.13	2.15	3.13	0.43	0.31	1.23	37	360	12.8	7.7
2158	398	6.29	3.33	2.70	0.06	0.19	0.0	35	389	12.8	7.5
2164	324	9.51	6.94	2.09	0.19	0.29	0.0	39	415	14.4	8.0
2172	449	5.82	2.44	2.74	0.23	0.41	0.0	41	436	14.4	7.5
2189	417	8.25	4.04	3.63	0.33	0.25	0.0	42	438	15.2	7.7
2195	301	5.32	3.19	2.02	0.11	0.0	0.0	38	408	13.2	6.8
2217	391	7.20	5.18	1.73	0.14	0.14	0.0	29	276	10.3	6.6
2229	316	6.93	4.02	2.49	0.27	0.14	0.0	41	445	15.2	7.5
2246	321	9.25	6.48	2.59	0.09	0.09	0.0	41	435	14.4	7.7
2247	401	8.17	3.92	3.35	0.16	0.74	0.0	36	379	13.2	7.8
2248	413	7.73	3.63	2.40	0.39	1.16	1.55	35	400	12.8	7.7
2249	683	5.61	2.86	2.19	0.39	0.17	0.0	37	425	13.2	8.2
mean	410 ±97	7.17 ±1.39	3.96 ±1.35	2.67 ±0.66	0.21	0.32	0.17	37.1 ±3.6	405 ±41	13.2 ±1.4	7.6 ±0.4

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	RBC ($x10^{-4}$)	Hgb., g	Serum protein, g
		Utirik Males, Age>40									
2101	296	11.80	6.37	4.96	0.24	0.24	0.0	38	389	13.2	8.4
2105	371	8.62	4.31	3.19	0.26	0.76	0.86	40	438	15.6	8.0
2110	437	6.06	3.39	2.55	0.06	0.06	0.0	42	393	14.8	7.7
2112	317	5.70	3.36	1.60	0.11	0.63	0.0	40	408	14.4	8.5
2114	306	7.34	3.74	2.94	0.07	0.59	0.0	45	487	16.0	8.0
2121	324	5.26	3.05	1.95	0.16	0.11	0.0	42	418	14.4	8.0
2125	467	8.56	3.77	4.11	0.17	0.51	0.0	39	453	14.8	8.6
2145	539	7.77	3.19	3.65	0.39	0.47	0.78	43	425	14.8	7.6
2148	308	5.90	3.07	2.36	0.35	0.06	0.59	42	435	15.6	7.5
2166	352	5.91	3.31	2.25	0.12	0.18	0.59	45	454	15.2	7.3
2169	296	6.31	3.03	2.97	0.19	0.06	0.63	41	410	14.4	7.1
2175	264	3.95	1.90	1.82	0.16	0.08	0.0	40	396	14.4	7.3
2181	275	7.19	4.53	1.80	0.36	0.43	0.72	40	368	14.4	8.0
2186	243	5.51	2.48	2.26	0.11	0.61	0.55	35	358	12.1	7.5
2206	368	6.74	2.97	2.97	0.61	0.20	0.0	43	456	16.0	7.8
2211	323	5.35	2.46	2.41	0.37	0.05	0.54	42	445	15.6	7.4
2214	384	5.09	2.55	2.29	0.05	0.20	0.0	43	493	15.2	7.5
2240	355	8.81	3.44	4.23	0.18	0.97	0.0	41	459	15.2	7.8
2253	308	8.77	5.35	2.81	0.26	0.35	0.0	43	442	15.6	7.7
mean	344	6.88	3.49	2.80	0.22	0.34	0.28	41.3	428	14.8	7.8
	±73	±1.85	±1.09	±0.91				±2.2	±36	±0.9	±0.4
		Utirik Females, Age >40									
2139	349	6.62						38	410	13.6	8.0
2140	254	5.29	3.02	2.01	0.05	0.16	0.0	39	419	14.8	8.0
2146	358	6.22	2.18	3.73	0.06	0.19	0.0	39	415	14.4	8.0
2162	294	6.99	3.29	3.01	0.21	0.49	0.0	35	398	12.4	8.3
2182	315	4.79	1.58	2.92	0.10	0.14	0.48	33	383	12.8	8.0
2191	309	7.43	5.20	1.63	0.22	0.22	1.49	35	359	13.2	8.3
2193	315	6.07	2.85	3.04	0.06	0.06	0.61	39	394	14.0	7.3
2196	289	9.13	3.65	4.47	0.55	0.46	0.0	39	414	14.4	7.3
2200	320	6.85	3.22	2.81	0.34	0.48	0.0	42	430	14.8	8.5
2212	312	8.47	3.56	4.32	0.25	0.34	0.0	38	402	14.0	7.7
2215	283	8.59	4.12	3.87	0.34	0.26	0.0	42	480	14.8	8.2
2216	516	7.71	4.01	3.01	0.31	0.39	0.0	38	416	14.0	8.3
2221	425	8.17	5.88	1.96	0.16	0.16	0.0	37	395	13.2	7.5
2224	308	5.99	3.17	1.80	0.12	0.84	0.60	35	359	12.4	6.8
2238	527	8.75	4.20	3.94	0.18	0.44	0.0	39	382	13.2	8.7
2244	510	6.27	2.19	3.57	0.31	0.13	0.63	40	416	14.4	9.0
mean	356	7.08	3.47	3.07	0.22	0.32	0.25	38.0	405	13.8	8.1
	±90	±1.30	±1.13	±0.92				±3.1	±28	±0.8	±0.6

APPENDIX 5

Individual Hematological Findings, 1964

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	Hgb. g
	Rongelap Exposed Males, Age 10-15								
2	430	7.65	3.52	3.52	0.15	0.31	1.50	38	13.2
3	396	12.03	6.13	3.85	0.48	1.44	1.20	36	12.1
5	365	6.25	3.13	2.88	0.13	0.13	0.0	37	12.1
19	380	4.68	1.92	1.82	0.19	0.75	0.0	43	12.8
23	365	7.40	3.03	3.18	0.0	1.11	0.70	39	12.8
32	306	9.10	3.09	5.10	0.18	0.46	2.70	39	12.8
54	368	7.35	2.21	4.19	0.29	0.59	0.70	57	11.8
83*	350	9.20	4.32	3.68	0.0	1.20	0.0	37	12.4
84*	404	8.40	2.49	5.76	0.26	0.09	0.0	38	12.8
mean	374 ±35**	8.01 ±2.10	3.31 ±1.27	3.78 ±1.17	0.19	0.68	0.76	40.4 ±6.1	12.5 ±0.4
	Ailingnae Exposed Males, Age 10-15								
6	328	7.55	3.17	2.87	0.45	0.98	0.80	37	12.1
mean	328	7.55	3.17	2.87	0.45	0.98	0.80	37.0	12.1
	Rongelap Exposed Females, Age 10-15								
17	309	6.35	3.11	2.67	0.13	0.44	0.0	39	13.6
21	275	7.00	3.01	2.52	0.07	1.33	0.70	42	13.2
33	585	8.63	3.11	4.83	0.09	0.52	0.90	40	14.0
42	440	9.20	4.23	4.42	0.09	0.46	0.0	37	13.6
65	378	7.40	3.85	2.29	0.15	1.04	0.70	38	12.4
69	403	6.60	3.04	3.30	0.07	0.20	0.0	41	12.8
mean	398 ±110	7.53 ±1.10	3.39 ±0.52	3.34 ±1.06	0.10	0.65	0.38	39.5 ±2.4	13.3 ±0.3
	Ailingnae Exposed Females, Age 10-15								
8	454	11.08	4.87	4.87	0.33	0.89	1.10	40	14.0
mean	454	11.08	4.87	4.87	0.33	0.89	1.10	40.0	14.0

* Exposed in utero.
** Standard deviation.

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	Hgb., g
	Rongelap Exposed Males, Age >15-40								
10	388	11.30	6.20	3.73	0.57	0.79	0.0	46	14.0
20	265	7.83	5.01	2.03	0.31	0.39	0.80	50	16.0
27	256	7.00	3.92	2.38	0.07	0.49	1.40	41	14.8
35	162	6.20	2.85	3.04	0.25		0.60	49	16.0
36	218	10.60	6.15	3.50	0.21	0.74	0.0	44	13.6
37	285	5.85	2.75	2.63	0.23	0.18	0.60	45	15.6
40	425	7.53	2.33	5.04	0.08	0.08	0.0	40	13.2
47	305	8.50	2.72	4.50	0.17	0.17	0.90	45	15.2
73	315	8.28	3.97	3.56	0.33	0.33	0.80	49	15.2
76	209	10.90	4.58	5.01	0.33	0.98	0.0	44	13.6
77	330	5.32	2.39	2.23	0.16	0.53	0.0	29	14.0
mean	287 ±78	8.12 ±2.10	3.90 ±1.44	3.42 ±1.08	0.25	0.43	0.46	43.8 ±5.5	14.7 ±1.0
	Rongelap Exposed Females, Age >15-40								
12	395	6.45	2.45	3.81	0.06	0.06	0.60	41	13.2
14	355	7.15	4.22	2.65	0.21	0.07	0.0	36	12.1
15	331	7.75	3.33	3.57	0.47	0.39	0.0	38	13.2
18	257	6.93	4.22	1.87	0.48	0.28	0.70	40	13.6
24	505	6.05	1.88	3.51	0.06	0.61	0.0	42	13.2
39	406	7.55	2.79	3.85	0.23	0.53	1.50	37	11.8
49	385	8.25	5.20	2.39	0.17	0.50	0.0	39	12.8
61	445	9.03	5.69	2.61	0.18	0.54	0.0	43	14.0
64	295	7.10	2.98	3.20	0.28	0.43	2.10	38	12.4
66	448	8.00						40	12.8
67	295	8.20	4.26	3.44	0.25	0.25	0.0	42	13.6
71	425	9.00	5.76	2.70	0.27	0.27	0.0	40	14.0
72	360	8.40	2.67	5.68	0.17	0.09	0.0	-	-
74	263	9.55	4.68	4.39	0.29	0.19	0.0	45	14.8
75	423	14.40	10.37	2.73	0.29	1.01	0.0	39	12.4
mean	372 ±73	8.25 ±1.90	4.32 ±2.13	3.31 ±0.96	0.24	0.37	0.35	40.0 ±2.3	13.1 ±0.7
	Ailingnae Exposed Females, Age >15-40								
48	295	7.13	2.57	3.92	0.07	0.50	0.70	42	14.8
51	415	9.40	4.98	4.04	0.28	0.09	0.0	44	14.0
53	531	6.30	2.90	3.09	0.19	0.06	0.60	40	13.2
70	320	5.15	1.80	2.32	0.26	0.72	0.50	26	7.6
81	348	6.03	2.95	2.59	0.18	0.30	0.0	38	11.8
mean	382 ±95	6.80 ±1.60	3.04 ±1.18	3.19 ±0.77	0.20	0.33	0.36	38.0 ±6.1	12.3 ±2.5

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	Hgb., g
	Rongelap Exposed Males, Age >40								
4	134	10.15	3.65	5.89	0.30	0.30	0.0	43	15.2
7	445	8.10	4.62	2.84	0.08	0.57	0.0	41	13.2
11	390	6.33	3.42	2.34	0.32	0.13	1.30	38	12.4
55	351	6.05	2.18	3.51	0.18	0.12	0.60	46	9.3
68	210	5.90	2.71	2.01	0.06	1.12	0.0	47	15.6
79	266	6.70	3.08	3.15	0.40	0.07	0.0	44	14.8
80	319	11.50	5.98	3.91	0.46	1.03	1.20	42	14.0
82	538	8.00	3.12	4.16	0.24	0.48	0.0	43	13.2
mean	331 ±126	7.83 ±2.00	3.60 ±1.20	3.48 ±1.22	0.26	0.48	0.39	43.0 ±2.7	13.5 ±1.9
	Ailingnae Exposed Males, Age >40								
16	386	6.33	2.59	3.10	0.13	0.51	0.0	46	14.0
29	235	7.70	5.24	2.23	0.0	0.23	0.0	40	14.0
41	225	5.98	1.79	3.35	0.24	0.49	1.20	42	14.8
50	448	6.35	2.48	3.43	0.13	0.32	0.0	44	15.2
mean	323 ±110	6.59 ±0.80	3.03 ±1.52	3.03 ±0.55	0.13	0.39	0.30	43.0 ±2.2	14.5 ±0.5
	Rongelap Exposed Females, Age >40								
13	628	5.45	2.56	2.02	0.05	0.82	0.0	30	10.0
34	253	9.80	3.72	4.90	0.0	1.08	1.00	38	12.8
58	295	6.73	2.22	4.30	0.07	0.13	0.0	40	14.0
60	250	9.80	3.63	4.41	0.29	1.47	0.0	35	11.8
63	250	6.20	2.60	3.16	0.0	0.31	1.20	41	13.6
78	404	10.40	7.70	2.39	0.10	0.10	1.00	40	14.0
mean	346 ±159	8.06 ±2.20	3.74 ±2.02	3.53 ±1.18	0.09	0.65	0.53	37.3 ±3.9	12.7 ±1.4
	Ailingnae Exposed Females, Age >40								
1	313	8.30	4.40	1.74	0.33	1.66	1.70	41	14.0
28	663	7.98	5.34	2.31	0.08	0.16	0.80	36	12.1
43	353	5.28	2.90	2.27	0.05	0.05	0.0	39	12.1
45	520	7.80	4.13	2.96	0.08	0.47	1.60	38	12.8
59	355	10.95	4.81	4.71	0.0	1.44	0.0	37	12.4
mean	441 ±148	8.06 ±2.00	4.32 ±0.91	2.80 ±1.15	0.11	0.76	0.82	38.3 ±1.8	12.7 ±0.7

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	Hgb., g
–	Male Children of Exposed Parent(s), Age <10								
88	355	10.50	4.20	5.56	0.32	0.42	0.0	36	11.8
89	395	10.93	6.77	3.17	0.33	0.44	2.20	40	14.4
90	380	11.00	5.17	4.18	0.11	1.43	1.10	37	11.8
91	298	9.85	5.32	3.94	0.10	0.49	0.0	38	12.8
93	503	13.00	8.58	3.38	0.26	0.78	0.0	37	11.5
96	619	15.18	8.35	5.01	0.30	1.37	1.50	36	12.1
97	678	8.50	3.40	3.57	0.26	1.19	0.90	37	12.4
98	528	11.20	5.49	3.81	0.45	1.46	0.0	36	10.9
102	600	8.45	2.03	6.25	0.17	0.0	0.0	40	13.2
104	429	12.65	6.45	4.43	0.38	1.27	1.30	39	13.2
109	410	10.90	4.47	5.56	0.22	0.55	1.10	34	11.2
110	440	9.80	4.41	4.90	0.20	0.20	1.00	38	12.1
111	635	6.35	1.65	4.00	0.06	0.64	0.0	35	11.5
113	490	7.78	3.34	3.34	0.31	0.78	0.0	39	13.2
115	400	12.15	4.74	5.95	0.49	0.85	1.20	36	11.5
116	385	10.90	3.60	6.98	0.0	0.33	0.0	36	11.8
118	585	11.65	3.84	7.57	0.12	0.12	0.0	39	12.8
126	433	8.60	2.24	5.85	0.17	0.34	0.0	35	11.5
130	485	7.85	4.16	2.59	0.24	0.86	0.80	37	10.9
131	670	13.95	9.77	2.79	0.28	0.98	1.40	35	11.8
132	470	7.98	2.07	4.86	0.16	0.80	0.80	28	9.7
mean	488 ±107	10.33 ±2.20	4.76 ±2.22	4.65 ±1.38	0.23	0.73	0.63	36.6 ±2.5	12.1 ±1.1
	Female Children of Exposed Parent(s), Age <10								
87	378	11.45	5.15	5.50	0.11	0.57	1.10	38	12.4
92	520	9.10	4.82	3.46	0.18	0.55	0.90	40	13.6
94	675	11.48	5.62	4.82	0.34	0.69	0.0	39	12.8
100	633	6.60	2.77	3.10	0.20	0.53	0.0	35	11.5
101	623	11.05	4.75	5.64	0.33	0.33	0.0	36	11.8
103	583	10.90	4.25	5.67	0.11	0.76	1.10	36	12.8
105	433	11.65	5.83	4.78	0.47	0.58	0.0	37	12.1
106	417	10.60	4.13	5.40	0.32	0.74	0.0	37	12.8
108	490	13.20	6.34	5.15	0.53	1.19	0.0	36	11.8
112	648	9.50	2.09	5.99	0.38	0.95	1.00	36	11.8
117	631	11.83	5.44	5.32	0.12	0.83	1.20	33	11.2
119	378	8.75	3.33	4.46	0.53	0.44	0.0	35	11.8
120	417	10.40	3.74	4.99	0.21	1.35	1.00	37	11.8
122	531	8.25	3.14	4.46	0.17	0.50	0.0	34	12.1
123	328	13.60	6.53	4.62	0.54	1.90	0.0	34	9.4
125	528	10.63	4.57	5.53	0.11	0.43	0.0	37	13.2
127	565	13.48	3.77	9.03	0.0	0.67	0.0	32	10.3
128	350	11.70	3.16	7.37	0.83	0.23	1.20	33	10.0
134	719	11.40	3.42	7.07	0.23	0.68	0.0	29	7.9
135	628	13.65	6.42	5.19	0.68	1.37	0.0	23	8.8
mean	523 ±119	10.96 ±1.90	4.46 ±1.30	5.38 ±1.31	0.32	0.76	0.38	34.9 ±3.7	11.5 ±1.4

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	Hgb., g
	Unexposed Males, Age 10-15								
813	405	6.65	2.06	4.19	0.27	0.13	0.0	36	13.2
814	285	10.80	5.51	4.43	0.54	0.32	0.0	36	12.4
815	200	8.05	2.25	5.15	0.24	0.40	0.0	38	12.8
818	505	9.95	5.27	3.88	0.50	0.30	0.0	39	12.1
819	273	5.45	2.45	2.18	0.05	0.71	0.50	38	12.4
820	412	23.20	20.42	2.32	0.46	0.0	0.0	40	13.2
863	730	9.00	4.59	3.96	0.09	0.27	0.90	40	13.6
912	215	12.00	7.32	3.12	0.12	1.44	0.0	36	11.2
913	340	8.40	4.45	3.70	0.17	0.08	0.0	39	12.8
921	335	19.50	14.43	3.51	0.39	1.17	0.0	34	10.6
931	465	13.20	1.98	6.86	0.40	3.83	1.30	36	12.4
981	410	12.40	5.58	5.70	0.37	0.62	1.20	38	12.8
1033	613	7.90	3.71	4.03	0.16	0.0	0.0	38	14.0
1036	151	11.00	5.28	5.06	0.44	0.22	0.0	37	12.4
1052	495	9.40	4.14	4.51	0.38	0.38	0.0	36	12.1
mean	389 ±158	11.13 ±4.70	5.96 ±5.03	4.17 ±1.22	0.31	0.66	0.26	37.4 ±1.7	12.5 ±0.8
	Unexposed Females, Age 10-15								
805	458	11.38	4.55	5.35	0.34	1.14	0.0	41	12.1
811	433	11.70	6.44	4.10	0.12	1 .05	0.0	35	12.1
812	333	8.80	4.14	2.82	0.35	1.23	2.60	38	12.1
816	334	8.68	3.12	4.86	0.17	0.52	0.0	37	11.8
909	325	5.95	2.32	2.62	0.18	0.77	0.60	42	12.8
911	416	8.48	5.17	3.05	0.08	0.16	0.0	36	11.8
925	275	6.60	2.71	3.63	0.07	0.13	0.70	40	12.4
926	360	11.85	6.75	3.91	0.24	0.95	0.0	40	13.6
937	570	17.80	10.32	4.98	0.36	2.14	0.0	37	12.1
946	335	8.55	3.33	3.76	0.26	1.11	0.90	40	13.2
955	538	7.80	3.28	3.98	0.31	0.16	0.80	39	13.2
959	448	11.05	7.29	2.76	0.11	0.88	0.0	38	12.8
960	390	9.25	4.16	4.53	0.09	0.46	0.0	37	12.1
962	365	6.70	2.01	4.02	0.0	0.54	1.30	35	11.2
978	218	7.80	2.26	4.52	0.0	1.01	0.0	39	12.8
980	283	8.40	3.86	2.69	0.42	1.43	0.0	41	12.4
996	629	14.33	7.59	5.73	0.57	0.43	0.0	33	10.6
1035	433	12.50	6.00	4.62	0.13	1.75	0.0	42	14.0
mean	397 ±106	9.87 ±3.00	4.74 ±2.25	4.00 ±0.94	0.21	0.88	0.38	38.3 ±2.5	12.4 ±0.8

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	Hgb., g
	Unexposed Males, Age >15-40								
822	628	14.15	10.33	3.11	0.14	0.57	0.0	44	14.0
823	346	15.65	10.48	3.13	0.47	1.41	1.60	42	13.6
827	339	8.75	5.08	2.45	0.44	0.79	0.0	46	14.8
828	428	13.28	8.36	4.51	0.40	0.0	0.0	46	15.2
830	360	5.78	2.98	2.35	0.06	0.23	1.10	45	15.2
831	353	9.00	2.88	4.41	0.45	1.17	0.90	54	16.9
833	428	6.45	2.71	3.48	0.26	0.0	0.0	47	16.0
836	453	7.50	3.52	3.38	0.15	0.45	0.0	46	14.4
840	308	7.68	4.30	2.92	0.08	0.38	0.0	47	15.6
842	528	9.70	3.10	4.66	0.20	1.65	1.00	50	17.4
864	322	9.95	4.08	4.48	0.50	0.90	0.0	47	14.8
881	333	7.90	3.32	4.19	0.32	0.08	0.0	45	14.8
882	175	6.49	2.72	3.44	0.13	0.06	1.30	44	14.8
885	203	11.03	6.28	4.08	0.22	0.44	0.0	45	15.6
892	295	7.90	2.37	4.03	0.24	1.11	1.60	43	15.6
918	205	7.15	2.43	4.00	0.21	0.43	0.70	47	16.0
919	308	7.80	4.68	2.11	0.47	0.55	0.0	39	12.1
939	220	10.80	8.53	1.62	0.11	0.54	0.0	43	14.4
944	313	6.15	3.44	2.40	0.12	0.12	0.60	45	14.4
966	270	8.55	5.73	1.97	0.09	0.68	0.90	47	15.2
971	403	18.95	10.42	6.82	0.57	0.95	1.90	47	15.6
1005	330	8.60						50	16.4
1500	275	6.80	3.13	2.99	0.20	0.48	0.0	51	16.4
1501	258	9.68	6.39	2.90	0.20	0.20	0.0	46	14.8
mean	337 ±104	9.40 ±3.40	5.10 ±2.73	3.45 ±1.15	0.26	0.57	0.50	46.1 ±3.1	15.2 ±1.1
	Unexposed Females, Age >15-40								
821	425	8.53	3.92	4.18	0.09	0.26	0.90	38	12.8
826	315	8.25	5.86	1.65	0.25	0.33	1.60	35	11.5
829	315	10.83	7.14	2.81	0.22	0.65	0.0	38	12.1
832	358	7.25	4.35	2.54	0.07	0.29	0.0	39	12.4
835	340	10.30	5.25	4.02	0.10	0.93	0.0	37	12.4
841	430	10.40	6.55	3.12	0.0	0.62	1.00	29	10.0
843	400	6.85	5.07	1.30	0.14	0.34	0.0	31	10.6
845	345	9.10	4.28	4.28	0.27	0.18	0.90	44	13.6
865	575	7.33	4.91	1.83	0.22	0.37	0.0	33	10.9
867	484	8.18	4.25	3.11	0.33	0.41	0.0	39	12.1
891	235	8.33	2.66	4.16	0.17	1.33	0.0	41	14.4
895	613	10.55	5.38	4.64	0.21	0.32	0.0	45	15.6
896	390	11.00	6.60	3.96	0.22	0.11	1.10	35	10.9
916	465	11.23	7.18	2.58	0.67	0.67	1.10	38	12.1
922	457	6.13	3.19	2.21	0.18	0.49	0.60	36	12.4
932	525	12.88	8.24	3.35	0.0	1.16	1.30	33	11.2
934	393	9.00	4.41	4.05	0.09	0.36	0.90	40	13.2
938	309	10.88	9.14	0.87	0.11	0.76	0.0	30	10.0
945	478	7.05	4.51	1.76	0.35	0.42	0.0	46	15.6
950	75	6.50	2.28	3.45	0.13	0.52	1.30	41	14.0
951	390	9.30	4.84	3.91	0.09	0.37	0.90	41	13.2
965	424	8.80	5.10	3.17	0.26	0.26	0.0	37	12.1
977	422	12.95	8.16	3.63	0.26	0.91	0.0	28	8.8
993	445	10.10	3.33	5.55	0.40	0.71	1.00	40	12.8
998	326	10.88	5.98	4.24	0.54	0.11	0.0	40	14.0
1001	280	5.83	3.20	2.04	0.17	0.41	0.0	39	13.2
1043	324	7.00	3.22	3.01	0.35	0.42	0.0	40	13.2
1050	330	7.90	4.98	2.45	0.0	0.40	0.80	38	12.1
1502	216	12.43	9.32	2.36	0.37	0.25	1.20	32	11.5
mean	382 ±110	9.16 ±2.00	5.29 ±1.87	3.11 ±1.11	0.22	0.49	0.50	37.3 ±4.5	12.4 ±1.6

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	Hgb., g
	Unexposed Males, Age >40								
849	203	7.70	3.47	3.39	0.0	0.85	0.0	44	15.6
853	343	8.30	3.24	3.65	0.25	0.16	1.60	39	13.6
856	675	8.73	4.80	2.79	0.17	0.87	0.90	39	12.8
868	278	8.50	5.36	2.64	0.26	0.26	0.0	45	15.2
878	303	7.90	2.92	4.50	0.0	0.40	0.80	40	13.2
880	324	7.80	3.59	3.43	0.55	0.23	0.0	46	14.8
884	321	10.75	5.48	4.19	0.21	0.75	1.10	41	13.2
897	340	8.30	4.15	3.65	0.25	0.25	0.0	43	14.0
899	288	5.40	2.97	1.84	0.22	0.32	0.50	40	13.6
915	538	8.40	5.29	2.18	0.25	0.67	0.0	37	12.1
947	380	7.55	4.00	3.02	0.08	0.38	0.80	40	14.0
948	298	5.95	1.84	3.33	0.30	0.36	1.20	44	16.0
961	253	7.30	2.56	3.72	0.07	0.88	0.70	45	14.8
964	203	5.63	2.87	1.80	0.23	0.68	0.60	38	13.2
969	439	7.83	3.99	3.29	0.23	0.31	0.0	40	12.8
973	415	8.53	4.43	3.07	0.17	0.77	0.90	44	14.0
975	283	7.05	5.01	1.69	0.14	0.21	0.0	44	15.2
1007	302	6.40	2.88	3.14	0.13	0.26	0.0	40	14.0
1041	428	9.15	5.86	2.75	0.18	0.37	0.0	42	14.4
mean	348 ±114	7.75 ±1.30	3.93 ±1.14	3.06 ±0.78	0.20	0.47	0.48	41.6 ±2.6	14.0 ±1.0
	Unexposed Females, Age >40								
844	485	8.93	5.00	3.21	0.62	0.09	0.0	44	14.0
851	205	8.10	1.62	5.67	0.16	0.65	0.0	36	12.1
852	443	10.20	4.28	4.90	0.20	0.71	1.00	35	11.2
858	468	8.00	3.28	4.00	0.32	0.32	0.80	38	11.8
859	525	7.75	2.95	4.34	0.0	0.47	0.0	40	13.6
893	328	10.50	5.78	4.20	0.0	0.42	1.10	37	12.1
894	426	7.88	4.80	2.13	0.16	0.71	0.80	44	14.0
898	263	6.48	3.24	2.33	0.19	0.58	1.30	41	12.1
908	173	6.13	2.45	3.31	0.0	0.37	0.0	41	12.8
928	435	6.65	3.26	2.53	0.27	0.47	1.30	35	12.1
929	439	6.35	3.18	2.79	0.25	0.13	0.0	41	14.4
936	275	8.93	3.84	4.55	0.09	0.36	0.90	37	13.2
941	235	6.50	4.36	1.69	0.26	0.20	0.0	40	13.2
942	390	6.73	2.89	3.30	0.27	0.20	0.70	40	12.8
956	330	7.53	4.59	2.18	0.38	0.38	0.0	36	11.8
957	350	8.60	3.78	4.30	0.34	0.17	0.0	39	13.2
970	450	11.80	3.66	7.79	0.12	0.12	1.20	37	12.1
982	283	8.40	5.29	2.69	0.08	0.25	0.80	43	14.0
991	323	13.05	8.22	3.13	0.52	1.04	1.30	47	16.0
1042	370	7.25	3.77	2.54	0.36	0.44	1.40	40	13.6
mean	360 ±99	8.29 ±1.9	4.01 ±1.41	3.60 ±1.45	0.23	0.40	0.63	39.6 ±1.0	13.0 ±0.6

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	Hgb., g
	Male Children of Unexposed Parents, Age <10								
801	399	8.83	3.26	4.85	0.09	0.62	0.0	40	13.2
802	265	10.68	5.23	4.91	0.21	0.32	0.0	40	13.6
803	299	11.95	8.37	2.99	0.24	0.24	1.20	38	12.4
807	454	13.58	5.43	5.70	0.27	2.17	0.0	36	12.4
809	300	8.90	3.56	3.56	0.27	1.42	0.0	35	11.5
870	483	5.85	2.11	3.16	0.18	0.41	0.0	35	11.8
904	435	11.00	5.28	4.84	0.44	0.44	0.0	40	13.2
905	640	14.53	10.60	3.20	0.15	0.44	1.40	37	10.6
952	610	16.40	6.40	7.71	0.49	1.80	0.0	37	12.4
1002	363	14.45	7.95	4.05	0.29	2.02	0.14	35	11.8
1004	681	12.83	5.13	7.31	0.26	0.13	0.0	37	12.4
1006	553	16.90	8.28	6.93	0.68	1.01	0.0	37	11.8
1009	280	8.05	3.70	3.46	0.40	0.40	0.80	38	12.4
1010	613	11.50	3.22	7.71	0.12	0.35	1.20	37	12.1
1013	548	9.90	6.73	3.07	0.10	0.0	0.0	34	10.3
1014	225	8.60	4.64	3.10	0.09	0.69	0.90	42	11.5
1018	649	12.80	4.99	5.25	0.26	2.18	1.30	36	12.4
1024	400	8.50	4.68	3.15	0.0	0.68	0.90	34	11.5
1026	575	11.15	3.68	6.02	0.11	1.34	0.0	34	11.8
1027	423	9.15	4.30	4.39	0.09	0.37	0.0	39	11.5
1030	510	9.65	5.31	3.38	0.39	0.48	1.00	36	12.4
1037	681	8.03	2.33	4.73	0.24	0.72	0.0	37	12.4
1038	500	10.70	4.07	6.10	0.32	0.11	1.10	35	10.6
1039	493	14.10	6.91	6.49	0.28	0.42	0.0	44	12.4
1040	603	9.58	5.17	3.54	0.29	0.58	0.0	37	12.1
1046	520	10.45	3.97	5.85	0.0	0.63	0.0	34	11.2
1047	643	17.70	8.32	8.32	0.53	0.35	1.80	35	10.6
1049	400	11.15	3.12	7.36	0.56	0.11	0.0	39	12.8
1053	490	8.25	3.47	4.04	0.17	0.50	0.80	38	12.4
1054	225	13.80	4.97	8.00	0.41	0.41	0.0	39	14.4
1058	550	8.20	2.54	4.76	0.49	0.41	0.0	37	14.4
1503	480	12.25	3.80	8.33	0.12	0.0	0.0	40	13.6
1504	366	11.95	4.42	6.69	0.60	0.24	0.0	37	12.8
mean	470 ±134	11.34 ±2.80	5.03 ±1.98	5.24 ±1.77	0.28	0.66	0.38	37.3 ±2.4	12.1 ±0.9

Subject No.	Plate. ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph. ($x10^{-3}$)	Mono. ($x10^{-3}$)	Eosin. ($x10^{-3}$)	Baso. ($x10^{-2}$)	Hct., %	Hgb., g
	Female Children of Unexposed Parents, Age <10								
810	461	8.40	4.87	2.52	0.84	0.08	0.80	39	12.8
866	203	6.20	2.42	3.35	0.06	0.37	0.0	37	12.1
901	543	19.50	11.12	7.41	0.20	0.59	1.95	35	10.9
902	264	9.90	2.97	5.25	0.0	1.68	0.0	34	10.9
903	419	13.80	8.14	4.55	0.41	0.69	0.0	39	12.8
906	455	7.83	2.58	4.54	0.08	0.55	0.80	36	11.8
923	423	10.65	5.33	4.37	0.43	0.43	1.10	38	12.8
930	651	8.60	3.78	4.30	0.09	0.43	0.0	36	12.1
954	328	11.60	4.18	5.68	0.23	1.51	0.0	38	12.4
979	386	9.70	4.66	4.17	0.0	0.87	0.0	40	13.6
995	350	8.30	2.74	4.48	0.33	0.58	1.70	38	12.4
1011	283	11.45	4.24	5.84	0.34	0.92	1.10	38	12.4
1012	478	7.20	2.23	4.54	0.14	0.29	0.0	35	12.4
1019	373	11.10	3.66	6.22	0.11	1.00	1.10	34	11.2
1020	629	14.85	8.76	5.20	0.0	0.74	1.50	37	12.1
1022	665	8.20	2.87	5.17	0.09	0.09	0.0	37	12.8
1025	635	13.73	3.29	9.74	0.14	0.27	2.70	40	13.6
1026	575	11.15	3.68	6.02	0.11	1.34	0.0	34	11.8
1029	440	8.75	2.36	5.95	0.18	0.26	0.0	37	10.9
1031	525	10.90	3.60	6.32	0.22	0.55	2.20	38	12.4
1034	410	9.40	3.57	4.98	0.38	0.38	0.90	39	13.6
1044	635	11.03	3.86	6.28	0.33	0.55	0.0	29	9.7
1051	494	11.20	4.03	6.50	0.34	0.22	1.10	39	13.2
1057	636	12.60	3.78	7.94	0.38	0.50	0.0	36	10.6
mean	468	10.67	4.28	5.47	0.23	0.62	0.70	36.8	12.1
	±133	±2.80	±2.10	±1.50				±2.4	±1.0

APPENDIX 6

Individual Basophil Determinations, 1963 and 1964

Subject No.	% Baso./4000 cell count		Subject No.	% Baso./4000 cell count	
	1963	1964		1963	1964
1	0.45	0.40	63	0.30	0.50
2	0.65	0.75	64	0.40	0.48
3	1.00	1.60	65	0.45	0.23
4	0.52	0.75	66	0.30	0.52
5	0.50	0.55	67	----	0.23
6	0.38	0.30	68	0.35	0.28
7	0.40	0.30	69	0.38	0.23
8	0.55	0.62	70	0.25	0.18
9	0.42	----	71	0.25	0.38
10	0.65	0.58	72	0.58	0.32
11	0.25	0.50	73	0.72	0.38
12	0.38	0.50	74	0.28	0.25
13	0.58	0.52	75	0.18	0.35
14	0.72	0.55	76	0.25	0.28
15	0.30	0.42	77	0.32	0.20
16	0.25	0.30	78	0.20	0.23
17	0.35	0.30	79	0.35	0.28
18	0.60	0.45	80	0.25	0.28
19	0.50	0.52	81	0.42	0.20
20	0.55	0.58	82	0.38	0.30
21	0.45	0.50	83	0.15	0.23
22	0.30	----	84	----	0.38
23	0.30	0.25	85	0.13	----
24	0.48	0.38	86	0.42	----
27	0.52	0.28	87	0.48	0.45
28	0.42	0.30	88	0.48	0.25
29	0.30	0.38	89	0.30	0.38
32	0.52	0.60	90	0.40	0.38
33	0.45	0.38	91	0.28	0.30
34	0.48	0.50	92	0.20	0.25
35	----	0.30	93	0.40	0.15
36	0.25	0.23	94	0.18	0.23
37	0.45	0.30	95	0.25	----
39	0.50	0.40	96	----	0.48
40	0.55	0.50	97	----	0.52
41	0.50	0.50	98	0.45	0.35
42	0.60	1.05	100	----	0.35
43	0.62	0.45	101	0.45	0.50
45	0.52	0.70	102	0.38	0.58
47	0.40	0.45	103	0.42	0.25
48	0.55	0.48	104	0.48	0.38
49	0.50	0.45	105	0.42	0.38
50	0.35	0.30	106	0.30	0.42
51	0.45	0.38	108	0.35	0.45
53	0.38	0.50	109	0.25	0.55
54	0.25	0.50	110	0.25	0.48
55	0.50	0.45	111	0.42	0.50
56	----	----	112	0.50	0.38
57	0.25	----	113	0.55	0.50
58	0.20	0.30	115	0.25	0.48
59	0.20	0.25	116	0.35	0.28
60	0.28	0.20	117	0.35	0.40
61	0.48	0.35	118	0.42	0.40

Subject No.	% Baso./4000 cell count 1963	1964	Subject No.	% Baso./4000 cell count 1963	1964
119 -	0.52	0.45	843	0.35	0.28
120	0.28	0.20	844	0.38	0.23
121	----	----	845	----	0.38
122	0.38	0.25	846	0.30	----
123	----	0.25	849	0.40	0.23
124	0.45	----	851	0.40	0.35
125	0.28	0.40	852	0.30	0.28
126	0.23	0.25	853	0.28	0.28
127	0.40	0.28	855	0.28	----
128	0.25	0.28	856	0.23	0.23
130	----	0.40	858	----	0.25
131	----	0.32	859	0.30	0.20
132	----	0.40	862	0.25	----
133	----	0.23	863	0.20	0.28
134	----	0.25	864	----	0.18
135	----	0.25	865	0.35	0.28
801	0.28	0.30	866	0.30	0.25
802	0.30	0.30	867	----	0.20
803	0.42	0.23	868	----	0.25
805	0.30	0.38	870	0.38	0.20
806	0.35	----	871	0.23	----
807	0.50	0.35	872	0.28	----
808	0.23	----	873	0.28	----
809	0.15	0.23	874	0.18	----
810	0.38	0.28	875	0.40	----
811	0.25	0.23	878	0.30	0.40
812	0.48	0.40	880	0.28	0.25
813	0.30	0.30	881	0.38	0.20
814	0.25	0.20	882	0.42	0.35
815	0.23	0.20	883	0.38	----
816	0.23	0.28	884	0.28	0.42
818	0.28	0.40	885	0.30	0.38
819	0.40	0.38	886	0.25	----
820	0.52	0.40	891	0.23	0.25
821	0.32	0.28	892	----	0.30
822	0.23	0.28	893	0.35	0.30
823	0.30	0.23	894	0.55	0.23
825	0.18	----	895	0.32	0.30
826	0.25	0.32	896	0.50	0.38
827	----	0.15	897	----	0.30
828	----	0.42	898	0.25	0.28
829	0.28	0.35	899	----	0.35
830	0.38	0.38	900	0.30	----
831	0.20	0.38	901	0.35	0.28
832	0.15	0.25	902	0.35	0.18
833	0.23	0.18	903	0.25	0.32
834	0.32	----	904	0.38	0.23
835	----	0.25	905	0.20	0.25
836	0.30	0.30	906	0.25	0.35
838	0.35	----	908	0.35	0.35
840	0.38	0.35	909	0.42	0.28
841	0.28	0.40	911	0.38	0.52
842	0.50	0.30	912	0.45	0.28

Subject No.	% Baso./4000 cell count		Subject No.	% Baso./4000 cell count	
	1963	1964		1963	1964
913	0.25	0.38	977	----	0.20
914	0.45	----	978	----	0.28
915	0.38	0.30	979	----	0.20
916	0.35	0.30	980	----	0.38
917	0.28	----	981	0.35	0.30
918	0.42	0.45	982	----	0.30
919	0.52	0.40	991	----	0.35
921	0.38	0.30	993	0.40	0.35
922	0.25	0.35	995	0.28	0.25
923	0.28	0.35	996	0.30	0.23
925	0.40	0.25	998	0.42	0.30
926	0.25	0.28	1001	0.30	0.38
927	0.32	----	1002	0.38	0.35
928	0.23	0.38	1004	0.48	0.30
929	0.35	0.30	1006	0.25	0.30
930	0.25	0.23	1007	0.32	0.23
931	0.30	0.32	1008	----	0.50
932	0.18	0.38	1009	0.30	0.28
934	0.42	0.30	1010	0.38	0.28
935	0.30	----	1011	----	0.35
936	0.30	0.30	1012	0.38	0.23
937	----	0.35	1013	----	0.28
938	0.32	0.25	1014	0.28	0.30
939	----	0.23	1015	0.40	----
941	0.40	0.23	1017	0.38	----
942	0.38	0.30	1018	----	0.30
944	0.32	0.25	1019	----	0.40
945	----	0.25	1020	0.20	0.25
946	0.30	0.28	1021	0.28	----
947	0.38	0.32	1022	0.40	0.32
948	0.38	0.28	1024	0.45	0.25
950	0.28	0.40	1025	0.28	0.30
951	0.40	0.30	1026	0.35	0.30
952	0.25	0.40	1027	0.42	0.30
954	----	0.28	1028	0.25	0.18
955	0.35	0.28	1029	0.38	0.28
956	0.30	0.35	1030	0.35	0.25
957	0.25	0.25	1031	0.35	0.30
958	0.52	----	1033	0.40	0.32
959	0.40	0.32	1034	0.30	0.28
960	0.30	0.25	1035	0.35	0.38
961	0.45	0.38	1036	0.30	0.38
962	0.35	0.28	1037	0.38	0.28
964	0.50	0.42	1038	0.23	0.23
965	0.23	0.50	1039	----	0.30
966	----	0.30	1040	0.28	0.35
967	0.30	----	1041	0.25	0.25
969	0.32	0.30	1042	0.40	0.25
970	0.30	0.38	1043	0.23	0.28
971	0.25	0.25	1044	0.23	0.30
972	0.30	----	1045	0.28	----
973	----	0.25	1046	0.32	0.30
975	----	0.32	1047	0.38	0.30

Subject No.	% Baso./4000 cell count		Subject No.	% Baso./4000 cell count	
	1963	1964		1963	1964
1049	----	0.38	2164	0.20	----
1050	----	0.25	2166	0.23	----
1051	----	0.25	2167	0.25	----
1052	----	0.28	2168	0.32	----
1053	----	0.23	2169	0.38	----
1054	----	0.30	2172	0.30	----
1057	----	0.20	2174	0.30	----
1500	0.30	0.30	2175	0.25	----
1501	0.23	0.28	2176	0.32	----
1502	0.28	0.28	2179	0.28	----
1503	0.10	0.20	2181	0.40	----
1504	0.28	0.20	2182	0.35	----
2101	0.25	----	2186	0.45	----
2102	0.32	----	2188	0.40	----
2104	0.23	----	2189	0.30	----
2105	0.38	----	2191	0.40	---
2106	0.35	----	2193	0.42	---
2108	0.70	----	2195	0.25	----
2110	0.30	----	2196	0.30	----
2111	0.40	----	2197	0.25	----
2112	0.30	----	2200	0.35	----
2113	0.38	----	2206	0.25	----
2114	0.25	----	2210	0.60	----
2115	0.50	----	2211	0.40	----
2119	0.48	----	2212	0.30	----
2121	0.23	----	2213	0.20	----
2124	0.30	----	2214	0.30	----
2125	0.25	----	2215	0.32	----
2126	0.30	----	2216	0.38	----
2128	0.38	----	2217	0.25	---
2129	0.38	----	2218	0.35	----
2130	0.35	----	2221	0.38	----
2135	0.40	----	2224	0.45	----
2136	0.25	----	2225	0.25	----
2137	0.35	----	2226	0.25	----
2138	0.30	----	2227	0.32	----
2140	0.30	----	2228	0.23	----
2142	0.38	----	2229	0.28	----
2145	0.40	----	2235	0.30	----
2146	0.30	----	2238	0.23	----
2148	0.45	----	2240	0.30	----
2149	0.45	----	2242	0.38	----
2150	0.35	----	2244	0.38	----
2151	0.25	-----	2246	0.23	----
2152	0.25	----	2247	0.20	----
2155	0.35	----	2248	0.48	----
2156	0.32	----	2249	0.30	----
2157	0.28	----	2251	0.38	----
2158	0.35	----	2253	0.30	----
2160	0.30	----	2255	0.25	----
2162	0.30	----	2256	0.30	----

APPENDIX 7

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
1 64 F	Obesity. URI. Menopause age 40. Grav. 12, para. 12.	Fixation left elbow.	157	190/100 Hypertension.	Macular degeneration and lenticular opacties.	Mild cystocele.	
4 48 M	URI, cough. Mild polio '63.	Trau. amp. distal phalanx left index finger.	143	128/80	Pterygium and lenticular opacities bilat. Arcus 4+.		2 cm. cyst on back over D5; removed surgically.
7 46 M			128	110/74	Bilat. pterygium. Arcus 1+. Bilat. small neck nodes.	Slightly enlarged prostate.	
9 32 M	Hx. of trichomonas.		156	116/70	Strabismus.		
10 34 M			139	110/60	Pterygium left eye.		
11 60 M	Slight pain and stiffness in joints.		112	115/90 Hypertensive 170/100 '63	Argylle-Roberson pupil bilat. Pterygium left eye. 3+ retinal arteriosclercsis.		Burn scars rt. shoulder and chest, healing. Ulcer rt. ankle (treated). Residual "beta burn."
12 28 F	Menarche age 13. Para. 5, grav.4. LMP June 1962.		127 '63	110/70 '62	Choroiditis rt. eye.	Pregnant, no pelvic 1963.	Nevi on back '63.
13 68 F	Menopause age 48(?). Para. 0, grav. 0. Poor vision.	Struck in left eye 7-8 years ago, ulceration.	76	118/60	R.E.: 20/70, old chorioretinitis, arcus, lenticular opacity. L.E.: 20/200, staphyloma 5x6mm, endophthalmitis.		
14 35 F	LMP 3/63. Para. 9, grav. 9. Lactating 12/63 to present.		127	90/60	Pinguecula(?) left eye.		"Beta burn" scars rt. elbow, left axilla, and left neck.
16 49 M			124	108/68	Arcus 2+. Rt. pterygium.	Prostate 1+.	
18 31 F	Menarche age 12. LMP 1/63. Para. 13, grav. 12. Lactating 10/63 to present.		108	100/68	Pinguecula rt, pterygium left. Throat inflamed.	Rectocele, cystocele. Healed cervical lacerations.	
22 27 F	Cough.		101 '62 98 '63	95/60 '62 84/50 '63			
24 23 F	Menarche age 12. Para. 2, grav.2. Itching of skin.		90 100 '63	104/68	Small nodes right neck.		Mottled depig. front of neck. Biopsy scar rt. ACF.
27 36 M	Chest pain.		141 134 '63	106/60 Pulse 52/min. Bradycardia			
28 78 F	Menopause: age 50. Para. 10, grav. 10. URI.		34 111 '61	138/68 pulse 82, regular 160/90 '63 180/90 '62	Arcus 4+. Pterygium bilat. Senile cataracts, bilat.	Liver palpable one finger breadth.	

Individual Adult Physical Findings

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	8,300	41	313	PBI 9.4 '63. Chest X-Ray: Cardiac enlarg., aortic arteriosclerosis'63. Pap.: Negative for malignant cells; marked inflammation with inflammatory atypia.	Hypertension. Obesity.
	10,200	43	133	Chest X-Ray neg. '63.	Bone marrow taken for general study.
Deformed upper lobe left ear. Tumor left buttock '63.	8,100	41	445		Prostatic hypertrophy. Neck adenopathy.
	7,200	47	125		1963 examination. No 1964 examination.
Lipoma left shoulder '63.	11,300	46	388	PBI 12.0 '63.	
Romberg +.	6,300	38	390	Cardiolysin slide flocculation test: reactive, titer 2. Reiter protein complement fixation test: reactive.	Arrested hues. Arteriosclerosis. Rec. Kahn test.
	6,500	41	395	PBI 8.8 '63	1963 examination. Hematology only 1964.
Atrophic vagina, 75° kyphosis, right scoliosis. Tumor left labia 1963.	5,500	30	628	Pap.: Negative for malignant cells; inflammation; some squamous atypia noted; ? trichomonas vaginalis infestation; high estrogenic level for age and menstrual history.	Kyphoscoliosis. Evaluate for possible ca. of bowel at Majuro.
Prominent ulnar styloid bilat.	7,200	36	355	PBI 8.3 '63. Pap.: Negative for malignant cells; inflammation; endocervical cell atypia.	
Minimal arteriosclerosis, weak right dorsalis pedis pulse. Hypoactive reflexes.	6,300	46	386		Arteriosclerosis. Prostatic hypertrophy.
Hypoactive reflexes.	6,900	40	257	Pap.: Negative for malignant cells; marked inflammation with inflammatory atypia.	
	7.1	39	208	Chest X-Ray negative '62.	1963 examination. No 1964 examination. Pregnant 2-3 months '63.
	6,000	42	505	Pap.: Negative for malignant cells; severe inflammation; marked squamous atypia; well-preserved spermatozoa noted.	Neck adenopathy.
	7,000	41	256		
Severe arteriosclerosis. Mild kyphosis and right scoliosis. Prominent rt. ulnar styloid.	8,000	36	663	Pap.: Negative for malignant cells; trichomonas vaginalis infestation with inflammation; mild endocervical cell atypia.	Aged and feeble, arteriosclerosis, kyphoscoliosis. Hepatomegaly. Rec. cataract removal.

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN GU or Gyn	SKIN
29 75 M	Blind in left eye. Right eye fair.		110	110/64 Pulse 80, reg.	Rt. cataract hyper-mature. Left aphakia.	Prostate 2+, firm left lobe.	Numerous nevi on shoulders.
34 55 F	Menopause-hysterectomy '49. Para. 14, grav. 10. Pain in legs.		126	106/70	Arcus 4+. Left pterygium. Rt. pingueculae. 1+ retinal sclerosis.	Mid-line surg. scar. Erosion of cervix.	Pigmented moles back and neck.
35 23 M			125 '62	110/60 '62			
36 18 M			134	115/60	Throat slight inflammation.		Tinea circinata back, abd., legs and arms.
37 30 M			146	120/70	Arcus 1+. Bilat. pingueculae.		
39 25 F			109 '62	90/60 '62	Corneal scar left eye '63.		Sl. roughening and pig. back of neck. Pig. var. and sl. hyperpig. dorsum right foot.
40 39 M	Fistula in ano (corrected surgically '64). Low back pain.	Traumatic deformity right index finger.	125 115 '63	110/70	Arcus 2+. Pingueculae and exophoria.	Fistula in ano with perirectal abscess '53. Leukoplakia '63.	Dermatitis right hand.
41 54 M	Lump right arm.		116	110/70	Arcus 3+. 2+ retinal arteriosclerosis. Circumpapillary ring of choroid degeneration.		
43 76 F	Menopause: time unknown. Para. 4, grav. 4.		68	130/72 Grade I sys. m.	Bilat. pterygium. Bilat. cataracts. Throat slight inflammation.		
45 42 F	Menarche age 13. LMP 3/7/64. Para. 11, grav. 9. Low back pain.		117	120/70	Arcus 2+. Left pingueculae. Right pterygium.		
47 18 M			135	110/70	Throat slight inflammation.		
49 25 F	Menarche age 13. LMP 2/5/64. Para. 6, grav. 3. Pain in joints, obese, URI.		166 137 '63	96/64	Throat inflamed.	Rt. paramedian scar. Severe lat. cervical tears, 1x3 cm. cervical erosion.	Pig. macs. both sides of neck, ACF.
50 44 M			185	120/70	Arcus 3+. Scar nose septum.		Scars on upper rt. arm (not "beta burns").
51 35 F	Menarche age 17. Para. 2, grav. 0. LMP 3/7/64.		99	90/60		Healed cervical tear. Bartholin cyst left labia.	Mole on abdomen.
55 85 M	Backpain. Blindness, partial.		134 '61	100/65 Pulse 86, reg.	4+ arcus. Blind, partial. Throat inflamed. Node left neck. Cataract OD) '63 Aphakia OD)	Prostate 1+.	

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
Slight gynecomastia. Mild kyphosis	7,700	40	235		Prostate suspicious for ca. Consider removal rt. cataract.
	9,800	38	253	Pap.: Negative for malignant cells; inflammation with marked squamous atypia, possibly on an inflammatory basis.	Cervical erosion.
	6,200	49	162	Chest X-Ray negative 1962.	
	10,600	44	218	Chest X-Ray negative 1963.	
	5,800	45	285		
	7,600	37	407	Chest X-Ray negative 1962.	1963 examination. Partial 1964 examination.
	7,500	40	425	Chest X-Ray negative 1963.	Surgical correction fistula in ano.
Minimal arteriosclerosis. 3 cm. mass over right biceps. Both 5th fingers short. Congenital dislocated hip 1963?	6,000	42	225		Appears older than 54 years. Arteriosclerosis.
Severe arteriosclerosis. Mod. kyphoscoliosis.	5,300	39	353	Pap.: Negative for malignant cells; post menopausal atrophic type smear.	Senile, arteriosclerosis, kyphoscoliosis. Recent removal right cataract.
	7,800	38	520	PBI 9.1 '64. Chest X-Ray: rt. tenting diaphragm, old pleurisy? '63. Pap.: Negative for malignant cells; inflammation; high estrogenic level; degenerating glandular cells noted.	
	8,500	45	305		
	8,300	39	385	Chest X-Ray: Soft tissue dens. lat. 1/3 rt. clavicle (lipoma?); elev. pul. seg. '63. Pap.: Neg. for malignant cells; fresh blood; severe inflammation with mild inflammatory atypia.	Large cervical erosion. Obese, gaining weight.
Bilat. hallux valgus.	6,400	44	448		
	9,400	44	415	Pap.: Negative for malignant cells; marked inflammation with histiocytic reaction; single atypical squamous cell noted.	
	6,000	46	351		Senile, examined at home.

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
57 110 F	Hearing poor,			134/70 '62 Arteriosclerosis 96/60 '63	Vis. L.P. '63 Cataracts O S'63		
58 69 F	Menopause age 54. para.12, grav.10		110 103 '63	120/66	4+arcus,strabismus,left cataract Rt.lenticular opacities.Throat inflammed.	Atrophic vagina, bled during exam.	Moles front and side of neck.
59 44 F	Menopause age 41. Para.2,grav. 1. URI and cough.		82	110/70	Bilat. choroidal degeneration.	Blood at cervical os.	Biopsy scar back. Nevi both breasts.
60 66 F	Menopause age 45. Para.0, grav. 0. Obese.		138 147 '63	190/90,170/75'63 Hypertension. Harsh systolic M.		Atrophic vagina.	Mole on forehead.
61 18 F	Menarche age 12. L M P 2/15/64. Para.2,grav.2. Obese		168 154 '63	120/78	Slight inflam. throat.	Cervical erosion '63. Palp. liver '63.	Scar right breast.
63 46 F	Menopause age 44. Para.13,grav.10. Dyspnea, pain in joints.		115	100/60			Biopsy scar left neck. Irreg. pig. back neck.
64 40 F	Menarche age 12. L M P May 1963. Para.10,grav.9. Lactating since May 1963.		157	110/70	2 pterygium right eye.	Uterus enlarged 5.0 cm dia.	Mole back of neck; sl. pig. var. front of neck.
66 40 F	Menarche age 13. L M P 3/5/64. Para.0,grav.0. URI.		139	110/70	Arcus 2+. Left pterygium.	Liver edge palp. 1 F B. Scar right labia.	
67 24 F	Menarche age 13. L M P 3/10/64. Para.0,grav.0.		127	Pulse 96 Split 1st sound.		No pelvic exam.	"Beta burn" scars dorsum left ft.
68 55 M	Pain in legs and feet. Poor vision		132	130/80 Split 2nd sound.	Rt.Light only. Left 20/600. Rt. Aphakia, left senile cataract.	Prostate 2+	
70 27 F	Menarche age 14. L M P Feb. 1964. Para.2,grav.2.		115	104/56		Multiparous cervix.	
71 38 F	Menarche age 16. L M P 2/25/64. Para.1,grav.1. URI.		124	124/84	Bilat pinguecular. Throat inflammed.		Few pig. spots left ACF.
73 28 M			157 160 '63	140/90 Hypertensive 110/68 '63		Few groin nodes.	
74 26 F	Menarche age 12. L M P Dec. 1961 Para.6,grav.6. Lactating.		180 161 '63 Obese	100/60		Lat. cervical tears. Ant. and post. erosions.	
75 22 F			122 115 '63	90/60		8 mos.pregnant, fetal heart sounds.	Biopsy scar left neck. Pig. area dorsum rt. 1st toe.

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
Kyphoscoliosis, osteo-arthritis, subcutaneous mass both hips, short left thumb, wasting lower extremities 1963.	5,400	34	286	Chest X ray neg. '61, '63	Died of old age 1963. No other information available concerning death.
Minimal arteriosclerosis.	6,700	40	295	Chest X-ray: Cong. scalloping diaphragm, elongated aorta '63. Pap:Clusters of somewhat suspicious glandular cells, both endometrial and endocervical in a background of fibrinated blood.	Atrophic vagina, bled on exam. Rec. cataract removal.
Minimal arteriosclerosis	11,000	37	355	Pap: Negative for Malignant Cells. Scanty smears showing fairly low estrogenic level (consonant with history of LMP - 2 years ago).	Postmenopausal bleeding. Rec. recheck of bleeding at intervals.
Mod. arteriosclerosis, slight kyphosis	9,800	35	250	Pap: Plaques of squamous epithelium showing marked atypia. High estrogenic level for age.	Arteriosclerotic heart disease. Hypertension.
Vaccination rt. arm. Temp. 100.2°	9,000	43	445	Pap: Negative for Malignant Cells. High estrogenic level. Smears Have a relatively clean background.	Vaccination, febrile.
	6,200	41	250	Pap: Negative for Malignant Cells. Inflammation with mild inflammatory atypia.	Bone marrow taken for gen. study.
	7,100	38	295	Pap: Negative for Malignant Cells. Marked inflammation with inflammatory atypia. Fresh blood.	Possible pregnancy.
	8,000	40	448	Chest X-ray: Elevated pul.seg.; congen. heart(?); rt.apical & lt. subclavicular densities of infl. nature (TBC?) '63. Pap: Negative for Malignant Cells.	
	8,200	42	295		
Moderate arteriosclerosis	5,900	47	210		Unsuccessful surgery rt. eye 1963. Arteriosclerosis. Bone marrow taken for gen. study.
	5,200	26	320	P.B.I. 8.7 '63. Pap: Negative for Malignant Cells. Trichomonas Vaginalis infestation with inflammation. Much amorphous debris.	Anemia Rec. Iron and Vitamin C.
	9,000	40	425	Chest X-ray neg. '63. Pap: Negative for Malignant Cells. Inflammation. Marked keratinization of squamous cells with atypia. ? Trichomonas Vaginalis infestation.	
	8,300	49	315		Developed hypertension. Bone marrow taken for gen. study.
	9,600	45	263	Pap: Negative for Malignant Cells. Moderate estrogenic level. Smears have a clean background.	2 pair of twins. Obese.
	14,400	39	423		

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
76 21 M			145 141 '63	145/90 cardiomegaly Gr. IV dias. M. 120/70 '63			
77 36 M	U R I. Hansen's disease			110/70	Pterygium left eye '63.		Scars of Hansen's disease.
78 47 F	Menarche age 13. LMP 3/7/64. Para.5,grav.4. Pain in joints.		146	110/70	Arcus 2+, rt pterygium	Menses, no pelvic exam.	Papillomas of neck and trunk.
79 49 M			133	130/80	Arcus 2+. Bilat. pinguesculae.		Bilat inguinal scar. Rt. abd. and rt. arm scar Pig. scar back 1 ear from "Beta burn".
80 56 M		1st left toe deformed 1963.	126 135 '62 129 '63	120/80 Extrasystoles	Arcus 2+. Rt. pinguesculae, left pterygium, rt. cataract, left opacity.	Prostate 1+.	1/2" diam. raised lesions on front of chest, l. arm and leg. (Fungus?).
81 18 F	Menarche age 15. LMP Mar. 1964 Para.1,grav.1.		99	Mitral systolic M 106/70		Rt. adnexa thickened.	Mole left breast. Vaccination scar rt. arm.
82 60 M	Old facial paralysis '63.		132 128 '63	112/68	Arcus 4+. Bilat Pterygium, choroidal atrophy, lenticular opacities.	Prostate enlarged '63.	
823 20 M	U R I		139 134 '63	115/60	Rt. pterygium. Exophoria.		
825 21 M			111 '62 113 '63	82/50 '62 104/60 '63		Liver edge down 1 cm. '63. cervical errosion? '63.	
826 27 F	Menarche age 7. L M P 2/25/64. Para.6,grav.5.		88	90/[illegible]	Bleeding gums.	Lat. cervical tears.	Patchy depigmentation.
827 24 M			127	114/78	Corneal scars. Throat inflammed.		Impetigo scar over pubis.
828 24 M			118	115/70	Pyorrhea. Throat inflammed.		
829 25 F	Menarche age 12. LMP Sept. '63. Para.7,grav.6. Lactating.		111 141 '63	100/68	Throat inflammed.	Severe cervical lacerations.	
830 25 M			151	106/60			
831 24 M	Abd. Pain		132	110/60	Rt. tonsil inflammed.		

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	10,900	44	209		Rheumatic heart disease, compensated Rec. Mitral valvulotomy.
Absent fingers and toes from leprosy. Hypoactive right knee. Healed ulcers on soles of both feet.	5,300	29	330		Examined at home.
Short 5th fingers observed '63.	10,400	40	404	Chest X-ray: Cardiac enlarg; aortic arteriosclerosis '63.	
Mod. arteriosclerosis. Pipestem brachial art.	6,700	44	266	Chest X-ray: Elevated pul. seg.; emphysema (?) '63.	Arteriosclerosis.
	11,500	42	319		Rec. rt. cataract removal following cardiac evaluation. Poss. heart block.
	8,900	38	348	Pap: Negative for Malignant Cells. Moderately high estrogenic level. Mild squamous and endocervical cell atypia.	Cardiac murmur.
Minimal arteriosclerosis	8,000	43	538		Arteriosclerosis.
Inguinal and cervical nodes.	15,600	42	346		
	8,000	40	355	Chest X-ray neg. '62. Urine prot. 100 mg. '62.	'63 examination. No '64 examination.
15° contracture both ring and little fingers. Displacement of patellas.	8,300	35	315	Pap: Negative for Malignant Cells. Marked inflammation. Relatively high estrogenic level.	Contraction and deformity of fingers and knees. Rec. X-ray eval.
Few Inguinal nodes.	8,800	46	339		
Few nodes right neck.	13,300	46	428		
	10,900	38	315	PBI 7.1 '63. Serum Iron 120 '63. Pap: Negative for Malignant Cells. Inflammation. Mild endocervical cell atypia.	
	5,700	45	360		
	9,000	54	353	Chest X-ray neg. '63.	

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
832 26 F	Menarche age 13. LMP Jan. '63. Para.6,grav.6. Lactating.		101	96/70		5 cm mass L.L.Q. (probably ovarian cyst in left adnexa).	
833 31 M	U R I		135	104/70	Chalazion left lower lid.		
834 30 M			118	115/60 '63	Pterygium rt. eye.		
835 30 F	Menarche age 12. LMP Dec. '63. Para.7,grav.7. Lactating since May 1962		96	106/70		Uterus 4 fingers above pubis.	
836 31 M	Weight loss.		126 122 '63	125/70	Corneal scar rt. eye. Node left neck.		
838 31 M			144 '63	100/68 '63			
840 34 M			156	100/60	Bilat.pterygium.		
841 31 F	Menarche age 14. LMP June '63. Para.7,grav.7. Lactating since March 4, 1964.		136	112/70		Uterus 4 cm above pubis, involutional. Rt. lat.cervical tear.	
842 40 M		Amp. rt. little and left index fingers.	154	112/70	Pingueculae bilat. Throat inflammed		Mole left cheek.
843 35 F	Menarche age 13. LMP Sept. '63. Para.6,grav.6. 6 mos.pregnant.		128-1/2	96/60	Left pingueculae	1 cm. ant. cervical erosion. Uterus at umbilicus.	Scar back of neck, left elbow.
844 45 F	Menarche age 13. LMP Feb.15,'64. Para.12,grav.11. U R I		100 109 '62 103 '63	110/70	Rt. pterygium, left pingueculae	Liver edge palp. I F B	1 cm. mole left breast.
845 34 M			154 140 '61	110/70	1+ arcus. Rt. pingueculae, left pterygium.		
849 45 M	Skin itch. Obese.		218 207 '62 213 '63	125/70	1+ Arcus, Bilat. pterygium, retinal arteriosclerosis		Scars on legs.
851 55 F	Menopause Jan.'63. Para.10,grav.10. U R I		167 166 '63	130/80	4+ Arcus. Bilat.pterygium.		Scar right arm.
852 60 F	Menopause-20 yrs ago. Para.0, grav.0. U R I		94	124/70	4+ Arcus. Bilat. pterygium.	Anal tag.	Mole on nose, left lip, chest. Skin tags in inguinal area.

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
Short 5th finger both hands.	7,300	39	358	Pap: Negative for Malignant Cells. Very high estrogenic. Keratinization of squamous cells.	Rec. Removal ovarian cyst.
Prominent left ulnar styloid. Healed acne on back.	6,500	47	428		
				Chest X-ray neg. '63.	'63 examination. No '64 examination.
Left breast 1 x larger.	10,300	37	340	Pap: Negative for Malignant Cells Trichomonas Vaginalis infestation with severe inflammation and histiocytic reaction.	3 mos. pregnant.
	7,500	46	453		
	9,800	51	224	Chest X-ray neg. '62.	'63 examination. No '64 examination.
	7,700	47	308		
	10,400	29	430	Chest X-ray neg. '63. Pap: Negative for Malignant Cells. Marked inflammation with inflammatory atypia. ? Fibrinated blood.	6 days post partum. Rec. Iron and Vit. C.
	9,700	50	528		
	6,900	31	400	Pap: Negative for Malignant Cells. Inflammation with inflammatory atypia. Vaginal smear 2MS.	6 mos. pregnant.
Left neck nodes.	8,900	44	485	Pap: Negative for Malignant Cells. Severe inflammation with mild endocervical cell atypia. Vaginal smear is scanty.	Losing weight. Hepatomegaly. Rec. hysterectomy; enlarged uterus.
	9,100	44	345		
	7,700	44	203		Obese.
	8,100	36	205	Pap: Negative for Malignant Cells. Trichomonas Vaginalis infestation with marked inflammation. Squamous and endocervical cell atypia noted.	Obese.
Minimal arteriosclerosis	10,200	35	443	Pap: Negative for Malignant Cells. Trichomonas Vaginalis infestation with inflammation. Red blood cells present.	

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
853 59 M	U R I		155 145 '63	158/90 Hypertensive. 120/70 '63.	4+Arcus. Bilat. pterygium, chor-oidal degeneration, retinal arterio-sclerosis 2+. Throat inflammed.	Prostate 1+.	Tinea versi-color.
856 65 M	U R I. Blind, Rt. back pain.		119 120 '63	164/80 128/64 '63.	Rt. cataract. Left lenticular opacities and scar.		
858 69 F	Menopause 20 yrs ago. Para. 3, grav. 3. Back pain.		92	120/74	3+ Arcus. Bilat. pterygium, lenti-cular opacities. Throat inflammed. 5x5 cm. thyroid mass, midline.		
859 71 F	Menopause 20+ yrs ago. Para. 9, grav. 6.		136 137 '63	146/96 Hypertensive. 120/80 '53.	4+ Arcus. Bilat. pterygium, lenti-cular opacities.		Nevi on neck and rt. chest.
860 74 M			114 121 '61	108/68	Blind in left eye. Rt. eye 8/200. Left phthisis bulbi.		
864 38 M	U R I. Lump on head.		155	118/80	Bilat. pterygium		Cyst left scalp, verruca of nose, 3 nevi right face.
865 31 F	Menarche age 13. LMP May '63. Para. 10, grav. 9. U R I.		97	100/68	Bilat. pinguecular.	External hemorr-hoids. Uterus involutional.	
867 36 F	Menarche age 18. LMP 3/18/64. Para. 9, grav. 9. Tubal ligation '52.		116 102 '62	110/74	Throat inflammed.	Rt. Paramedian scar. No pelvic menses.	Nevi neck, chest and abd.
868 41 M	Poor vision		199 182 '61	110/70	1+ Arcus.		
875 47 M							
877 26 M							
878 64 M	U R I. Back pain.		193	148/94 Pulse 64. Hyper-tensive. 140/90 '53.	3+ Arcus. Bilat. pterygium. Ethmoiditis. Vitreous opacities.		
880 43 M			191 188 '63	120/70	Rt. pterygium.		Papilloma chest and back. Scar abdomen.
881 32 M	U R I.		169	116/74			
882 31 M			122	90/50	Throat inflammed.		Appendectomy scar.

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
Minimal arteriosclerosis. 2 x 3 cm. ulcer right tibia.	8,300	39	343	B. Sugar 247 '63 F.B. sugar 187 '64 Chest X-ray neg. '63	Diabetes. Hypertension. Arteriosclerosis. Leg ulcer. Tinea versicolor. Prostatic hypertrophy.
	8,700	39	675		Rec. cataract removal, rt.
Mod. kyphosis	8,000	38	468	Pap: In cervical smear there are two clusters of cells suspicious for carcinoma of cervix or endocervix.	Non-toxic nodular goiter 20 + years.
Mod. arteriosclerosis, small rt. 3rd toe.	7,700	40	525	Pap: Negative for Malignant Cells. Inflammation. High estrogenic level for age.	Hypertension. Rec. glasses.
Moderate arteriosclerosis. Weak d.p. pulse left foot. Marked kyphosis, hallux valgus.					Arteriosclerosis. Kyphosis, hallux valgus. No hematology '63 or '64.
Small inguinal nodes.	10,000	47	322		
	7,300	33	575	PBI 8.2 '63. Serum Iron 117 '63. Pap: Negative for Malignant Cells. Very marked inflammation with histiocytic reaction and marked squamous atypia.	1 mo. post partum.
	8,200	39	484		
	8,500	45	278		Obese.
					Not examined since '62.
					Not examined since '61.
	7,900	40	303		Hypertension. Nasal irritation.
	7,800	46	324		Obese.
	7,900	45	333	Chest X-ray neg. '63.	
Nodes in neck and inguinal area.	6,500	44	175		

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
883 52 M	Facial asymetry.		138	120/80	Corneal opacity, left.		
884 59 M	Poor vision.		152	120/80 136/70 '63	4+Arcus. Bilat. pterygium, rt. chalazion, lenticular opacities.	Prostate 1+. Anal tags.	Scar right groin. Tinea versicolor. Nevi on face.
885 24 M	Leg and chest pain.		139	110/60 Systolic M	Throat inflammed.		Tinea versicolor.
888 35 F							
889 39 F							
893 44 F	Menarche age 15. LMP 2/10/64. Para.13,grav.11. 8 mos. since last menses.		103	85/60 90/60 '63.	Arcus 1+. Pterygium, Lenticular opacities.		
894 67 F	Menopause age 45. Para.0,grav.0.		98	110/70, split first sound, p.80. Irregular fine rales both lungs.	4+ Arcus. Left Lenticular opacities, rt. cataract. Throat inflammed.	Questionable hepatomegaly. Anal tag.	Nevi and cyst on face.
895 34 F	Menarche age 17. Pelvic surg. '63 U R I.		120	96/60	Bilat.pingueculae	Cervix O.K., adnexa thick, uterus anteflexed.	
896 24 F	Menarche age 13. LMP 2/25/64. Para.3,grav.3.		100	100/60			Scar on neck.
897 66 M			171 154 '62	155/80 120/60 '62	Arcus 4+. Bilat. pterygium, left cataract.		Nevi on back. Tinea versicol on face.
898 66 F	Menopause age 45. Para.4,grav.4. Vag. bleeding after exam.		170 172 '63	112/78	4+ Arcus. Bilat. pterygium, Lent. opacities.	Atrophic cervix.	Scars over tib
899 70 M	Poor vision		125	160/80, Grade 1 sys.M.	3+Arcus. Bilat. pingueculae, lent. opacities, retinal arteriosclerosis 2+.	Liver edge palp. Prostate 1+.	
908 74 F	Menopause age 54. Para.15,grav.14. Dyspnea, fainting.		117 102 '63	170/96 Hypertensive. 180/90 '62 150/80 '63	4+ Arcus. Bilat. pterygium and lent. opacities.	Anal tags.	
910 61 M			120	110/64	2+ Arcus. Melanoma left iris.		
914 29 F			89	90/60			
915 67 M	U R I. Pain elbows.		119	100/60	3+ Arcus. Bilat. lent opacities.	Prostate 1+.	

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	5,800	43	238	Chest X-ray: ? Heart enlarg. '63.	'63 examination. No '64 examination.
Minimal arteriosclerosis	10,800	41	321		Fundi not examined. Arteriosclerosis. Prostate hypertrophy.
Bilat. inguinal nodes.	11,000	45	203		Cardiac murmur.
					Not examined since '62.
					Not examined since '62.
Painful right shoulder-osteoarthritis.	10,500	37	328	B. Sugar 379 '63. Pap: negative for Malignant Cells. Trichomonas Vaginalis infestation with inflammation and histiocytic reaction. Fresh blood. Mild squamous atypia.	RX diabetes.
Mod. arteriosclerosis. Mod. kyphoscoliosis.	7,900	44	426	Pap: Negative for Malignant Cells. Atrophic post menopausal type smear.	ASHD, poss. decompensation Rec. EKG and workup.
	10,600	45	613	Pap: Negative for Malignant Cells. Mild inflammation. Glandular cell atypia.	Surg. '63, Tubal ligation?
Rt. leg 4 cm. shorter than left leg. Arthritis rt. knee.	11,000	39	390	Pap: Negative for Malignant Cells. Severe inflammation with histiocytic reaction. Probable Trichomonas Vaginalis infestation.	Rt. slipped femoral epiphyis.
	8,300	43	340		Rec. cataract removal.
	6,500	41	263	Pap: Negative for Malignant Cells. Fresh blood. Mild inflammation. Smears are somewhat dry.	Obese.
Mod. arteriosclerosis. + Romberg. Weak rt. biceps. Pupils react to light. Dupuytren's contracture.	5,400	40	288		A S H D. Paralysis right arm. + Romberg - hues?
Min. arteriosclerosis. Kyphoscoliosis.	6,100	41	173	Chest X-ray neg. '63. Pap: Inflammation with histiocytic reaction. Atypical glandular cells noted. Few giant histiocytes also seen.	Hypertension. Rec. glasses.
Few neck and groin nodes. Min. arteriosclerosis. i.p. pulse weak on right.					Arteriosclerosis. No hematological exam '63 or '64.
	7,900	37	268		'63 examination. No '64 examination.
	8,400	37	538		Prostatic hypertropny.

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
916 40 F	Menarche age 14. LMP Oct. '63. 5 mos. pregnant. Para.14,grav.8.		143	90/60		Uterus to umbilicus. Fetal heart sounds.	
917 45 M	Abd. pain. Myocardial damage (EKG '59)		184 175 '63	120/78 pulse 72, reg.	Bilat.pinguecula.	Appendectomy scar.	
918 66 M	Diabetes. Obese.		188 182 '63	120/70 Grade 1 systolic M.	4+ Arcus. Bilat. pterygium, lent. opacities. Leukoplakia of mouth.	Left varicocele.	
920 32 M							
922 40 F	Menarche age 14. LMP 2/5/64. Para.11,grav.11.		107	110/80		Uterus 4FB above pubis, irregular, firm.	Nevi left face.
928 51 F	Menopause age 47. Para.1,grav.1. Pain abd. and joints.		124	110/70	3+ Arcus. Bilat. pterygium, scars of chorioretinitis.		Scars left breast.
929 66 F	Menopause age 46. Para.0,grav.0. Poor vision		129	110/74 '63	Rt. pterygium and lent. opacities. Left cataract.	Atrophic cervix.	
932 29 F	Menarche age 14. LMP Jan. '64. Para.3,grav.3. U R I		104	90/54		1 x 2 cm. cervical erosion.	Scar right chest.
934 29 F	Menarche age 13. LMP 3/8/64. Para.0,grav.0.		141 121 '63	110/70		No pelvic exam, menses.	
935 66 M				110/64		↑ Enlarged liver.	
936 73 F	Menopause - 4 mos. ago? Para.3, grav.3. Nocturia.		118	110/60, no m. M detected '62.	4+ Arcus. Bilat chorioretinitis scars and lent. opacities.	Liver palp. IFB. Cervical discharge.	Wart left eyelid.
938 25 F	Menarche age 14. LMP Nov. '63. 4 mos. pregnant. Para.5,grav.4.		92	95/50 fine rhonchi left lung.		Uterus to umbilicus.	
941 63 F	Menopause age 53. Para.11,grav.10.		109	120/70 140/90 '61 122/72 '63	4+ Arcus. Bilat. pinguecula. Leukoplakia of hard palate. Rt. cataract.	Liver edge palp. IFB.	
942 49 F	Menarche age 13. LMP Feb. '64. Para.0,grav.0.		134	110/70	1+ Arcus. Bilat.pinguecula.		Scar left scapula.
943 36 M							

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	11,200	38	465	Pap: Negative for Malignant Cells. Moderate estrogenic level. -Heavy T. Vaginalis.	5 mos. pregnant.
	6,300		183	Chest X-ray: Card. enlarg. '63.	Gaining weight. No hematological exam '64.
Varicose vein right leg.	7,200	47	205		Oral leukoplakia. A S H D with sys. murmur. Varicocele and varicose veins. RX diabetes.
					Not examined since '61.
	6,100	36	457	Pap: Negative for Malignant Cells. Inflammation. Mild endocervical cell atypia. High estrogenic level.	Leiomyoma of uterus.
	6,700	35	435	Pap: Negative for Malignant Cells. Inflammation. Mild endocervical cell atypia. Vaginal smear is scanty.	
Mod. arteriosclerosis	6,400	41	439	Pap: Negative for Malignant Cells. Inflammation with histiocytic reaction. Fresh blood. Atypical glandular cells noted.	Arteriosclerosis. Atrophic cervix.
Node right neck.	12,900	33	525	B. Sugar 79 '63. Pap: Negative for Malignant Cells. Inflammation. Fresh blood. Mild endocervical cell atypia.	
	9,000	40	393		
	5,100	47	324		'63 examination. No '64 examination.
Left 5th toe absent	8,900	37	275	Pap: High estrogenic level for age. Marked inflammation with histiocytic reaction. Some very atypical glandular cells present in vaginal smear raising question of endometrial lesion.	Questionable vaginal bleeding. RX diabetes.
6 toes right foot.	10,900	30	309	PBI 5.6 '64. Pap: Negative for Malignant Cells. Severe inflammation with histiocytic reaction. Atypical glandular cells noted probably endometrial.	4 mos. pregnant. Rec. Iron & Vit. C.
Minimal arteriosclerosis	6,500	40	235	Pap: Negative for Malignant Cells. Mild inflammation. Relatively high estrogenic level for age and menstrual history.	Leukoplakia. Hepatomegaly. Arteriosclerosis. Rec. rt. cataract removal.
Deficient eyebrows. Absent knee reflexes.	6,700	40	390	Chest X-ray neg. '63. Pap: Negative for Malignant Cells. Inflammation with inflammatory atypia. High estrogenic level for age.	
					Not examined since '62.

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
944 39 M			182 176 '62 179 '63	130/80	Melanoma left iris. Rt. pinguecula, rt. pterygium.		Nevi on abdomen.
945 39 F	Menarche age 13. LMP 3/1/64. Para.1,grav.1. U R I.		88	130/80 no m. murmur '63	Pterygium, left lent. opacities.		Scar dorsum left hand.
947 56 M	U R I.		110	190/100, grade 1 sys. M. 140/96 '63. Hypertensive.	4+ Arcus. Bilat. pterygium, rt. esotropia, rt. cataract, lt. lent. opacities.	Enlarged prostate '63, not significant '64.	Nevi on back. Scar left arm.
948 56 M			176 162 '63	140/84 120/50 '63	3+ Arcus. Bilat. pterygium.	Prostate 1+.	Scars back and shoulders.
951 31 F	Menarche age 14. Para.7,grav.7. Lactating.		136	120/80	Horizonal nystagmus, rt.pinguculae.		
956 55 F	Menarche age 12. LMP 2/20/64. U R I		125	128/80 Crepitation left lower lung.	Rt. pterygium.		Tinea versicolor. Nevi right shoulder.
957 56 F	Menopause age 46. Para.2,grav.1. Obese.		164 162 '63	116/80	Bilat.pterygium, left lent. opacities.Throat inflammed.		
958 32 M	Chr. bronchitis.		120	140/80			
961 71 M	Gen. pain. Mouth sores		139 144 '63	130/70	4+ Arcus. Bilat. pterygium, left lent. opacities.	Prostate 1+	
963 46 M	Abd. pain. Worms		138	104/60	Bilat.pterygium.		
964 88 M	Back pain.		135	160/90 pulse58, regular. Hypertensive 140/80 '63	4+ Arcus. Premature cataracts and lent. opacities.	Prostate 2+	
965 20 F	Menarche age 15. LMP 3/20/64. Para.0,grav.0.		112	Pulse 110	Throat inflammed	No pelvic exam.	
966 32 M			148	110/70	Bilat. pinguculae.		
967 21 M			149	108/70			
969 46 M	U R I. Cough.		116	110/66 Grade 1 sys.M.	Rotary nystagmus. Rt.pigmented nevi. Throat inflammed.		Nevi on trunk

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	6,200	45	313	PBI 2.0 '64.	Repeat PBI.
	7,000	46	478	Pap: Negative for Malignant Cells. Marked inflammation. Degenerating glandular cells seen. High estrogenic level noted.	
	7,600	40	380	Chest X-ray: Min. card. enlarg., aortic arteriosclerosis '63.	Evaluate + RX hypertension. Rec. cataract removal?
Minimal arteriosclerosis.	6,000	44	298		Arteriosclerosis. Prostatic hypertrophy. Bone marrow taken for gen. study.
	9,300	41	390	Pap: Negative for Malignant Cells. Inflammation.	
	7,500	36	330	Pap: Negative for Malignant Cells. Severe inflammation with histiocytic reaction. Squamous and endocervical cell atypia. ? Trichomonas Vaginalis infestation. Vaginal smear QNS.	Rec. surgery rt. pterygium.
Minimal arteriosclerosis.	8,600	39	350	Pap: Negative for Malignant Cells. Relatively low estrogenic level noted. One or two giant cells seen.	Rec. glasses.
	8,700	41	358	Chest X-ray: ?Density rt. hilus with sm. central radiolucency, inflam. nature? '63.	'63 examination. No '64 examination.
	7,300	45	253		Prostatic hypertrophy.
					'63 examination, no hematology. No '64 examination.
Slight gynecomastia. Minimal arteriosclerosis. Marked kyphoscoliosis. Lipoma above left knee.	5,600	38	203		Arteriosclerosis and hypertension. Prostatic hypertrophy. Kyphoscoliosis. Rec. cataract removal?
	8,800	37	424		
	8,600	47	270		
	8,500	52	340		'63 examination. No '64 examination.
	7,800	40	439	Chest X-ray neg. '63.	Cardiac murmur. Nystagmus.

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
970 50 F	Menopause age 47 Para.0,grav.0.		108 101 '63	110/60 Rhonchi and rales left lower lung.	Bilat,pterygium. Throat inflammed.	Atrophic cervix.	Scars both legs.
971 21 M			128	110/70	Left pterygium.		Scar rt. shoulder.
973 55 M	Losing weight.		129 133 '61	112/70 Rales right chest.	2+ Arcus. Rt. immature cataract. Left lent. opacities.Pinguseculae. Throat inflammed.	Old rt. epididymitis.	Rt. inguinal and left leg scars.
975 41 M							
982 43 F	Menarche age 14. LMP, present. Para.3,grav.2. Abd. pain.		181 140 '62	180/115 Hypertension. 170/108 '62.	Pterygium, bilat.	Menses, no pelvic exam.	Nevi left shoulder.
984 32 F							
991 56 F	Menopause age 54 Para.1,grav.1. Obese. Diabetes.		175 173 '61	120/80	Bilat.pinguseculae, rt. senile cataract,left lent. opacities.		
1001 30 F	Menarche age 13. LMP 12/15/63. Para.7,grav.6.		129	100/64		Uterus 3 FB above pubis. 3mos. pregnant.1x3 cm ant. cervical erosion.	
1005 31 M		Absent right thumb.	176	130/70			
1007 53 M			155	120/80	2+ Arcus. Bilat. pterygium.	Prostate 1+	Absent lat. portion of eyebrow Scar right ear Scar right inguinal area.
1041 59 M	Chest pain U R I		184 '63	120/46 Rales left lung.	Rt. pterygium.		
1042	Menarche age 17. LMP Feb. '64. Para.6,grav.4. Losing weight.		120 133 '63	130/80	3+ Arcus. left pterygium. Scarred right ear drum. Carious teeth.	2 midline scars 1x3 cm.Cervical erosion.Uterus 6-8 cm. above pubis.	Tinea versicolor
1043 29 F	Menarche age 14. LMP 3/5/64.		96	105/60	1+ Arcus. Bilat. pterygium.		
1050 30 F	Menarche age 18. LMP 2/15/64. Para.1,grav.1. Abd. pain.		138	120/78	Duane's syndrome. Throat inflammed.		Scar right biceps.
1500 33 M			117 108 '63	120/70	Throat inflammed.		Nevi right shoulder.

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
Minimal arteriosclerosis.	11,800	37	450	Pap: Negative for Malignant Cells. Inflammation with some glandular cell atypia. Occassional anucleated squamous cell noted. Good estrogenic level.	Arteriosclerosis. Rales in lung. Rec. chest X-ray and glasses.
Adenopathy '63.	18,900	47	403	Chest X-ray: Flural thickening lt. apex; increased bronchovasc. Markings from lt. hilus into apex (TBCT) '63.	
	8,500	44	415		Rales chest.
	7,000	44	283		'64 hematological exam only. No other exam since '62.
	8,400	43	283	PBI 6.3 '64.	Obese. Hypertension.
					No examination since '61.
Minimal arteriosclerosis.	13,000	47	323	F B S 248 mg % '64. Pap: Negative for Malignant Cells. Moderately high estrogenic level for age. Smears have a relatively clean background.	Arteriosclerosis. Cataract. RX diabetes.
1 x 1.5 cm. mass dorsum right wrist.	5,800	39	280	Pap: Negative for Malignant Cells. Inflammation with histiocytic reaction.	Pregnant. Rec. removal ganglion rt. wrist.
1 x 2 cm. subcutaneous mass rt. hypochondium. Swelling left knee.	8,600	50	330	P B I 7.9 '64.	Lipoma? Arthritis of knee?
Ulnar nerve palpable. Hansen's disease?	6,400	40	302		Prostatic hypertrophy. Hansen's disease questioned. Bone marrow taken for gen. study.
	9,200	42	427	B. Sugar 106 '63.	Resp. infection RX'd.
	7,300	40	370	B. Sugar 180 '63. Pap: Negative for Malignant Cells. Trichomonas Vaginalis infestation with marked inflammation and histiocytic reaction. Endocervical cell atypia.	Weight loss. Cervical erosion and leiomyoma of uterus. Rec. hysterectomy.
	7,000	40	324	P B I 5.8 '64. Pap: Negative for Malignant Cells. Mild inflammation. High estrogenic level. Cervical smear is scanty.	
	7,900	38	330	Pap: Negative for Malignant Cells. Mild inflammation. Degenerating endometrial cells present.	Duane's syndrome.
	6,800	51	275		

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
1501 27 M	U R I. Abd. pain.		147	106/60			
1502 25 F	Menarche age 13. LMP July '63. Para. 5, grav. 3. 7 mos. pregnant.		124	100/60	Throat inflammed.	Uterus 3FB below xiphoid. Cervical erosion.	

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	9,700	46	258	Chest X-ray: Card. enlarg., mainly lt. '63.	
	12,400	32	216	Chest X-ray neg.'63. Pap: Negative for Malignant Cells. Trichomonas Vaginalis infestation with severe inflammation, with inflammatory atypia and histiocytic reaction.	Pregnant, 7 mos.

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
2 11 M	URI		65-1/4 133.1	92/60 Gr II systolic m '62; no m '64			Perianal depigmentation; scars and depigmentation on neck
3 11 M	URI		68.2 114.2	112/80	Myopia		Depigmented areas axillae & perianal areas; pig. area behin l. ear
5 11 M	? Blood in stools '64		51.0 113.6	102/58 Systolic m '54; no m '64			Neg.
6 11 M	Recent cut on l. big toe; pneumonia '54; inf. hepatitis date ?		61-1/4 127.9	86/48 Gr. I systolic m	Trach. scar	Both testes down; liver edge palp.	Neg.
8 12 F	URI		75.2 139.7	112/80 Systolic m '63; no m '64	Old impetigo scars	#3 breast development	Cafe au lait sp thigh; mollusc; impetigo scalp thigh lesion lo more like a pi mented nevus now '64
15 17 F	Moles on face		119-1/2 158.1	112/82 Gr I systolic m at mitral area			Neg.
17 13 F	Epigastric pain; nocturia; neg. '64.		99-3/4 115.8	80/60 Gr I systolic m	2.0 cm nodule in left lobe of thyroid; tongue papillae pigmented		Depigmented area l. antecubital fossa
19 15 M	Epigastric pain '60; scars on head & arm from known childhood injuries		84 149.4	122/72 Gr I systolic m	Mole upper lip; scar 2-1/2x0.5 cm on scalp;keloid on arm;brown spots on teeth		Neg.
20 17 M	Headaches; bronchitis; melena & worms; neg. '64		117-3/4 159.4	140/92 RA 138/90 LA Recheck 124/82 Gr I systolic m	Corneal pigmentation; FB in eyelid rt. ('56); neg. '64		Pig. patch ba neck; biops pig. spots neck
21 13 F	Earaches; URI's; sores in mouth '64		87-1/4 145.3	96/60	1.5x2.5 cm firm movable nodule in l. lobe of thyroid; no cerv. nodes		Pigmented p back of nec
23 13 M	Pain in rt. knee; cough; swelling of feet ('59); abd. pain ('58); mild URI '64		97-1/4 147.4	106/48 Gr I systolic m '62; no m '64			Area of dep on shaft of penis
32 14 M	Chest and abd. pain '58; no complaints '64		71.0 136.9	96/70 Gr I systolic m	Tonsils 2+	Testes down	Pig. nevus 3. cm on chest; depig. lesions on skin
33 12 F	Occ. cough; pain l.knee & elbow ('63); worms '61; no complaints '64		81-1/4 147.1	116/84 No m			Scars on legs small 1.5 cm nevus on neck pale in colo
42 13 F	URI; abd. pain; no complaints '54		68 138.5	102/60 No m	Scarred rt. TM		Impetigo scar leg and neck warts
44 14 M	Colds; constipation; earaches		63-3/4 130.3('61)	90/50('59) Systolic m '59 gr I	Draining rt. ear '54		

Individual Children Physical Findings

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	7,650	38	430	PPD - '57 BCG - '57 Chest OK '62	
Head 51.5 cm; odd appearance to face; short stature	12,025	36	396	PPD neg. '57 BCG '57 Chest OK '62	Odd physical appearance - ? cretinoid; husky voice
Short stature - stubby fingers	6,250	37	365	Prominent aortic arch on '54 x-ray; head of humerus deformed bilat. '62; PPD neg. '57; BCG '57	
	7,550	37	328	PPD neg. '57 BCG '57 Chest OK '62 PBI 7.9 ('63)	
	11,075	40	454	PPD neg. '57 BCG '57	
	7,750	38	331	PPD neg. '57 BCG '57 Chest OK '62	
	6,350	39	309	PPD neg. '57 BCG '57 Chest OK '62 PBI 6.8 '64	
	4,675	40	380	PPD neg. '57 BCG '57 Chest OK '62	
	7,825	50	265	UA OK (?) Chest OK '62	
	7,000	42	275	PPD neg. '57 BCG '57 Chest OK '62 PBI 8.1 ('64)	
	7,400	39	365	PPD neg. '57 BCG '57 Chest OK '62	
	9,100	39	306	PPD neg. '57 Chest OK '62	
	8,625	40	585	PPD neg. '57 Chest OK '62	
Deciduous upper lateral incisor persists	9,200	37	440	PPD neg. '57 BCG '57 Chest OK '62	
	7.65	36	366	(61 counts)	Not examined since '61

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	ENT	ABDOMEN GU or GYN	SKIN
48 16 F	No complaints '64		103-3/4 155.0	138/78 Gr I systolic m '62; no m '64	Teeth fine	Liver at costal margin	Pig. patch rt. neck
53 18 F	Abd. pain daily; dysuria; hepatitis (date?); lumps in abdomen '64		101-3/4 155.0	126/70	Corneal opacities (posterior) date ?		Tinea
54 10 M	No sig. hx. '64		81-3/4 140.2	110/62 Gr I systolic m			Mottled pig. & depig. neck (fr. beta burn biopsy '54
65 11 F	Mild URI '64		52.0 123.7	90/54 Gr I systolic m '62; no m '64	Vascular anomaly upper margin of disc OS	Liver 2 cm down	Neck scars noted
69 14 F	URI's; occ. abd. pain '58; worms; neg. '64		101 155.4	108/72 Gr I systolic m '63; no m '64; no cardiomegaly	Small nodule in l. thyroid		Neg.
72 17 F	OK '64		136-1/2 157.2	130/68 Gr I m in prd area		Abdomen OK	Acne on face
83 10 F	No hx. '64		64-1/4 113.3	100/74	Rt. TM red; dental caries-5; cervical nodes	Neg.	
84 10 M	No sig. hx. '64		57-1/2 124.0	82/60		OK	Scars
85 9 M	Worms; URI's		48 120.9		Assym. skull; rhinitis		Impetigo face '57
86 9 F	Otitis		44 116.3	95/50('62) Gr I sys m '62, '59; no m '56	Caries; generalized nodes '62		Papilloma l. thumb; mole face; mollus '59
87 9 F	No complaints '64		48 118.3	78/58 Gr I sys m	URI		
88 9 M			52-1/2 118.0	82/60 Gr I sys m		Sore abdomen; diarrhea	Scars
89 9 M	No sig. hx. '64		45-1/2 115.2	92/68 Gr I sys m	OM bilateral	Testes down	Scar rt. axilla
90 9 M	Hosp. with bloody diarrhea '57		54 120.0	No murmur heard '64	Few bilat. cerv. nodes	Pigeon breast '62; liver 5 cm '59	
91 9 M	No sig. hx. '64		55-1/2 124.1	100/74 Gr I sys m	URI; rhinorrhea		

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	7,125	42	295	Chest OK '62 PPD neg. '57 BCG '57	
	6,300	40	531	Chest OK '62	
Lesion on back resembles a simple pigmented nevus	7,350	57	368	Chest OK '62	
Question of Sturge Weber raised '58	7,400	38	378	Chest OK '63 PPD neg.'56	
	6,600	41	403	PBI 12.2 '63 PPD neg. '56 PBI 10.2 ('64)	
Scars of impetigo	8,400		360	Chest OK '62	
	9,200	37	350	Chest OK '62 PPD neg. '57	
	8,400	38	404	PBI 9.3 ('64)	
	7,287	40	257	PPD neg. '57 BCG '57	Examined '63 No exam. '64
Cafe au lait spot abdomen	7,328	39	247	Chest OK '62 PPD neg. '57 BCG '57	Examined '63 No exam. '64
	11,450	38	378	Chest OK '63	
	10,500	36	355	Chest OK '63	
	10,900	40	395	PPD neg. '57 BCG '57	
	11,000	37	380	Chest OK '63 PPD neg. '57 BCG '57	
	9,850	38	298	Chest OK '63 PPD neg. '57 BCG '57	

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	ENT	ABDOMEN GU or GYN	SKIN
92 8 F	? Inf. hepatitis submandibular abcess '57; URI		48-1/2 117.0	Gr I sys m RSB	Caries		Scars
93 7 M	No sig. hx. '64		45-1/2 115.8	96/56	Active otitis media; cervical nodes	Liver 1 cm down	Warts on legs
94 7 F	Chronic cough; hosp. for malnutrition in '57; no sig. hx. '64		40 107.1	88/60			
95 8 F	Polio		40-3/4 114.0		Caries	Small umb. hernia at birth	
96 6 m	Polio 3/63; emphalitis '58		41 106.4	76/58 Gr I apical sys m		Liver and spleen are not palpable	
97 6 M	URI '64' rhinorrhea		41 113.3	No m		Scars on legs	
98 6 M	Polio ?; no sig. hx. '64		37 101.3	84/50 Gr II sys m at apex & base $P_2 = A_2$		Scars on legs	
100 8 F	Abd. pain; bronch pneumonia '56; no complaints '64		50-1/2 117.3	98/50 Gr II apical sys m			
101 6 F	Pneumonia '63		37-3/4 101.2			Liver 1 cm down	Scars
102 6 M	URI '64; polio? kerosene ingestion ('60); rectal bleeding ('60)		37-1/4 110.7	88/40 Gr II sys m	Microcephalic (47.2 cm); flat back to head; mental retardation; active URI		Impetigo scar
103 6 F	Polio - arm weakness; sores on corners of mouth '64		36.0 105.6	92/62 Gr I sys m $P_2 = A_2$	LUM red; pharynx injected		
104 5 M	Neg. except for URI '64		34-3/4 104.9	Gr I sys m	URI with left OM		Warts rt. foot
105 5 F	Polio; URI		39-3/4 107.0	76/40	Ant. cervical & axillary nodes		WK except for scars
106 4 F	Previous polio		35 102.7	90/60 Gr I sys m	Ant. & post. cervical nodes		Liver 1 cm down
108 5 F	Pinworms		33-1/2	Sys m gr I '63	Cerv. nodes	Liver 3 cm '61	Furuncles

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	9,100	40	520	PPD neg. '57 BCG '57	
	13,000	37	503	Chest OK '62	
	11,500	39	675		
Bilateral lower extr. paralysis (polio)	12,500	37	414	Chest OK '62 PPD neg'57 BCG '57	Examined '63; no examination '64
Total flacid paralysis of left leg with atrophy of gluteals as well	15,200	36	619		Rec. polio rehabilitation at Ebeye or Majuro
Small head (47.2 cm); flat occiput	8,500	37	678		
Very sl. lower rt. facial paresis persists	11,200	36	528	Epiphyseal dysplasia on X-ray of chest (hum.)	Rec. iron and Vit. C
	6,600	35	633		
	11,100	36	623		
	8,450	40	600		RX tonsilitis; rec. exam for retardation
No arm weakness found	10,900	36	583		
	12,600	39	429	Chest X-ray OK '63	
	11,650	37	433		
Very questionable rt. lower facial paresis	10,600	37	417		
	13,200	36	490		

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	ENT	ABDOMEN Gu or Gyn	SKIN
109 4 M	URI		38-1/2 114.0	Sl. pharynx injection			
110 4 M	Polio?; melena & diarrhea '61; skin lesions '64		33-3/4 98.3	88/46 No m			Impetigo legs and chest
111 5 M	No sig. hx. '64		29-3/4 95.7	No m RSR	Ant. cervical nodes; purulent nasal discharge		Wart on leg
112 6 F	Otorrhea; ? abd. pain '64		29-3/4 93.0	78/60 Gr I sys m	Cervical nodes	Liver 1 cm down	
113 3 M	URI '64		30	No m			Scars; mole on upper lid OD
115 4 M	No sig. hx. '64		32-3/4 87.0	Gr I sys m $P_2 = A_2$			Scars on legs; molluscum arm
116 4 M	Neg. history		32-1/2 95.3		Tonsils 2+		
117 3 F	No complaints '64		25-1/4 39.1	Gr I sys m	Ant. cervical nodes		Scars
118 3 M	Conjunctivitis; URI		29 91.7	86/42 No m			Mongoloid spot rt. shoulder
119 4 F			31-3/4 92.4	No m	Draining l. ear		Scars
120 4 M	No hx. '64		31-3/4 92.7	No m			
122 4 F	No hx. '64		29-3/4 93.8	No m	L. TM sl. red	Liver 1 cm down	
123 2 F			23-1/2 81.3	88/56			
124 2 F							
125 3 F	No hx. of significance '64		29.0 88.4	No m		Liver not palp.	Scars on [illegible] warts on feet

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
Fullness in LLQ	10,900	34	410		
	9,800	38	440		
	6,350	35	635		
	9,500	36	647		
	7,800	39	490		
	12,100	36	400		
	10,900	[illegible]	385		
	11,800	33	631		
	11,600	39	585		
	8,750	35	378		
No detectable paresis of left leg; measurements same for both legs (calf, thigh); reflexes OK	10,400	37	417		
	8,250	34	531		
	13,600	34	328		
	12,900	38	468		1963 examination; no examination '64
	10,600	37	528		

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	ENT	ABDOMEN Gu or Gyn	SKIN
126 2 M	?Polio		24-1/4 91.0			Tip of spleen only	
127 2 F	?Polio; no hx. '64		21-1/4	Gr I systolic m '63; no m audible at this time ('64)			Small nevus l. cheek
128 F	Congenital hemangioma rt. ankle; no hx. '64		16-3/4				Hemangiomas o neck and back
130 1 M				No m			
131 1 M			13	No m			
132 1 M			13-1/4	No m			
134 1 F			17-3/4	No m			
135 2 F				No m			
801 8 M	Occ. abd. pain; repeated URI		39.0 108.4	88/64 Systolic m '62; no m '64	Head 49 cm	Liver not palpable	Warts on hand and le
802 8 M	URI; abscess on back '56		48.0 118.1	Systolic m '62; no m '64	Inguinal & ant. cerv. nodes		No active impetigo
803 8 M	URI; abd. pain occ.		46 118.1	Systolic m '63; no m '64	Head 51.1 cm	Both testes decended now	Scars of impetigo
805 10 F	Cardiac surg. '57; patent ductus; URI		61 129.9	98/82 Gr I sys m '63; no m '64, however P_2 is very loud	-2D myopia bilaterally		Warts on rig foot (sole)
806 9 M			47.5 118.3	Gr I sys m '61	General adenopathy		Nevus l. hand
807 10 M	No sig. hx. '64		41-1/4 116.7	102/64 Gr I systolic m '62; no m '64	Caries and pyorrhea; sub-mandibular node from caries; head 48.7 cm		
808 9 F	Abd. pain '59; ? worms		49 117.3		Tonsils #; genl. nodes; caries	Liver 1.5 cm '62	

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	8,600	35	433		
No apparent muscle weakness	13,500	32	565		Rec. iron and Vit. C
	11,700	33	350		Rec. iron and Vit. C
	8,750	37	485		
	13,950	35	670		
	8,000	28	470		Rec. iron and Vit. C
	11,400	29	719		Rec. iron and Vit. C
	13,650	23	628		Rec. iron and Vit. C
	8,800	40	398		
	10,700	40	265	Chest OK '62 PPD - '57	
	11,900	38	299	PPD - '57 BCG - '57	
	11,400	41	458	Chest - pul. seg. prominent '62 (cause ?); PPD - '57	
	12,600	38	450	Chest OK '63 PPD - '57 BCG - '57	1963 examination; no examination '64
	13,600	36	454	Chest OK '62 PPD - '57 BCG - '57	Very poor teeth
	9,738	40	520	Chest OK '62	1963 examination; no examination '64

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
809 8 M			48-1/4 123.9	82/60 Very faint sys m		Testes down	Scars
810 9 F	URI		56.5 131.6	102/62 Gr I apical systolic m - functional	-2D myopia OD; marked cupping of discs bilat.; serous rt. otitis media		
811 10 F	Occ. URI's		56-1/2 125.0	92/60 Gr I apical sys m - functional	Serous nasal discharge		
812 9 F	Night blindness; convulsion '57 - cause?		58-1/2 129.7	118/76 Gr I sys m	Tonsils 2+		Tinea; impetigo scars active impetig on face
813 10 M	Pinworms; URI		55 125.9	104/72 $P_2 > A_2$; no m'64	URI; tonsils #	Liver 1 cm down on inspiration	Impetigo scars
814 12 M	ROM '61; neg.'64		69.0 134.3	92/68 No m	Mild URI	Liver 1 cm down; testes down	
815 13 M	Painful inguin. mass '63; abd. pain '59 ('57?)		89.0 149.4	108/52 No m	Eyes neg.; teeth good		Skin clear
816 14 F			104 152.3	112/52 Systolic m '63; no m '64 $A_2 > P_2$	Tonsils 1+; ant. cerv. nodes		Skin scars only
818 12 M	URI		81-3/4 146.3	122/88 Gr I sys m '62; no m '64 $A_2 > P_2$	Tonsils 1+; ant. cerv. nodes		Scars only
819 15 M	LOM '62. Occ. diarrhea; occ. abd. pain; neg. '64		123 164.5	108/68 No m '64; gr I sys m '59	Ant. cerv. nodes		
820 15 M	Worms '58; URI		109 116.1	110/70 No m, $P_2 = A_2$	Ing. node 1 cm on right; URI. TM's red		Scars
821 17 F	Fever occ. '59; poor night vision; neg.'64		126-1/2 147.7	98/62 No m '64; gr I sys m '63	Exophoria		Skin neg.
822 17 M	Perforated LOM '59; pul. TBC by hx.		169 159.9	92/40 Extrasystoles with bradycardia '63; no m, (pulse 92)		Liver edge palp.	
863 14 M	No sig. hx. '64		85.0 147.0	126/78 No m '64; gr I sys m '62			Acne
366 9 F	URI		46-1/2 119.2	82/50 Gr II sys m '63; split P_2 - no audible sys m '64	Thickened TM's; ant. cerv. nodes; hard to see left fundus	Liver edge at costal margin	

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	8,900	35	300	Chest OK '62 PPD - '57 BCG - '57	
	8,400	39	461	Chest OK '62 PPD - '57 BCG - '57	
	11,700	35	433	Chest OK '62	
	8,800	38	333	Chest OK '63 PPD - '57 BCG - '57	
	6,650	36	405	PPD - '57	Chest X-ray
Head shape OK; size 50.7 cm	10,800	36	285	Chest OK '62 PPD - '57 BCG - '57	
	8,100	38	200	PPD - '57 BCG - '57	
	8,700	37	334	Chest OK '62 PPD - '57 BCG - '57	
	9,900	39	505	Chest OK '62 PPD - '56	
	5,450	38	273	Chest OK '62 PPD - '57 BCG - '57	
	23,200	40	411	Chest OK '62 PPD - '57 BCG - '57	Rec. achromycin for otitis media
	8,500	38	425	PPD - '57 BCG - '57	
	14,200	44	628	Chest OK '62	
	9,900	40	730	Chest OK '62	
	6,200	37	203	PPD + '57	

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	ENT	ABDOMEN Gu or Gyn	SKIN
870 8 M	Polio		46-3/4 120.9	92/66 Gr I sys m			Scars
874 17 M	Substernal pain '59; worms		119 168.3	118/60 Pul. sys m '58			Healed skin lesion
879 9 F	Occ. diarrhea; sore on l. foot		54.0 126.3	86/60 Gr I apical sys m	Liver 1 cm down		Marked warts on l. foot; impetigo scar
887 18 M			116 169 '62	110/70	Hemangioma near disc - not thought to be Sturge Weber		Ch. impetigo '59
891 16 F	Pain in joints; neg. '64		90-3/4 151.9	100/68 No m			
892 19 M	Occ. abd. pain; no sig. hx. '64		114-3/4 161.3	92/50			
900 7 F			110		Caries; cerv. nodes '62		Sores on legs impetigo '59
901 7 F	Polio; URI and cough '64		42 110.7	80/48	Canals OK		Molluscum on back
902 6 F	No sig. hx. '64		40-3/4 110.2	78/50 Gr I sys m with loud venous hum under rt. clavicle	Left TM sl. retracted		Impetigo l on elbow
903 6 F	Polio; foreign body ear; (deaf l. ear '63); poor hearing only '64		38-1/4 107.4	76/40 Gr I sys m '62; Gr I apical sys m with change c position	Both TM's are thick and probably have fluid behind them; tonsils 1+		
904 6 M	Abd. pain '63; worms '61; occ. abdominal pain '64		44-1/2 113.2	92/56 Gr I sys m '63, '62, '61; rales in chest; clear chest-no m audible '64			Molluscum face
905 5 M	No sig. hx. '64		35 106.1	88/60 Gr I apical sys m with musical quality			Ulcers leg; nevus left leg '57
906 6 F	Anorexia		34-1/2 107.4	76/40 Sys m Gr I '62; no murmurs audible - split P_2 '64		Liver edge at costal margin	
909 14 F			78.0 14.14	110/70 No m	Infected throat		
911 11 F	Broken wrist '59; no sig. hx. '64		77 135.0	112/40 Gr II sys m at apex '63; gr I systolic m at apex '64			Vitiligo or persisting tinea

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
Slight rt. lower facial paresis	5,800	35	483	PPD + '57 Chest OK '62	
	13,400	37	293	PPD + '56	1963 examination; not examined '64
					1962 examination; not examined '63 or '64
	8,300	41	235		
	7,900	43	295		
					Partial exam '63; not examined '64
Rt. leg / Lt. leg Mid thigh 28 / 23.4 Mid calf 23.4 / 22.0 Length 6.1 / 61 (ant. spine to heel)	19,500	35	543	Chest X-Ray OK '63	Rec. iron and Vit. C
	9,900	34	264		Rec. iron and Vit. C
Rt. deltoid weakness again noted '64	13,800	39	419	General cardiomegaly '63-X-ray	Rec. audiometric workup for deafness; tympanotomy and drainage
	11,000	40	435		
	14,500	37	640		
	7,800	36	455		
	6,000	42	325		
	8,500	36	416	Chest OK '61	

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
912 11 M	No significant history '64		58 130.8	98/56	Ant. cervical nodes; parotids do not seem enlarged		
913 13 M	No hx. '64		70 138.0	106/64 Gr I sys m '62; no m, M_1 split in '64	Clear	Genitalia 2	Scars of impetigo
919 16 M	Swelling of rt. wrist; abd. pain '62		77-1/2 150	80/50			
921 10 M	URI '64		56-1/4 125.0	108/50 Gr I sys m	Tonsils +++		
923 9 F	LOM '61-'63; loss of hearing; occasional earaches '64		46-1/2 116.3	82/60 Sys m gr I '63; no m '64	Carious teeth	Liver 2 cm '62; neg. '64	Numerous scars
924 9 M			107 cm '62			?Undescended rt. testis '62	
925 14 F	ITP '59 Emaj. Hosp.; no sig. hx. '64		84-3/4 145.9	102/60 Gr I sys m '62; no m '64	Sl. infection of throat		
926 13 F	Night blindness in '63; URI '64		71.0 140.6	82/60 Sys m gr I '59; no m '64			Patch of impetigo on
930 8 F	Polio, ?piles in '59; URI and leg pain '64		50-1/2 120.7	78/58 Gr I sys apical m			
931 10 M	URI '64		53 122.9	98/56			Tinea on trunk
937 11 F			77 137				Molluscum
939 18 M	No sig. hx. '64		149-1/4 163.7	118/58 No m		RLQ scar	
940 15 M	Deafness '62; otorrhea '61		81-3/4 146.5	90/50 Gr I sys m '62	Caries + '62	RLQ scar, caused	
946 13 F			91-1/2 147.8	106/62			Scars
950 20 F	No complaints '64		158-1/2 155.4	122/82		Obese	

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	12,000	36	215	Chest OK '63	
	8,400	39	340	Chest OK '62	
?Arthrogryposis '62	7,800	39	308	Chest OK '63; PPD + '56	
Cervical nodes	19,500	34	335	Chest OK '63	
	10,600	38	423	Chest OK '62	
Clonus and hyperactive reflexes '62					Not examined since 1962
	6,600	40	275	Chest OK '62; Platelets ('59) 340 ('61) 453	
	11,800	40	360		
	8,600	36	651	Chest OK '62	
	13,200	36	465		
Temp. 101, probably due to impetigo lesions on legs	17,800	37	570	Chest OK '62	
	10,800	43	220	PPD '56, neg.	
					Not examined since '62
	8,500	40	335	Chest OK '62	
	6,500	41	75	Chest X-ray '62; prom. pul conus infiltrate rt. base PBI 6.7 ('64)	

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	ENT	ABDOMEN Gu or Gyn	SKIN
952 7 M	Joint pains '61; no sig. hx. '64		43-3/4 115.0	84/52	Caries		Scars only
954 7 F	URI		39.0 109.3	72/40	ROM & LOM '61; malformed l. pinna '63	Liver edge palp.	Active impet
955 12 F	No sig. hx. '64		98.0 145.0	116/82			Tinea spots
959 16 F	Fainting spells, edema of feet'63; neg. '64		127.0 150.0	120/82 Gr I sys m '62; no m '64	1+ tonsils		
960 13 F	No sig. hx. '64		97-1/4 148	104/70 Gr II-III sys m '63, '62; no m audible '64			
962 11 F	Worms '61; joint pain '61; nausea in '64		61-1/4 130.1	84/50 Gr I sys m '63; no m '64			
972 9 M	Otitis and abd. pain '61		45-1/2 117.2	80/40	Caries		Molluscum '
977 18 F			109-1/2 157.5	122/76			
978 13 F	No sig. hx. '64		101-1/2 151.3	88/70			Scars of impetigo
979 9 F	No sig. hx. '64		42-3/4 115.1				
980 11 F	Occ. myalgia '61; ? piles '59; no sig. hx. '64		85.0 114.3	86/60		Liver edge at costal margin	
981 10 M	URI '64		51-1/2 125.3	86/50 Gr I sys m		Liver 1 cm down	Molluscum ' scar on ili crest 'burn active impe
987 7 M	Worms '61		98 cm '61			Liver 2.5 cm '61	Impetigo
989 19 M				120/60 Gr I sys m '59			Molluscum - chest
992 6 F	Admitted to hosp. with diarrhea '59		32-1/4 99.2	Gr II sys m '62		Liver 3 cm '59	Impetigo

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
Cervical and axillary nodes	16,400	37	610		
	11,600	38	328		
	7,800	39	538	Chest OK '62	
	11,100	38	448	PPD + '51 Chest '62 infiltrate rt. base; Chest '63 neg.	
	9,250	37	390	PPD - '51 Chest Neg. '62	
	6,700	35	365	Chest neg. '62	
	6,874	39	364	Chest neg. '63	1963 examination; not examined 1964
	13,000	28	422		5 mo. pregnant; rec. iron and Vit. C.
	7,800	39	218		
	9,700	40	386		
	8,400	41	283		
	12,400	38	410	Chest neg. '62	
					Not examined since 1961
					Not examined since 1962
					Not examined since 1962

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	ENT	ABDOMEN Gu or Gyn	SKIN
993 17 F	No sig. hx. '64		114-3/4 154.6	94/60 No m			Lump under l. ear 1 cm '62; wart rt. axill '62; scars '6
995 7 F	URI		42 110.9				Excoriation on lip, mole on cheek '63; tin on face '64
996 11 F	Joint pains at night for yrs., no hx. of further joint pain '64		62-3/4 133.1	106/60 No m erect; gr I m prone; seems entirely functional	Exophoria '59	Breast devel. #3	Bilat. acute otitis media
998 17 F	Infectious hepatitis '58(?); no hx. of sig. '64		119.0 155.9	128/80 No m	Prominent papillae on tongue, dark in color		
1002 9 M	URI '64		43 113.1	94/66 Gr I sys m	Cervical nodes		Active impeti
1004 6 μ M	Joint pain '61; no hx. except URI '64		36.0 104.0	Gr I sys m	Tonsils ++++		Scars through-out
1006 6 M	Abd. pain after eating; poor appetite '64		36-1/4 106.2	82/60 Gr I sys m '63, '62; no m '64	Liver edge at costal margin; 1+ tonsillar hypertrophy		
1009 5 M			37.0 99.1	Gr I sys m	Liver 1 cm down		Scars
1010 4 M	Earaches; no sig. hx. '64		33-1/4 99.6	Gr I sys m, musical		Liver 1 cm	Vaccination scar (fresh
1011 5 F	No significant hx. '64		33-3/4 97.0	No m			Molluscum
1012 6 F	Polio (?); occ. abd. pain; neg. except URI '64		41-3/4 110.8	90/60			Scars
1014 8 M			39-1/4 113.4	88/46 Gr II m in apical and mitral area			
1015 3 M			29 #				
1017 6 M	Joint pain '61		28-3/4 95.6		Tongue desquamated '62	Umbilical hernia '62	
1018 4 M			30-3/4 92.8	Sys gr I m '62; no m '64			Skin ulcers leg '62; s on legs '6

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	10,100	40	445	Chest OK '62	
	8,300	38	350	Chest OK '63	
	14,300	33	629	PPD '56, negative;chest x-ray '62 - prom. pul. conus	Recheck X-ray; rec. iron and Vit. C
	10,900	40	326	Chest neg. '62	
Inguinal nodes 1 cm	14,500	35	363		
Nodes throughout	12,800	37	681		
	16,900	37	553		
	8,100	38	280		
	11,500	37	613		
	11,400	38	283		
	7,200	35	478		
	8,600	42	225		
	12,200	41	167		1963 examination; not examined '64
	9,600	33	416		1963 examination; not examined '64
	12,300	36	649		

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
1019 4 F	URI		30-3/4 95.2		Bronchitis; liver edge palpable		Active impetigo
1020 5 F	Red eyes 1 yr.; eyes still red '64		28-3/4 94.5		Conjunctivitis '63; bulbar conjunctival vessels injected in '64		Impetigo; keloid-like lesion on neck
1021 5 F			22 # '61				Impetigo '61
1022 4 F			32-1/4 99.1				
1024 4 M	Diarrhea with blood '61; neg '64		39-1/4 100.0	Gr I sys m '63; no m '64			Scars
1025 5 F	Draining ears; polio; neg. hx. '64		29.0 93.5	Sys Gr I m			Skin neg.
1026 4 F	Hx. neg. '64		29-3/4 96.7	Gr I sys m			Skin neg.
1027 3 M	No sig. hx. '64		27 87.0	Gr I sys m, very faint			Scars only
1028 3 M	Occ. diarrhea with bld. or pus '63		21-1/2 #				
1029 3 F			29-1/4 90.5				
1030 3 M			29-1/4 90.2	Gr I apical sys m			Vitiligo-l spots on b inguinal s contracture hand
1031 3 F	Polio; no sig. hx. '64		30-1/2 #	Gr I sys m			Molluscum c trunk; Impet on legs
1032 4 M	Neg. exam. '62						
1033 14 M	Neg. '64		105 150.0	110/78 Gr I sys '63,'62; no m '64			
1034 6 F	Worms, poor appetite '63; URI only '64		38-3/4 112.5	90/60 Gr I sys m - $P_2 > A_2$	Tonsils 1+		Scars

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	— 11,100	34	373		
	14,850	37	629		RX infected neck scar (Bacitracin ointment)
	15,400	35	420		1963 examination; not examined '64
	8,200	37	665		
	8,500	34	400		
	13,700	40	635		
	11,200	34	575		
	9,100	39	423		
	12,500	36	347		1963 examination; not examined in '64
Molluscum on body; wart on hand	8,750	37	440		
	9,600	36	510		
Hemangioma chest wall '62, '63; genl. adenopathy; no leg weakness	10,900	38	525		
					Not examined since '62
Adolescent breast enlargement rt. '63; breasts normal '64	7,900	38	613		
	9,400	39	410		

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
1035 15 F	No sig. hx. '64		107.0 146.3	116/78 Gr I sys m - mitral area			Scars
1036 12 M	No sig. hx. '64		66-3/4 134.1	106/64 Gr I sys m '62; no m '64		Liver at costal margin	Scars
1037 2 M	Polio between '62 and '63; no interval hx. '64		24-3/4 #			3 cm inguinal hernia	
1038 2 M	Cold only '64		27-1/4 84.0				Scars and active impet
1039 2 M	URI - mild '64			Gr I sys m not transmitted '64			Scars
1040 3 M	No sig. history '64; polio '63; rashes on neck in '63		28-3/4 87.0				Scars
1044 2 F	No sig. hx. '64		20 #			Liver edge palpable	Skin neg.
1045 2 M						Spleen 2 cm '63	
1046 1 M			17-3/4 #	No m	Ears neg.		Skin neg.
1047 2 M	No sig. hx. '64		18-3/4 #			Spleen 2 cm '63	
1049 4 M	No sig. hx. '64		35.0 97.9	No m			
1051 9 F	URI		59 123.6	104/56			
1052 11 M	URI		58 132.1	106/74 Gr I sys m	Tonsils 3+		
1053 5 M	No sig. hx. '64		33-1/2 99.0	92/58 Gr I sys m	Tonsils 1+	Liver 1 cm down	
1054 4 M	No sig. hx. '64		15 #	Gr I sys m - RSR			

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	12,500	42	433	Chest X-ray neg. '62	
	11,000	37	151		
Fresh vaccination scar	8,025	37	681		
	10,700	35	500		
	14,100	44	493		
	9,600	37	603		
	11,000	29	635		Rec. iron and Vit. C
	12,700	35	545		1963 examination; not examined '64
	10,500	34	520		
	17,700	35	634		
	11,200	39	494		
	9,400	36	495		
	8,300	38	490		
	13,800	39	225		

NO., AGE, SEX	PAST HISTORY	INJURIES	WEIGHT POUNDS HEIGHT CENTIMETERS	BLOOD PRESSURE HEART & LUNGS	EENT	ABDOMEN Gu or Gyn	SKIN
1055 1 F							
1056 1 M			8-3/4#				
1057 1 F			15#	No m			
1058 1 M			8-1/2 #	No m			
1503 6 M	Sores on nostrils; no hx. of sig. '64		30-1/4 96.1	78/58 Gr I apical sys m			Scars
1504 2 M	Polio (?) date?; no sig. history aside from leg pains '64		25-1/4 85.2	Gr I apical sys m			

MISCELLANEOUS, NEUROLOGICAL, TUMORS, ETC.	BLOOD COUNTS WBC	HCT	PLAT	LAB DATA, Urine, Pap., X-ray, etc.	COMMENTS & RECOMMENDATIONS
	—				Not examined '64
	12,600	36	636		Eczema from cows milk, ange to rice or Jugaroo
	8,200	37	550		
	8,588	39	251		
No evidence of paresis; reflexes normal					

APPENDIX 9

ANTHROPOMETRIC STUDY OF ADULT MARSHALLESE

Albert R. Behnke, Jr., M.D.

Unifying Principle Underlying Anthropometric Measurements.

F, a factor derived from $\sqrt{W/h^{0.7}}$ is proportional to the sum of 11 circumferences, and the sum of the 11 circumferences divided by F is a biologic constant, approximately 195 (194 to 197) for widely differing groups of males. If the mean value for each measurement is divided by F, then the quotient (Mean/F or d) can be used for comparison of measurements. The d values are the raw measurements converted to a common basis for comparison of relative body size.

Analysis of Data.

RONGELAP FEMALES MEAN VALUES*

	Group 1 N= 10 Age 30.3 yr. Weight 52.4 kg. Height 15.10 dm F** = 2.797		Group 11 N =10 Age 31.8 yr. 51.2 kg. 14.71 dm. F = 2.793		Reference Woman 20 to 24 yr. 56.8 kg. 16.38 dm F = 2.832	
Circumference	cm	d Values (cm/F)	cm	d Values (cm/F)	cm	d Values (cm/F)
Shoulder	94.08	33.63	94.45	33.82	97.16	34.30
Biceps	28.44	10.17	28.53	10.22	26.90	9.50
Forearm	23.95	8.56	23.14	8.29	24.28	8.57
Wrist	14.76	5.28	14.65	5.25	15.31	5.40
Chest	81.79	29.24	81.02	29.00	83.17	29.39
Waist (Abd.1)	(70.99)	(25.37)	(72.30)	(25.89)	(66.33)	(23.42)
Abd. avg.	79.52	28.43	78.65	28.17	72.33	25.53
Buttocks	90.95	32.50	90.18	32.30	94.60	33.44
Thigh	53.52	19.14	51.87	18.58	56.24	19.85
Knee	34.97	12.50	35.52	12.72	35.16	12.41
Calf	30.33	10.84	31.65	11.34	34.37	12.13
Ankle	19.59	7.00	20.01	7.16	20.74	7.32
	553	197.3	550	196.9	560	197.8

*Individual data on separate taole. ** Factor (F) $=\sqrt{W/h^{0.7}}$, W(weight), h(height)

SELECTED MEASUREMENTS FOR COMPARISON WITH U.S. DEPT. OF AGRICULTURE DATA

	Average d values Groups 1 & 11	U.S.D.A. Age Group (35-39yr.) N = 1215, W(61.11 kg) h(16.04 dm, 63.3 in.) F = 2.960		U.S.D.A. Age Group 10yr N = 6253 W(31.90 kg) h(13.82 dm) F = 2.252	
	d Values	cm	d Values	cm	d Values
Chest	29.12	88.93	30.04	67.76	30.09
Waist(Abd.1)	25.63	74.85	25.29	57.77	25.65
Buttocks	32.40	99.34	33.56	71.88	31.92
Thigh	18.86	57.00	19.25	41.66	18.50
Calf	11.09	33.22	11.22	27.40	12.17
Knee	12.61	35.30	11.93	29.03	12.89
Forearm	8.42	24.89	8.41	-----	-----
Wrist	5.27	15.26	5.16	-----	-----
Ankle	7.08	23.60	6.98	-----	-----
Sum	150.5		151.8		

INDIVIDUAL DATA

Young Women (<40 yr.) N = 20 divided into two groups

Group 1 N = 10 Body Weight = $D^2 \times h^{.7} \times .255$ D = Sum 11 cm/100

No.	Age	Height decim.	Weight Obs.	Weight Calc.*	Sum Circum. cm	h is height in dm
14	35	15.13	57.7	56.1	574	
18	36	15.49	49.3	49.5	534	
24	23	14.92	40.9	41.8	497	
1001	30	14.92	58.8	59.7	594	
1050	30	15.67	62.7	63.0	600	
1502	25	15.49	56.4	53.9	557	
71	38	14.41	56.6	55.7	568	
829	25	15.37	50.4	49.8	537	
51	35	14.90	45.0	46.2	523	
832	26	14.07	45.9	46.2	526	
Mean	30.3	15.10	52.4	52.2	553	

INDIVIDUAL DATA CONT'D

Group 11 N = 10

No.	Age	Height Decim.	Weight Obs.	Weight Calc.	Sum Circum. cm
835	30	14.61	43.6	43.5	511
841	31	16.07	61.8	59.5	578
843	35	14.61	58.4	57.4	587
865	31	15.18	44.1	42.5	504
867	36	15.03	52.7	55.8	573
895	34	15.18	54.5	54.6	565
896	24	12.59	45.5	43.5	538
932	29	14.48	47.3	46.4	529
934	29	14.73	64.3	64.4	620
945	39	14.61	40.0	40.5	493
Mean	31.8	14.71	51.2	50.8	550

---

* Calc. Weight (kg) = $(\text{Sum Circum.}/100)^2 \times h^{.7} \times .255$

Gravid? 49	25	15.49	75.5	74.2	739	(12 circum. Abd(1) & 2
" " 61	18	15.37	76.4	74.6	742	" " " "
" " 74	26	15.43	82.0	81.2	773	" " " "

Calc. Weight (kg) = $(\text{Sum 12 circum}/112.9)^2 \times h^{.7} \times .255$

12 Circumferences = 10 circum. + Abd (1) and Abd (2)

(11 " " = 10 circum. + Abd (avg.)

RONGELAP MALES

Height	Weight	Calc. Wt.	F $\sqrt[3]{W/h^{3.7}}$	Sum 11 Circum.	Sum 11 Circum. / F
Group 1 N = 19		Age 30 (20 to 39)			
16.27	63.7	64.6	3.007	590	196.2
Group 11 N = 10		Age 48 (40 - 53)			
16.15	70.8	70.6	3.178	616	193.8
Group 111 N = 10		Age 58 (54 - 64)			
15.58	61.3	63.0	2.995	588	196.3
Group 1V N = 10		Age 73 (65 - 88)			
15.80	61.6	62.7	2.987	586	196.1

Circum.	Group 1 Mean cm	Group 1 Mean/F d	Group 11 Mean cm	Group 11 Mean/F d	Group 111 Mean cm	Group 111 Mean/F d	Group 1V Mean cm	Group 1V Mean/F d
Shoulder	107.1	35.92	109.6	34.60	102.9	34.35	103.4	34.60
Biceps	31.65	10.65	33.11	10.42	31.53	10.53	29.12	10.32
Forearm	27.64	9.30	28.54	8.98	27.47	9.18	25.75	8.63
Wrist	16.54	5.57	17.46	5.49	17.48	5.84	17.40	5.82
Chest	90.00	30.00	95.05	29.92	91.32	30.49	91.96	30.82
Abd.(avg)	76.05	25.54	84.40	26.56	82.63	27.60	86.16	28.84
Buttocks	89.95	30.12	95.45	30.05	90.16	30.10	91.67	30.70
Thigh	52.72	17.99	56.38	17.74	51.91	17.34	50.51	16.90
Knee	36.51	12.17	38.33	12.05	36.75	12.29	36.75	12.32
Calf	34.63	11.69	36.53	11.50	34.34	11.47	32.38	10.84
Ankle	21.09	7.19	21.61	6.80	21.32	7.12	21.30	7.13
		196.14		194.11		196.31		196.92

RONGELAP MALES - INDIVIDUAL DATA

Group 1 N = 19 Av. age 30

Number	Sum 11 Circum. cm	Weight Obs.	Weight Calc.*
845	604	70.0	67.6
864	622	70.4	71.4
881	642	77.0	77.2
882	555	55.7	56.2
885	592	63.2	65.3
966	600	67.3	67.8
1501	617	66.8	70.1
823	588	63.2	65.1
77	558(h,15.50)	(55.8)**	55.8
10	600	63.2	65.2
27	592	64.1	65.8
37	597	66.4	66.9
40	568	56.8	57.8
73	610	71.6	71.9
827	571	57.7	59.4
828	551	54.0	53.6
830	604	68.6	67.4
833	591	61.5	65.4
836	554	57.3	57.5
Group 11	**N = 10 Av. Age 48**		
842	612	70.0	67.8
50	660	84.1	82.4
917	657	83.6	81.2
7	578	58.2	60.2
4	602	65.0	67.5
16	569	56.4	58.0
849	720	99.1	96.5
1007	616	70.4	69.9
68	575	60.0	61.4

Group 111 N = 10 Av. Age 58

Number	Sum 11 Circum. cm	Weight Obs.	Weight Calc.*
41	550	52.7	55.1
80	582	57.3	58.9
973	583	58.7	60.9
947	549	50.0	53.1
840	619	70.9	71.4
853	625	70.4	68.7
11	549	51.1	53.7
910	559	54.5	55.8
82	587	60.0	61.4
878	679	87.7	87.7

Group 1V N = 10 Av. Age 73

29	540	50.2	51.3
856	553	54.1	55.7
860	551	51.8	54.6
884	593	69.0	66.9
897	668	77.7	77.5
915	559	56.8	55.9
918	684	85.5	87.8
964	603	61.4	63.5
55	559(h,15.36)	(55.6)***	55.6
899	558	56.8	57.1

** Assumed stature 15.50 dm, weight calc.

*** Stature left blank in protocol Calc. Weight based on assumed (H) = 15.36 decimeters.

Remarks

Calculation of Weight.

Sum 11 Circum./100 = D

$D^2 \times Height^{.7} \times .263 = Weight\ (kg)$

The equation, $D^2 \times Height^{1.0} \times .111 = Weight\ (kg)$ gives a good approximation also of weight. With this equation, calculated weights are lower. For the Rongelap group, the correct power of height lies between 0.7 and 1.0

Interpretation of Data.

The d values for Group 1 reflect good muscular development and leanness based on a comparison with the d values of a Reference (Military Man)* and other groups.

The d values for Group 1V reflect loss of lean tissue and fattening that accompanies the aging process.

The d values of Group 11 are somewhat puzzling. This group does not have the muscular development, for example, of the older age Group 111, despite the increased weight of this group. The number of individuals in each group except Group 1, is small, however. There should be at least 30 men in each group. Nevertheless, there is no question about the excellent muscular development of Group 1. The relatively small ankles compared with Reference Man* may be a physical characteristic of the males of this race.

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* Reference (Military Man) Age group 20 - 24 years. Weight 70.0 kg.
Height 17.40 decimeters (68.5 inches).
Sum of 11 Circumferences = 600 F = 3.078
Sum 11 Circum./F = 194.9

d Values for Reference Man

Shoulder (36.00), Biceps (10.32), Forearm (8.72), Wrist (5.62),
Chest (29.84), Abdomen Avg. (25.49), Buttocks (30.36),
Thigh (17.80), Knee (11.90), Calf (11.64), Ankle (7.31)

Conclusions.

1. The men in the Group 20 to 29 years, especially, reflect excellent physical development. The d value for biceps girth is 10.65 compared with 10.32 for a reference military (young) man. (A difference greater than 0.20 is highly significant).

2. By contrast, the women (ages 24 to 39) with the exception of the arm measurements are either physically immature, or they have lost a considerable amount of lean tissue.

The striking immaturity is reflected in the girths of hips and thigh. The d values for these measurements are much lower than the comparable d values for a reference woman and for the mean values for a group of American women measured about 1937 - 1939 by the Dept. of Agriculture in connection with garment patterns. The relatively small size of the calf musculature is noteworthy. The d values for arm size compare favorably with those of a reference woman and with those of the USDA (35-39 yr) group.

APPENDIX 10

Nausea and Vomiting in Marshallese Following Exposure to Fallout, March 1, 1954

Subject No.	Age (1954)	Sex	Nausea		Vomiting, Onset
			Onset	Duration	
2	2	M	3/1 (1200)	?	
3	1	M	3/2	3 days	3/2 and 3/3
4	38	M	3/2	1 day	
5	2	M	3/2	1 day	3/3
9	22	M	3/2	?	3/2
10	24	M	3/1 (1600)	1 day	
11	50	M	3/2	?	
14	25	F	3/2 (1200)	2 hours	
15	7	F	3/2	?	
19	3	M	3/2	?	
20	7	M	3/2	1 day?	
21	3	F	3/1 or 3/2	?	3/1 or 3/2
22	17	F	3/2 (0700)	5 hours	
24	13	F	3/2 (0700)	?	
27	26	M	3/1 or 3/2	?	
32	3	M	3/2	?	3/2
33	1	F	3/2	3 days	
34	45	F	3/2 (1200)	12 hours	
36	7	M	3/2	2 days	3/2
37	20	M	3/2	1 day	
39	15	F	3/1?	1-2 days	
40	29	M	3/1 (1200)	2 days	
42	3	F	3/2	2 days	3/2
43	66	F	3/2	1 day	
49	15	F	3/1 or 3/2	1 day	
54	1	M	3/1 or 3/2	?	
58	59	F	3/2 (0800)	4 hours	
61	8	F	3/2 (1200)	4 hours	
62	57	F	3/2 (0600)	6 hours	
63	36	F	3/2 (0800)	4 hours	
64	30	F	3/2	1 hour	
65	1	F	3/1 or 3/2	1 day	
66	29	F	3/2 (1800)	12 hours	
67	14	F	3/2 (1200)	1 hour	
68	45	M	3/2 (0800)	4 hours	
69	4	F	3/1	2 days	
71	28	F	3/2 (1000)	5 hours	
72	6	F	3/1 or 3/2	?	
74	16	F	3/2	?	
75	12	F	3/2	1 day	
77	26	M	3/1 or 3/2	1 day	
78	37	F	3/2 (0800)	4 hours	
80	46	M	3/1 (1800)	1 day	
82	50	M	3/2	1 day	

NOTE: Total of 44 cases (69%) of 64 people receiving 175 r reported nausea in the first 2 days after exposure. No nausea was reported in the 18 Ailingnae people (receiving 69 r) or in the 157 Utirik people (receiving 14 r).

APPENDIX 11

Pediatric Anthropometric Data (Height and Weight) on Rongelap Control (Unexposed) Children, 1957 through 1964

			1957		1958		1959		1960		1961		1962		1963		1964	
No.	Sex	Birth date	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb
801	M	6/29/56	69	17	81	21	87	25	92	23	97	31	100	34	104	35	108	39
802	M	3/16/56	66	19	79	24	88	28	--	—	101	35	106	38	111	41	118	48
803	M	3/18/56	71	20	85	26	91	29	100	--	104	37	108	38	112	43	118	46
804	M	/56	74	23	—	--	—	--	--	—	--	--	--	—	---	--	---	--
805	F	2/25/54	88	27	96	36	104	40	112	49	119	49	121	52	126	56	130	61
806	M	1/ /55	79	25	89	30	96	34	104	39	108	40	--	—	118	48	---	--
807	M	6/13/55	84	25	90	29	95	28	100	37	104	34	108	38	112	40	117	41
808	F	3/29/55	81	23	88	28	96	32	104	36	109	39	113	43	118	49	---	--
809	M	6/18/56	76	22	84	25	99	29	102	32	107	36	113	38	118	43	124	48
810	F	2/5/55	91	27	99	32	105	34	112	39	118	44	121	46	126	52	132	57
811	F	2/14/54	85	28	93	32	99	34	105	38	111	42	114	46	118	50	125	57
812	F	2/ /54	88	27	96	33	102	37	—	--	115	42	--	--	124	54	130	59
813	M	1/2/54	89	29	95	33	102	35	109	40	113	44	117	48	122	52	126	55
814	M	4/5/52	99	36	105	40	112	43	118	50	122	53	125	57	130	62	134	69
815	M	5/4/50	113	43	119	46	125	50	129	57	133	63	136	66	141	71	149	89
816	F	10/31/49	116	47	122	52	127	59	133	70	138	76	144	80	150	94	152	104
817	M	10/19/50	116	49	121	50	—	—	130	69	138	--	—	—	---	--	---	--
818	M	3/4/51	114	43	119	48	125	51	130	58	134	65	138	70	142	75	146	82
819	M	12/15/48	132	57	—	66	135	71	140	78	145	89	149	95	155	111	165	123
820	M	10/25/48	124	53	128	56	128	61	134	72	146	79	152	90	157	106	161	109
821	F	8/1/47	122	58	129	68	135	76	143	93	146	103	148	107	148	114	148	127
822	M	12/26/45	132	66	136	69	141	79	146	91	154	104	158	112	159	120	160	169
823	M	8/11/43	145	84	152	95	156	109	162	124	165	126	165	126	---	--	---	--
824	M	4/3/44	141	77	—	—	--	--	--	--	160	124	164	131	---	--	---	--
825	F	3/9/42	151	101	152	107	152	115	153	124	--	--	--	—	---	--	---	--
826	F	/37	154	78	--	--	--	--	—	—	--	--	—	—	---	--	---	--
827	M	4/20/40	157	121	157	122	158	123	--	--	--	--	—	--	---	--	---	--
828	M	8/26/40	150	106	151	103	--	--	--	--	--	—	—	—	---	--	---	--
829	F	/39	152	104	--	--	--	--	--	--	--	—	--	—	---	--	---	--
830	M	9/9/38	160	128	162	141	--	--	--	--	--	--	--	—	---	--	---	--
831	M	6/21/39	152	98	157	113	160	122	160	125	—	--	—	—	---	--	---	--
863	M	6/25/50	112	44	117	49	123	55	127	60	133	64	136	70	140	75	147	85
866	F	7/ /55	81	19	85	25	91	30	--	--	105	37	110	41	114	44	119	47
869	M	4/ 9/46	130	57	134	64	140	74	147	88	155	98	--	—	---	--	---	--

No.	Sex	Birth date	1957 Ht., cm	1957 Wt., lb	1958 Ht., cm	1958 Wt., lb	1959 Ht., cm	1959 Wt., lb	1960 Ht., cm	1960 Wt., lb	1961 Ht., cm	1961 Wt., lb	1962 Ht., cm	1962 Wt., lb	1963 Ht., cm	1963 Wt., lb	1964 Ht., cm	1964 Wt., lb
870	M	2/21/56	76	19	82	24	92	27	100	31	106	35	111	38	116	42	121	47
872	M	8/4/43	149	83	159	102	167	124	—	—	—	—	—	—	---	--	---	--
874	M	8/ /46	133	59	138	68	145	81	—	—	—	—	—	—	168	119	---	--
876	F	/39	160	120	—	—	—	—	—	—	—	—	—	—	---	--	---	--
879	F	4/ /54	81	24	93	29	—	—	—	—	—	—	—	—	---	--	126	54
885	M	10/17/38	164	120	165	135	—	—	—	—	—	—	—	—	---	--	---	--
887	M	10/19/44	141	67	146	—	153	86	160	104	165	105	169	116	---	--	---	--
891	F	5/15/48	122	46	126	54	130	57	135	65	143	74	—	—	150	90	152	91
892	M	7/17/46	128	53	132	64	138	70.5	145	84	154	94	156	102	---	--	161	115
896	F	5/6 /38	137	90	139	100	139	100	139	108	—	—	—	—	---	--	---	--
900	F	7/ /57	—	—	68	18	82	23	—	—	—	—	—	—	111	---	---	--
901	F	7/12/57	—	—	67	16	78	23	—	—	94	31	100	38	105	38	111	42
902	F	10/23/57	—	—	63.5	12	75	21	—	—	93	30	99	34	103	36	110	42
903	F	11/19/57	—	—	57	10	71	19	—	—	—	30	97	34	101	35	107	38
904	M	12/22/57	—	—	—	13	79	22	—	—	96	32	101	35	107	39	113	45
905	M	10/23/57	—	—	62	14	74	19	—	—	91	27	95	30	102	30	106	35
906	F	3/1/58	—	—	—	—	68	15			90	25	96	28	102	32	107	35
909	F	3/11/50	—	—	109	40	—	—	120	50	125	51	—	—	137	74	141	78
911	F	3/8/53	—	—	101	38	108	41	—	50	119	55	125	61	129	66	135	77
912	M	6/1/53	—	—	101	37	109	38	114	44	120	48	124	51	127	54	131	58
913	M	3/27/51	—	—	114	43	120	47	126	55	129	56	131	60	135	65	138	70
919	M	3/9/48	—	—	125	47	—	—	—	—	136	58	141	63	148	71	150	78
921	M	10/11/53	—	—	98	38	105	39	111	42	115	48	118	51	122	54	125	56
923	F	6/9/55	—	—	82	25	88	29	98	38	102	36	106	37	111	42	116	47
924	M	/55	—	—	84	29	—	—	—	—	—	—	107	—	---	--	---	--
925	F	5/4/50	—	—	115	44	120	48	124	55	131	57	136	68	140	78	146	85
926	F	2/26/51	—	—	114	44	—	—	125	52	128	56	—	—	136	66	141	71
930	F	4/ 4/56	—	—	87	26	95	30	—	—	106	36	110	41	116	44	121	51
931	M	/54	—	—	90	30	—	—	104	37	109	41	—	—	118	50	123	53
937	F	/53	—	—	101	39	—	—	—	—	122	54	128	63	133	69	137	77
939	M	1/10/46	—	—	141	86	146	97	152	118	159	117	162	134	162	133	164	149
940	M	9/19/48	—	—	124	54	130	57	135	66	139	72	147	82	---	--	---	--
946	F	10/6/50	—	—	114		—	—	—	—	130	67	—	—	144	78	148	92
950	F	7/29/44	—	—	151	109	—	—	—	—	135	126	—	—	155	134	155	159
952	M	9/26/56	—	—	87	26	92	29	99	32	103	35	107	38	112	42	115	44
954	F	6/ /56	—	—	—	—	79	23	—	—	92	28	—	—	---	--	109	39

No.	Sex	Birth date	1957 Ht., cm	1957 Wt., lb	1958 Ht., cm	1958 Wt., lb	1959 Ht., cm	1959 Wt., lb	1960 Ht., cm	1960 Wt., lb	1961 Ht., cm	1961 Wt., lb	1962 Ht., cm	1962 Wt., lb	1963 Ht., cm	1963 Wt., lb	1964 Ht., cm	1964 Wt., lb
955	F	5/11/52	—	—	112	43	118	48	—	--	129	65	133	71	139	82	145	98
959	F	8/30/48	—	—	128	65	134	74	140	95	148	107	149	119	150	132	150	127
960	F	12/5/51	—	—	115	47	121	51	126	59	133	63	138	74	144	86	148	97
962	F	11/3/52	—	—	102	39	108	42	—	--	118	49	122	53	125	55	130	61
965	F	/ /44	—	—	145	91	—	—	—	--	148	95	150	101	---	--	---	--
967	M	8/10/43	—	—	152	104	158	117	—	--	160	133	160	145	---	--	---	--
971	M	8/13/43	--	--	151	93	158	106	161	116	164	124	165	126	---	--	---	--
972	M	7/1/55	—	--	92	30	98	32	104	36	110	38	—	—	117	46	---	--
976	M	10/19/47	—	—	137	74	141	90	—	--	—	—	—	—	---	--	---	--
977	F	2/9/46	—	--	143	74	150	102	—	—	155	112	—	—	---	--	158	110
978	F	10/20/50	--	—	118	50	123	50	129	66	135	70	—	—	---	--	151	102
979	F	6/5/55	--	—	84	23	91	28	96	31	102	32	108	—	---	--	115	43
980	F	10/3/52	—	--	108	39	113	44	118	50	123	53	—	—	---	--	144	85
981	M	8/8/54	--	—	94	31	101	33	—	—	112	40	--	—	120	47	125	52
985	F	5/20/52	--	--	102	35	--	—	—	--	—	—	—	--	---	--	---	--
986	F	10/24/54	--	--	92	29	--	--	—	—	110	—	—	—	---	--	---	--
987	M	/57	—	—	--	--	—	—	--	--	98	—	—	—	---	--	---	--
988	F	7/ /54	—	—	94	31	96	33	105	38	110	41	—	--	---	--	---	--
989	M	1/23/46	—	—	134	--	--	--	—	--	—	--	—	—	---	--	---	--
990	F	/54	—	--	84	24	--	--	--	—	--	--	--	--	---	--	---	--
992	F	8/14/57	--	--	--	--	77	20	--	--	94	28	99	32	---	--	---	--
993	F	2/25/47	--	--	132	59	140	67	148	81	153	99	154	117	155	120	155	115
995	F	3/19/57	--	—	73	20	81	25	—	--	95	34	101	36	106	37	111	42
996	F	1/16/53	--	--	102	31	108	35	112	43	118	44	122	49	127	54	133	63
997	M	/52	--	—	111	44	—	—	—	--	--	--	--	--	---	--	---	--
998	F	6/12/47	--	—	135	65	142	72	—	--	154	99	155	106	156	113	156	119
1002	M	3/22/55	--	--	—	--	91	28	--	--	101	34	--	—	108	40	113	43
1003	M	3/28/58	—	--	—	--	75	21	--	--	--	--	--	—	---	--	---	--
1004	M	5/31/58	—	--	—	—	72	20	—	—	88	27	93	31	99	34	104	36
1006	M	8/12/58	—	--	—	--	70	15	--	—	87	25	94	28	100	32	106	36
1009	M	1/22/59	—	--	—	—	58	12	--	—	79.8	28	87	31	94	34	99	37
1010	M	1/27/59	--	--	—	--	53	9	—	—	—	22	--	26	93	31	100	33
1011	F	3/9/59	--	--	--	—	--	7	—	—	—	24	—	--	---	--	97	34
1012	F	Age 4'62	--	--	—	--	--	--	--	--	94	31	100	33	105	37	111	42
1014	M	Age 6'62	--	--	—	—	--	--	--	--	98	30	—	--	108	36	113	39
1015	M	12/31/60	--	--	—	—	--	—	--	--	—	—	78	24	---	29	---	--

No.	Sex	Birth date	1957 Ht., cm	1957 Wt., lb	1958 Ht., cm	1958 Wt., lb	1959 Ht., cm	1959 Wt., lb	1960 Ht., cm	1960 Wt., lb	1961 Ht., cm	1961 Wt., lb	1962 Ht., cm	1962 Wt., lb	1963 Ht., cm	1963 Wt., lb	1964 Ht., cm	1964 Wt., lb
1017	M	Age 4'62	—	—	—	—	—	—	—	—	84	22	90	29	96	29	---	--
1018	M	3/17/60	—	—	—	—	—	—	—	—	—	—	78	22	---	--	93	31
1019	F	1/18/60	—	—	—	—	—	—	—	—	—	—	80	—	---	--	95	31
1020	F	7/15/59	—	—	—	—	—	—	—	—	—	—	—	23	89	27	95	29
1021	F	5/11/59	—	—	—	—	—	—	—	—	—	22	—	—	---	--	--	--
1022	F	11/20/59	—	—	—	—	—	—	—	—	—	—	84	26	---	30	99	32
1024	M	11/13/59	—	—	—	—	—	—	—	—	76	25	85	31	92	35	100	39
1025	F	6/13/59	—	—	—	—	—	—	—	—	—	18	81	24	87	26	94	29
1026	F	5/28/60	—	—	—	—	—	—	—	—	—	—	80	21	90	26	97	30
1027	M	12/7/60	—	—	—	—	—	—	—	—	—	—	71	18	82	23	87	27
1028	M	2/22/61	—	—	—	—	—	—	—	—	—	—	71	16	---	22	--	--
1029	F	3/8/61	—	—	—	—	—	—	—	—	—	—	—	17	---	26	91	32
1030	M	3/26/61	—	—	—	—	—	—	—	—	—	—	72	22	---	26	91	29
1031	F	1/5/61	—	—	—	—	—	—	—	—	—	—	75	20	86	26	--	31
1033	M	/50	—	—	—	—	—	—	—	—	—	—	87	78	143	86	150	105
1034	F	Age 4'62	—	—	—	—	—	—	—	—	—	—	96	32	106	36	113	39
1035	F	Age 12'62	—	—	—	—	—	—	—	—	—	—	145	92	146	98	146	107
1036	M	Age 10'62	—	—	—	—	—	—	—	—	—	—	127	56	131	60	134	67
1037	M	9/18/61	—	—	—	—	—	—	—	—	—	—	65	14	---	20	---	25
1038	M	10/31/61	—	—	—	—	—	—	—	—	—	—	66	17	74	24	84	27
1039	M	12/18/61	—	—	—	—	—	—	—	—	—	—	—	11	---	--	---	22
1040	M	9/24/61	—	—	—	—	—	—	—	—	—	—	66	17	---	25	87	29
1008	F	6/24/58													---	--	95	32
1013	M	9/23/60													---	--	--	--
1044	F	9/17/62													---	16	--	20
1046	M	10/ 9/62													---	14	--	18
1047	M	12/28/62													---	--	---	19
1051	F	/ /55													---	--	124	59
1052	M	/ /53													---	--	132	68
1053	M	/ /56													---	--	99	34
1054	M	11/29/63													---	--	---	15
1056	M	3/4/64													---	--	---	9
1057	F	8/ 4/63													---	--	---	15
1058	M	1/16/64													---	--	---	9
1503	M	/ /58													89	27	96	30
1504	M	/ /62													---	21	85	25

APPENDIX 12

Pediatric Anthropometric Data (Height and Weight) on Children Born to Exposed Parents, 1956 through 1964

No.	Sex	Birth date	1957		1958		1959		1960		1961		1962		1963		1964	
			Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb
87*	F	10/17/54	76	21	—	24	—	—	97	30	105	36	112	—	115	43	118	48
88*	M	9/ 8/55	70	21	81	26	89	31	98	36	103	39	108	43	113	48	118	52
89*	M	12/28/55	81	21	—	24	87	28	95	22	100	35	105	38	109	40	115	46
90*	M	11/29/55	71	22	86	28	94	32	101	36	108	41	113	45	120	51	120	54
91*	M	1/ 3/55	85	26	90	29	97	34	104	38	110	43	116	48	129	51	124	56
92	F	3/16/56	71	22	81	26	86	28	94	33	101	36	106	41	111	45	117	49
93	M	2/17/57	50	8	74	21	86	27	93	32	100	36	106	39	110	41	116	46
94	F	10/ /56	64	16	—	—	84	26	—	—	95	34	100	35	105	38	107	40
95	F	2/ 5/56	69	18	83	25	91	28	98	32	105	35	109	38	114	41	---	--
96	M	2/12/58			51	9	71	23	83	29	90	34	97	38	---	--	106	41
97	M	10/31/57			—	16	78	23	—	—	96	31	—	—	---	--	113	41
98	M	3/ 5/58					71	20	—	—	85	28	91	38	95	33	101	37
100	F	4/26/56	71	22	83	25	88	33	96	35	102	40	—	—	---	--	117	51
101	F	4/24/58									89	27	—	—	101	33	106	38
102	M	3/16/58					75	18	84	24	93	28	99	30	105	33	111	37
103	F	5/28/58					70	16	—	—	—	26	94	30	99	31	106	36
104	M	10/ 2/58					68	17	—	—	86	26	—	—	98	31	105	35
105	F	10/ 9/58					65	16	—	—	85	26	92	29	99	34	107	40
106	F	3/11/59											89	26	96	33	103	35
107	F	1/22/59									—	22	—	—	---	--	---	--
108	F	12/16/58									—	24	87	—	95	32	98	34
109	M	1/ 7/60									—	21	—	—	95	33	114	39
110	M	12/ 5/59											84	26	90	31	98	34
111	M	5/24/59											83	23	88	26	96	30
112	F	6/ 8/59											80	23	87	27	93	30
113	M	2/27/61											—	20	---	24	---	30
115	M	8/16/60											—	21	80	28	87	33

*Data for 1956 on the first five children are as follows: No. 87, 16 lb; No. 88, 58 cm, 15 lb; No. 89, 13 lb; No. 90, 62 cm, 11 lb; No. 91, 75 cm, 22 lb.

No.	Sex	Birth date	1957 Ht., cm	1957 Wt., lb	1958 Ht., cm	1958 Wt., lb	1959 Ht., cm	1959 Wt., lb	1960 Ht., cm	1960 Wt., lb	1961 Ht., cm	1961 Wt., lb	1962 Ht., cm	1962 Wt., lb	1963 Ht., cm	1963 Wt., lb	1964 Ht., cm	1964 Wt., lb
117	F	3/28/61											71	16	78	20	89	25
118	M	11/25/60											68	18	82	26	92	29
120	F	6/27/60											76	22	---	27	93	32
116	M	5/15/60													---	28	95	33
119	F	7/19/60													85.8	29	92	32
121	F	6/7/60													---	--	---	--
122	F	4/12/60													---	26	94	30
123	F	11/26/61											77	22				
124	F	10/23/61											56	--	---	--	81	24
125	F	6/ /61											66	16	74	23	---	--
126	M	9/26/61											71	17	81	23	88	29
127	F	5/17/62											64	16	73	21	81	24
128	F	1/30/63													---	17	---	21
130	M	4/19/63													---	--	---	17
131	M	10/28/63													---	--	---	--
132	M	/ /63													---	--	---	13
134	F	5/ /63													---	--	---	13
															---	--	---	18

APPENDIX 13

Pediatric Anthropometric Data (Height and Weight) on Rongelap Exposed Children, 1954 through 1964

No. & sex	Age at exposure	Birth date	1954 (Mar.) Ht., cm	1954 (Mar.) Wt., lb	1954 (Sept.) Ht., cm	1954 (Sept.) Wt., lb	1955 Ht., cm	1955 Wt., lb	1956 Ht., cm	1956 Wt., lb	1957 Ht., cm	1957 Wt., lb
83 M	In utero	6/8/54	—	—	66	15	74	20	84	28	90	31
84 M	" "	5/31/54	—	—	—	—	86	—	—	—	—	28
85 M	" "	9/17/54	—	—	—	7	66	17	86	—	88	27
86 F	" "	10/17/54	—	—	—	—	58	16	—	—	83	25
54 M	1 y	2/21/53	—	23	—	—	80	28	90	36	98	39
65 F	1 y 2 m	12/52	—	21	—	23	79	24	83	27	88	26
5 M	1 y 4 m	10/52	—	20	80	25	85	27	88	29	93	31
3 M	1 y 5 m	9/52	—	22	83	25	84	28	90	31	93	31
2 M	1 y 4 m	10/52	—	22	—	26	85	29	90	31	95	34
6*M	1 y 4 m	10/52	—	24	—	—	81	27	90	30	95	32
8*F	1 y 8 m	6/52	—	23	—	25	84	26	91	30	99	35
33 F	1 y 7 m	7/52	—	22	—	25	88	28	95	32	99	33
42 F	3 y	3/51	—	25	—	27	92	28	97	31	100	36
21 F	3 y	3/51	81	29	—	—	91	32	98	35	101	39
17 F	3 y 4 m	10/50	90	31	—	32	98	35	102	38	109	41
23 M	3 y 5 m	9/50		38	95	37	100	40	105	47	110	49
32 M	3 y 6 m	8/50	—	29	—	29	95	32	100	36	105	38
44*M	4 y	3/50	—	32	99	32	—	—	107	40	112	40
69 F	3 y 7 m	7/50	95	33	100	34	100	37	105	42	113	44
19 M	5 y 2 m	1/49	99	33	104	32	105	37	109	39	113	42
48*F	5 y 8 m	6/48	—	41	116	43	117	44	121	48	126	52
72 F	7 y	3/47	108	44	113	40	112	44	116	49	121	53
15 F	7 y	3/47	106	35	114	37	113	41	116	48	123	47
20 M	6 y 9 m	5/47	110	43	111	43	115	49	118	57	125	59
36 M	7 y 4 m	10/46	116	50	120	51	119	57	124	64	129	64
61 F	8 y	3/46	124	66	120	70	130	79	139	99	145	115
47 M	8 y 5 m	9/45	120	55	123	54	124	56	130	64	133	68
81*F	8 y 2 m	12/45	114	43	—	48	119	50	124	55	130	56
53*F	8 y 2 m	12/45	118	48	122	46	126	49	130	51	133	56
76 M	10 y 7 m	7/43	128	63	130	64	135	65	138	73	143	79
75 F	11 y 6 m	8/42	135	79	138	82	145	91	145	100	146	108
26 M	12 y 4 m	10/41			143	104	150	110	155	138	163	140
24 F	13 y 5 m	9/40		96	142	100		99	144	100	145	103
35 M	13 y 5 m	9/40	138	98	147	94	155	105	155	111	156	114
67 F	13 y 7 m	7/40	151	115	152	117	152	108	152	116	154	123
39 F	13 y 5 m	9/40	148	104	149	102	150	103	150	108	151	109
70 F	15 y	/38	142	96	—	104	—	108	—	—	150	116
74 F	15 y 9 m	5/38	—	—	151	134	151	142	151	137	151	141
22 F	15 y 9 m	5/38	151	120	154	120	154	116	154	110		
49 F	15 y 11 m	3/38	150	120	150	123	150	127	150	145	150	146
73 M	18 y	3/36	170	160	170	158	170	156				
12 F	19 y	/35	147	96	147	112						
37 M	19 y	/35	155	128	165	132						

*Ailingnae group.

1958		1959		1960		1961		1962		1963		1964	
Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb	Ht., cm	Wt., lb
98	34	105	39	113	45	117	48	123	55	127	58	131	64
94	33	99	35	105	39	110	44	—	—	---	--	124	58
96	30	101	33	108	37	113	40	—	—	121	48	---	--
91	28	97	30	104	33	108	36	112	41	116	44	---	--
107	45	113	47	118	55	124	57	127	62	134	73	140	82
93	31	98	33	103	38	109	40	114	44	119	---	---	--
96	35	99	36	102	40	105	44			111	48	114	51
99	37	102	40	107	44	109	50	110	51	114	65	114	68
103	40	108	42	116	46	120	52	125	56	128	61	133	65
100	38	106	41	112	44	116	50	120	53	124	59	128	61
105	39	111	43	118	45	122	52	125	57	132	63	140	75
107	39	116	44	121	50	127	55	132	60	141	72	147	81
108	40	113	42	118	47	123	50	127	54	132	58	139	68
110	44	115	49	121	56	127	76			140	79	145	87
117	48	122	53	128	60	133	64	139	70	146	81	152	100
119	52	123	60	129	68	134	75	138	79	142	87	147	97
113	43	118	46	121	54	125	56	129	58	132	64	137	71
117	47	122	52	127	58	131	64	—	—	---	--	---	--
120	50	126	54	130	62	138	69	144	77	150	90	155	101
119	48	123	51	128	60	132	63	137	66	141	76	149	84
133	61	139	69	145	82	151	92	154	96	154	103	155	104
132	63	139	75	148	93	153	115	154	118	160	126	157	137
130	58	136	65	144	75	152	86	155	99	157	113	158	120
132	64	135	67	140	80	148	87	155	104	158	112	159	118
134	76	139	80	146	88	149	97	156	115	163	124	---	---
152	124	152	142	154	152	153	156	154	161	---	---	---	---
140	77	145	79	152	98	160	119	165	130	167	137	---	---
135	66	145	83	152	92	154	107	155	108	---	---	---	---
142	67	149	83	153	90	154	92	154	94	154	98	155	102
153	97	162	113	166	127				138	---	--	---	---
151	103	149	99	150	94								
173	153	175	154	175	165	175	168						
—	109	148	96	149	100								
—	123	163	122	—	117								
156	121			158	118	160	127						
155	116	155		155	106								

APPENDIX 14

Supplementary Anthropometric Data on Rongelap Control Children

1957

Subject No.	Sitting ht., in.	Lower extremity length, in.	Upper extremity length, in.	Arm span, in.	Biacromial width, in.	Intercristal width, in.	Head circ., in.	Chest circ., in.	Left calf circ., in.	Buttocks circ., in.
801	16	12.5	10.2	26	6.5	5	17.0	17	7.0	17
802	17	11	11.5	33	7	5	16.5	17	6.5	18
803	18	14	11	27	6.5	4.5	18	17.5	7	18
804	17	15.5	12	29	7	5.5	18	18	8	19
805	20	18	14.5	33	8	6.5	18	19.7	6.5	19
806	19.5	16	13	31	8	6	19.5	19	7.7	19
807	19	17	13.2	32.5	8	6	18.7	18.7	7.7	18.5
808	19	15	12	30	7.5	6	18	18.5	7.5	14
809	19	14	12	28	6.5	5.5	17.5	19	6.7	17
810	20.5	19	14	33.5	8	6	19	19	7.2	19
811	19.5	19	14	31.5	7.7	6	19	19.5	7.7	19.5
812	20	18.5	14.2	35	8.5	6	19	21	7.5	19.5
813	19.5	18.5	14.5	34.5	8.0	6.5	19	19.5	8	19.5
814	21	21.7	16.7	38	9	7	19	22	8	21
815	23.5	25	19	42.5	10	7.5	19	22	9	22
816	25.2	26.5	19	44	9.5	7	19.7	21.7	9	22.5
817	24.5	26.5	19	43	10.5	6.5	20	22.2	9	24.5
818	24	26	19	43	10	7	21	22	9	23.5
819	27	25.2	20.7	47.5	10.5	8.5	19.7	24.5	10	24.5
820	25	29.5	21.5	49	12	7.5	19.5	25.5	9.5	24.5
821	26	28	20.5	46	10.5	8	20.7	24.5	10.5	26.5
822	25.5	30	22	51	11.7	9	20.5	25	10.5	33
823	30	34	25	59.5	13	10	20.2	26.5	12	29.7
824	27.7	33	24	55	13	9	20	25.5	11	28
825	31	35	25.5	59	14	9	21	30.5	11.2	28
826	30	37	25	57	14	8	21	26	10	30
827	32.5	37	28	64	15.5	9.5	22.5	34.5	13.5	34
828	26	34	26.5	58.5	14.5	10	20.7	34	12.5	32
830	33	37	28.5	65	16	11	21.5	33.5	14	36
831	30.5	36	26	60	14.5	8	22	30	12.5	32.5
863	22.5	25	18	43.2	9	6.5	19.5	24	9	22
866	19	14.5	12	29.2	7.5	5.5	18	18	7	17.5
869	26	30.5	22.2	50	11	7.5	20	24.7	10	26
870	18	14.5	12.5	29	7	5	17.5	18	7	17
872	29.5	37	27	61.5	13.5	9	20.5	28.5	11	29
874	26.5	31	23.5	54	12	8	20	24.2	10	26
876	33.5	37	28	63.5	13.5	10	21	30	13.5	34
879	19.5	17	12.5	31	8	6	18	18.5	7	19.5
885	33	37.7	29.5	67	15	10.5	22	33.5	13.5	36.5
887	28.5	33.5	24	54.2	12.5	8	20	25.5	10.5	27.2
891	25	27	20	47	10	9	20	23.5	9	29
892	27.2	28.5		48.5	11	8	20.5	24.5	10	26

1958

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
801	45.7	13.5	15.2	47.0	45.5	18.2	17.4	13.3	46
802	45.2	12.6	15.4	47.6	45.5	18.2	17.3	14.1	47.3
803	48.5	13	16.8	—	48	19	18.1	13.7	—
805	47.5	13.6	15.4	54.7	49	21	20.7	17.6	56.5
806	49.8	13.4	17.1	53.3	49	20.2	18.5	15.9	49.5
807	47.2	13.1	16.3	49.6	49	19.5	18.5	15.3	48
808	46.2	12.7	16	53.2	50.3	20	19.7	15.2	49.7
809	46.5	12	16.7	50	50.5	18.5	19.7	15.7	47
810	47.7	12.6	16.7	56.9	49.4	20	21.2	16	51.5
811	49.4	12.7	17.2	53.5	51.4	21.2	19.8	15.6	54.0
812	48.8	12.2	17.4	53.7	52.5	21.5	20.4	16	52.3
813	47.5	13.6	16.1	53.8	52.1	20.7	20.9	15.7	52.2
814	48.7	14	16.4	58.3	55.7	22.4	23.9	16.6	54.2
815	49.3	13.7	16.5	62.5	57	22.9	23.2	18.3	58
816	50.2	13.6	17.5	66.6	57	24.1	24.8	19.5	62.5
817	50.3	14	17.3	67	57	23.5	25.2	18.7	60.8
818	51.2	13.9	18	65.6	58	23.3	24.6	18	60.5
819	51.4	14.9	17.1	72.2	65.8	27.8	27.3	20.4	66.4
820	48.3	14	16.4	66.7	60.7	24.2	27.1	18.7	63.3
821	53	13.9	18.7	71.4	62.8	28.5	26.6	22.4	67
822	52.5	14.6	18.0	72.5	63.6	27.4	28.8	23.1	69.9
823	52	13.4	17.7	78.3	70.2	30.7	>30	25.4	78.8
825	53.1	13.6	18	84	--	31.6	>30	25.3	--
827	54	14.4	18.8	82	85.8	33.9	>30	25.5	—
828	52.4	14.3	18.2	81.7	77	31.2	>30	24.9	77.7
830	55.9	14.5	19.3	84.8	86.4	36.3	--	27.2	—
831	55.7	15	19.1	83.1	76	32.5	>30	25.7	79
863	50.5	14.3	17.1	62.9	59.2	23.9	25.2	18.7	59.4
866	46.4	13.1	16.1	52.7	48.4	19.1	18	14.4	49
869	50.6	14.2	16.3	70	63	26	27.3	21.1	67.2
870	46	13	15.5	47	46.4	19	19.3	14.5	46.5
872	53.2	14.7	17.7	78.6	75.6	31.4	>30	25.3	79.4
874	51	14.6	16.9	71.4	62.9	26.5	28.5	20.8	69.1
879	46.8	12.3	16.8	53.9	50	20.2	21	16.2	49
885	56	15.2	18.9	85	84	34.6	—	28.6	89
887	51.3	13.8	17.9	75.8	67.7	28.3	28.5	21.0	69
891	50.3	13.1	17.5	67.3	59	24.3	24.9	19.5	64
892	52	14.2	18	71.4	64.5	25.5	27.2	20.8	66.5
896	51.6	13.8	17.2	75.6	—	31.4	—	—	--
900	43	11.8	14.8	--	42.5	16.7	16	12	—
901	41.7	12.1	13.8	--	41	17	13.6	12.9	—
902	40.6	11.3	14.0	—	39.4	18.2	13.7	12.4	--
903	36.5	10.5	12.4	--	36	13.5	--	10.5	--
904	39	--	—	—	37.5	--	—	—	--

1958 (cont.)

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
905	40	--	--	--	40	—	--	—	—
909	50.3	13.4	17.1	61.1	51	22	21.5	16.0	--
911	49	13.8	16.3	56.2	53.5	22.5	22.1	17.0	54
912	49.3	13.2	17.5	59.7	52.3	21.3	20.7	17.9	53
913	49.6	13.4	17.3	62.8	52	22.3	23.2	19.2	57.8
919	48	12.5	16.7	67.1	55.3	22.6	26.4	20.2	59
921	49.9	12.8	17.8	56.7	55.8	22.6	21.6	17.0	55.8
923	47.8	13.1	16.7	48.5	47.0	17.4	18.2	14.0	—
924	48.8	13.2	16.8	50.7	48	19	17.8	14.5	—
925	51.0	13.5	17.8	63.1	55	21.8	25	18.2	56.5
926	49.4	12.5	17.6	63.2	54.5	21.8	23.3	12.7	57.5
930	47.2	13.3	16.2	50	48	19	18.7	14.0	—
931	48.7	13.7	16.5	51.5	51.5	21.2	20.6	15.5	50.5
937	48.4	13	16.6	55.3	52.5	21.5	21.2	16.4	56.7
939	51.4	14.2	17.7	74.9	67.5	31	30	21.7	74
940	48.6	13.4	16.7	65.5	61	25.2	26	20	62
946	49.7	13.0	17.2	63.1	54	22.5	23.7	18.4	57
950	54.7	14.9	18.2	80.6	--	31.5	>30	21.6	85.5
952	47	12.8	15.9	51.3	47	19.2	18.5	14.5	47
955	48.5	13.1	16.8	62.2	52.7	23.2	22.9	18.5	56
959	51.2	14.4	17.0	69.1	61.3	26.8	27.9	20.4	68
960	50.3	13	17.8	63.5	56.6	24.2	23.4	18.7	60
962	51.0	13.3	17.9	58.4	54.5	21.6	21.9	18	57.5
965	52.7	13.1	18.0	76.2	—	29.1	25.2	--	79
967	52.5	14.4	17.8	79.7	78	32.7	>30	23.5	—
971	51.1	13.9	18.0	78.9	69.6	30	>30	22.4	75.5
972	48.9	12.4	17.7	53.3	52	19	20.8	15.8	—
976	51.3	14.1	17.4	71.9	65	27.4	28	21.8	70.5
977	51.7	14.1	17.3	76	60.5	27.5	29.5	23.8	69.9
978	50.4	13.5	16.7	66.1	56.5	24	24.7	18.0	60
979	47	12.6	16.6	48.3	45	17.8	18.0	14.3	46.5
980	50.7(hair)	13.9	17.1	58.4	51	22.3	21	18	57
981	45.8	12.7	16	52.9	49	21	20.4	14.3	51.5
985	49.5	13.8	16.8	56.3	52	20.2	22.1	16.5	53.5
986	46.8(hair)	12.9	16.2	54.5	48.5	20.2	20.1	15.2	49
988	45.8	12.8	15.0	52.5	48	21	21	15.1	50.5
989	52.3	14.3	18	72	66.9	27.6	29.4	20.6	69.7
990	47.2	12.9	16.2	48.8	47	18.0	19	13.9	47.5
993	52.2	14.5	17.6	71.2	59	24.6	26.5	19.8	63
995	43.6	--	--	—	42.5	—	—	—	—
996	47.4	13.0	16.2	55.8	49.2	20.8	21.7	16.8	52
997	48.7	13.2	16.8	61.2	55	23.2	24.3	17.3	55.5
				71	63	26.3	26.5	22.0	68

1959

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
801	46.6	13.9	15.5	50.9	47.5	19.0	18	14.8	47
802	46.3	13	15.7	50.4	49.1	19.8	19.6	15.7	49.5
803	48.6	13.5	17.1	54.4	49.4	19.6	20.5	14.9	49.4
805	48.3	13.8	15.5	58.8	54.2	21.4	21.2	18.0	55.5
806	50.3	14	17.3	57.3	51.5	21.5	20	17	52.5
807	47.7	13.3	16.5	52.5	--	19.7	20	16.3	—
808	46.8	12.8	16.2	56.6	50.4	20.6	21.4	17.2	53.5
809	47.2	12.2	17.2	54.8	49	19.5	19.4	16.4	47.2
810	48.2	12.6	16.9	58.3	50	20.1	21.4	16.5	52.5
811	49.6	13.0	17.5	55.5	50.7	20.8	20.6	16.8	52
812	49.5	12.3	17.8	58.8	53	22	22.2	17.6	54
813	48	13.5	16.4	56.7	52.7	20.6	22.3	17	51.7
814	49	14	16.5	61.4	56	22.3	23.9	18	56
815	49.2	13.7	16.7	68.6	56.7	23.9	25	18.1	58
816	51.3	13.8	17.6	68.2	59.4	25.5	25.6	21.5	64
818	51.2	13.9	18	68.5	58.3	23.6	24.7	19.4	61.5
819	51.5	14.8	17.1	74.6	66.5	28.4	28.5	21.9	66
820	48.5	14	16	69	63	25.5	27.9	19.8	59
821	54.3	14	19.1	73.7	64.8	29.4	28	22.2	71
822	52.8	14.7	18.2	74.3	66.5	28.9	30.1	23.7	66
823	52.4	13.4	18.6	83.1	76.5	32.9	> 30	28.5	83.8
825	53.0	13.8	18.2	83.0	—	32.8	--	26	86
827	53.5	14.2	18.5	83.1	--	34.0	> 30	> 30	—
831	56.2	15	19.1	85.1	79	33.6	—	25.0	85
863	50.6	14.2	17.1	65.4	67.2	24.1	25.8	19.1	60.5
866	47.4	13.3	16.3	52.8	51	19.8	20	15.2	51.0
869	51.3	14.4	17.2	72.3	66.7	27.6	28.2	22	65.6
870	46.6	13	15.7	52.5	48.4	19.7	19.4	15.7	47.8
874	51.8	14.6	17.6	74.4	68.8	28.2	30	22.5	74
887	51.3	13.8	17.8	78.7	69.6	29.7	30.1	22.0	72
891	50.5	13	17.3	70.1	59.5	24.7	25.4	19.8	64.6
892	52.2	14.2	18.1	73.5	66.2	27	27.7	21	69
896	52.2	13.8	17.3	73.7	—	32.1	31	25.0	84.5
900	45.7	12.4	16.0	--	46.2	17.3	16.8	13.7	--
901	45.5	13	15.2	--	44.5	19	17	14.5	47.3
902	44.5	12.2	15.7	--	44.3	18	16.6	13.2	46.9
903	42.7	12.1	14.6	—	43.1	16.0	16.5	12.0	—
904	45.8	12.7	15.5	--	45.6	17.5	16.2	14.2	44

1959 (cont.)

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
905	44.8	12.4	15.7	—	44.8	16.3	15.7	13.3	42.5
906	42	13	13.8	--	40.5	39.5	16	12.6	39.5
911	49.5	14.0	16.7	61	53.7	23	23.7	18.0	56.0
912	49.8	13.2	17.7	63.5	51.2	21.2	23.1	17.8	55
913	50.5	13.6	17.5	65.6	54.4	23.0	24.4	20.2	59.4
921	49.8	12.9	17.9	59.3	55.7	22	22	18.0	54.5
923	49.3	13.3	17.0	49.5	48.8	19.2	19	15.5	49.7
925	51.7	13.6	17.8	65.4	57	22.7	25	19.5	59.0
930	48.2	13.3	16.5	54.8	48.9	20.4	19.7	14.6	49.5
939	51.7	14.3	17.6	78	72.5	32.4	30.3	23.5	75.5
940	48.7	13.5	16.8	68.8	62	25.6	24.1	20.4	63.8
952	47.4	12.7	16.6	53.3	48.3	19.4	19.1	15.4	47
954	47	12.6	16.5	—	46	18.2	16.2	14.6	--
955	49.4	13.5	16.8	63.4	55.5	24	23	18.8	59.5
959	51.6	14.3	17	71.6	65.5	28.5	28.8	21.7	69
960	50.4	13.2	17.8	66	57	24.7	25.3	19.5	61
962	51.9	13.4	18.1	62.5	54.9	22.5	22.4	18.0	58.8
967	52.8	14.6	18.0	83.5	82.5	34.1	>30	23.7	83.5
971	51.6	14	18	82.3	74.3	31.1	>30	23	83
972	49.4	12.6	17.9	55.3	52.6	19.5	21	16.5	51.2
976	52	14.2	17.5	75.5	71.8	30.1	29.6	22.8	76.5
977	53.1	14.5	17.6	81.5	--	30.9	30	24.4	81.2
978	51	13.9	17.1	68.1	57.8	26.2	25.2	19	65
979	47	12.7	17.2	50	47	19.6	19.5	15.3	48
980	51	14	17.4	60.2	52.5	23.8	21.5	18.8	57.2
981	46.3	12.7	16.0	58	50.5	21.5	21	16.2	51.5
988	46.5	12.9	15.6	54.5	49.5	21.3	21.4	16	52.5
992	45.3	12.9	15.5	—	45	16.2	17	13.5	44
993	52.7	14.5	17.5	75.6	61.5	26.4	27.7	21	66
995	49	12.7	17.5	--	49.3	18.6	16.4	14.6	46.5
996	47.8	13.0	16.4	57.8	50.2	21.1	22.7	17.8	52.7
998	52.5	13.7	18.1	75.4	65	26.5	27.3	23.4	70
1002	47	14	15.5	55	50.3	19	21.2	15.9	49.9
1003	44.2	12.5	15.5	--	44.5	—	—	--	--
1004	45.3	12.4	15.8	--	43	—	16.2	13.0	--
1006	42.8	12.2	14.5	—	41.5	--	15.0	11.8	—
1009	38.2	10.8	12.6	—	38.7	--	13	11.7	--
1010	37	9.8	12.6	--	35.8	—	--	--	--

1961

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
801	47.5	14.2	15.7	54.7	49.5	20.3	20.2	16.3	50.0
802	47.4	13.5	16	56	52	22	22.1	17.5	52
803	50.2	13.9	17.4	59	52.7	21.7	21.7	16.8	53.5
807	48.3	13.8	16.7	55.2	50.8	20.6	22	17	51
808	47.8	13.1	16.6	62.4	52.6	22.5	23.2	17.5	56.5
809	48.5	12.7	17.2	60	51.5	20.5	21	18.1	50.5
810	48.6	12.9	17.2	61.9	53.2	22	24.2	18.4	58
811	50.2	13.2	17.7	62.1	54.5	22.5	20.6	17.7	55.5
812	50.1	12.7	17.9	64.2	56.4	23.0	24.7	18.2	57.0
813	49	14.1	16.7	62	55.3	22.7	24.4	17.9	57
814	50	14	16.7	64.6	60	24.4	26.3	19.3	62.5
815	50	13.9	16.9	71	62	25.6	27.5	20	66.5
816	52	13.9	17.8	74	64	27.8	27.6	23	73.5
817	52.3	14.3	17.5	75.5	72.8	29.2	29	22.6	78.5
818	51.5	14	18.1	71.2	63	25.9	26.7	20.7	68.0
819	52.3	15	17.2	79	70.3	31	30	23.3	77
820	49.3	14.3	16.4	74.3	68	28.2	30	21.3	71.5
821	55	14.3	19.2	81	—	33	31	26.4	83.5
822	54	14.7	18.7	79	74.5	32.5	—	27.2	80.5
823	53.5	13.7	19	87.3	81.5	34.4	—	29	87.5
824	53	14.2	18.2	85.2	80	33.6	—	25.2	85.8
863	51.5	14.4	17.3	69.4	61.5	26.3	27.8	20.3	66
866	48.8	13.8	16.4	60.2	52.2	21.1	22	17	54.4
869	52.3	14.5	17.5	78.5	73.5	30.5	31	24.8	77.5
870	47.9	14	16.1	57.5	51.5	21	22.5	17.5	51.5
887	52.5	14	18	84.5	77.5	32	—	25.5	80.5
891	51.2	13.4	17.7	75.4	--	27	28	21.8	74
892	53.3	14.5	18.6	81.3	72.6	30.3	31.0	23.8	76.7
901	47.5	13.4	16.5	55	49	20.5	19.9	16.2	51.0
902	47	13	16.4	51.5	49.2	21.1	18.6	15.0	51.0
903	45.7	12.7	16	--	—	--	--	—	—
904	48.7	13.4	16.5	54.4	50.5	20.4	20.4	16.0	49
905	47.3	13.2	16.5	52.5	49	19.3	18.3	15.2	45.5
906	45.5	13.5	14.6	50	46.8	18.5	19	15.3	46.5
909	51.8	13.6	18.0	69.7	57.1	25.5	23.8	20.0	67.2
911	51	14.2	17.1	68.2	60.5	26.7	26.1	19.0	63.2
912	50.5	13.5	17.8	68.8	55.5	23.4	24.4	19.7	59.0
913	50.7	13.7	17.7	70	57	24.5	26.2	21.5	65.0
919	48.8	12.5	17	71	60.5	24.6	27.3	21	67.8
921	49.8	13.2	17.8	65.2	59	23.6	23.7	18.6	59.5
923	50.4	13.6	17.8	57.2	50.5	20.5	21.3	16.9	53.5

1961 (cont.)

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
925	51.7(hair)	13.8	17.6	68.6	59.5	24.2	27.5	19.8	63.2
926	50.6	12.2	17.7	70.6	58.0	24.2	25.2	19.7	64
930	49	13.6	16.5	58.5	52.2	22	22.5	16	53
931	50	13.9	17.2	60.3	55.2	23.3	23.5	17.5	55.5
937	50.0(braid)	15.3	17.0	65.6	58.2	24.5	25.3	18.2	64.0
939	52.8	14.6	18.2	83.5	77.8	33.7	—	27	85.0
940	49.4	13.7	17.0	70	66.7	27.9	27.2	21.7	70
946	51.3	13.3	17.6	70.4	59.5	25	25.9	20.7	65.8
950	55	15.2	18.3	81.9	—	33.5	--	26.8	85
952	48	13.1	16.7	58.2	51.0	21	21.6	17.0	52
954	48.5	13.1	16.7	55.4	48	18.9	19.1	16.3	49
955	49.5	13.3	17.2	68.8	60.8	27	25.5	20.5	69
959	53	14.5	17.5	77.7	--	32.2	31	24	84.5
960	51.3	13.3	18.0	71.2	63.5	27.7	25.7	21.1	66
962	52	13.5	18.5	64.5	56.5	23.5	24.8	18.8	62
965	52(braids)	13	18.1	78.3	--	30	—	26.5	81.5
967	53.5	14.5	18.4	84.9	88.3	35	--	24.5	88
971	52.2	14.2	18.1	86	79	31.5	--	25.3	87
972	50.2	13.1	17.9	61.2	55	20.7	22.5	17	53.3
977	53.5	14.2	17.7	82	--	31.5	--	27	87.0
978	51.5(hair)	13.8	17.4	73.7	63.1	27.8	26.2	20.8	70
979	48.3	13	16.4	55.1	50	20.5	21.1	18.5	50.5
980	51.7	14.2	17.7	67.2	56	25.1	23.6	19.6	61
981	47.4	12.9	16.3	62.8	52.1	22.9	22.4	17.7	55.7
986	48.5	13.2	16.5	61.6	23.3	21.3	23.3	18	55
987	48.3	12.8	17	58	53.2	21.5	20.8	16.6	53
988	46.5	13	15.7	60	53.5	23	23.1	17.6	57
992	47.6	13.5	16.4	52	50	19	20.3	15.5	48
993	54(hair)	14.7	17.8	81	72.5	29.9	31	23.2	80
995	50.5	13.2	18.2	56	51	21	20.6	15.6	52.5
996	49	13.3	16.7	61.2	55.2	23	25.1	18.9	59.5
998	54	14	18.4	83.8	—	29.7	29.6	26.3	79
1002	47.8	14	15.7	58.2	53	20.2	23.2	16.8	51.2
1004	48.5	13.3	17.1	51	48.5	19.2	19.6	15.8	47.5
1006	46.9	13.2	16.2	50.5	46.5	18.5	19.0	15.0	44
1009	48.8	13.5	16.5	--	49	20.5	18	15	50
1010	47	--	—	--	--	--	--	--	—
1012	47.6	12.5	17.4	54	50	20.5	19.9	16.8	50.5
1014	48.5	13	17.2	57.2	50	19	20.6	16.6	49
1017	45.4	12.3	16	--	48	17.9	—	—	—
1025	46.2	12.0	16.6	--	--	--	--	--	—

1962

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
801	48.2	14.3	15.8	55.4	51.3	20.4	21.1	16.7	51.0
802	47.8	13.5	16.4	57.4	54.4	22.5	22.5	18.5	53.0
803	50.4	14	17.5	60	53.4	21.5	22.8	17.4	52
805	49.8	14	16	62.8	57.2	23.6	24.5	20.1	--
807	48.6	13.7	16.5	56.6	52	21	22.8	17.8	51.3
808	48	13.2	16.8	63.8	55.0	22.8	23.2	17.6	57.8
809	48.8	12.6	17.5	62	53	20.8	22.5	17.6	51.2
810	49.3	12.9	17.2	63	54.7	22	23.7	18.3	59
811	50.7	13.2	17.6	63.5	56	23	23.8	18.2	57.9
813	49.2	14	16.7	62.7	57.4	23.6	25.1	18.5	57
814	50.4	14.3	16.7	64.4	60.5	24.8	26.8	19.4	61.3
815	50.2	14	16.9	71	63.2	26.2	27.5	20.9	66
816	52.2	14	17.9	75.1	--	27.8	29	23.6	74.5
818	52	14.2	18.2	71.5	66	26.2	27.5	21.4	68.5
819	52.9	15	17.5	79.9	71.5	31.5	31	24.6	78.8
820	50	14.3	16.6	76.4	71	29.1	--	21.7	76.5
821	55.4	14.1	19.3	80	--	32.9	31	26	79.5
822	54.2	15	19.7	83	76.5	32.9	--	26.7	85.0
823	53.5	13.6	18.6	86.5	81.5	34.5	--	28.5	87.5
863	51.8	14.5	17.4	67.6	65.6	26.8	29.1	21.3	68.5
866	48.9	13.6	16.8	61.5	54	21.8	22.7	17.2	56
870	48.4	13.5	16.4	60.9	52.7	21.3	23.6	18.0	51.9
892	54	14.5	18.5	80.5	73.3	31.1	--	24.4	74.7
900	48.1	13.5	16.2	55.5	51	21.5	20.7	17.7	53.6
902	47.8 (braid)	13.2	16.3	55.2	48.9	21.4	20.3	16.2	51.5
903	46.5	13	16.1	53.2	53.2	20.5	20	16.5	52
904	49.2	13.7	17	55	52.5	21	20.2	17	51.5
905	48.2	13.4	16.8	53.5	49.3	20.1	20.6	16.0	47.4
906	46.2	13.6	14.4	52.3	49.1	19.6	19	16.2	48.3
911	51.7 (braid)	14.1	17.1	67.8	61.5	27.2	26.7	20	64
912	50.7	13.5	17.2	69.8	56	23.3	25.5	19.6	60
913	51	13.9	17.7	69.6	50	25	27.0	22.0	65.0
921	50.7	13.2	18.0	65	60.3	24.2	25.2	19.5	62.3
923	50.6	13.6	17.5	58.4	51.5	20.4	22.4	17.5	53.9
925	52.4	13.7	18.0	70	63.5	25.5	27.2	21.3	67.5
930	49.5	13.7	16.8	62.2	53.9	22.0	23.0	16.3	54

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
				1962 (cont.)					
939	53.6	14.6	18.4	87	81.3	35.5	—	27.7	86
940	50	13.5	17.1	72.8	69.6	29	30.3	23.8	73.0
952	48.2	13.1	16.5	58.2	53.6	21.8	22.6	20.5	70.0
955	50.2	13.4	17	69.2	63.2	27.6	26.6	20.5	70.0
959	53.4	14.5	17.6	78.4	--	33.8	—	26.5	86
960	51.7	13.4	18.1	74.8	65	28.9	28.7	21.8	72
962	52.6	13.6	18.3	67	58.5	23.5	25.1	19.5	63.0
971	52.5	14	18.2	85.5	78.5	32.2	--	25.5	87
992	48.3	13.7	16.6	55.7	50.2	19.2	21	16.2	51
993	54.2	14.8	17.8	82.3	--	31.8	31	26	86
995	50.6	13	18.4	57.7	54.2	21.1	21	16	53.0
996	48.8	13.3	16.6	62.2	57.5	23.8	25.5	19.0	60.0
998	54	14	18.6	81.3	--	30.3	30.5	27.0	83.0
1004	49.6	13.2	17.3	50.2	50	20	20.3	16.8	50
1006	48	13.2	16.6	52	48.3	19	20.2	16	47
1009	49.7	13.5	16.8	50.2	51.5	21.3	19.1	16.2	50.3
1012	48.4	12.5	17.1	55.7	50.2	20	21.4	17.5	51.8
1015	47.2	12.6	16.6	--	46.5	18.5	17.8	13.7	47
1017	46.1	12.3	15.9	52	46.8	18.6	19.1	15.8	45.7
1018	47.1	12.5	16.5	--	45	17.5	18.5	14	44
1022	45	12.7	15.2	--	48	19.1	18.8	14.1	48
1025	48.1	12.5	17.5	--	47	17.3	--	--	--
1026	44.2	12.5	14.9	--	43.5	17	17.3	14.5	43
1027	46.2	--	--	--	--	--	--	--	--
1028	43.3	10.8	15.1	--	42.4	--	--	--	--
1029	43.3	--	--	--	--	--	--	--	--
1030	46	12.0	16.5	--	46.5	18.2	16.6	13.0	43.4
1031	45.8	12.7	15.7	--	--	--	--	--	--
1033	53.8	14.7	18.3	69.7	66.5	28.7	26.8	23.0	73.0
1034	48.5	12.9	17	53.5	50	19.1	20	16	50
1035	51.0	13.9	15.8	74.5	--	28.9	31.2	23.2	78.0
1036	52.2	14.3	17.8	67.7	62	25	25.3	20.4	63.0
1037	40.8	12.0	13.3	--	38.5	--	—	--	--
1038	42	11.4	14.6	--	42.2	—	--	--	--
1040	41.7	11.5	14.0	--	--	43	--	--	--

1963

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
801	48.3	14.3	15.6	57.0	52.0	21.0	22.1	17.1	53.3
802	48.2	13.6	16.5	56.7	55.3	22.5	23.5	18.7	56.3
803	----	14.0	17.6	58.5	55.5	22.6	24.0	17.9	56.0
805	43.5	14.1	16.3	62.5	58.7	24.1	25.0	20.9	63.0
806	52.0	14.1	18.0	63.1	57.3	23.0	23.8	19.0	57.7
807	48.7	13.9	16.7	59.4	53.5	22.0	23.5	18.5	55.0
808	48.4	13.2	15.9	60.9	57.0	24.8	24.7	18.6	59.0
809	49.2	12.7	17.4	62.1	54.7	21.3	23.7	18.5	54.5
810	50.2	13.0	17.4	67.5	57.7	23.4	24.6	19.5	62.2
811	51.1	13.5	17.8	61.8	56.5	24.0	23.5	19.0	59.0
812	51.1	12.7	18.1	66.7	57.5	25.0	26.5	18.6	63.0
813	49.8	14.1	16.8	63.5	58.3	24.1	25.9	19.0	60.0
814	50.5	14.2	16.9	68.7	63.0	50.4	27.0	20.4	66.0
815	50.5	13.9	17.0	71.5	64.5	27.7	28.2	22.0	68.0
816	53.2	14.0	17.9	80.5	----	30.0	27.0	25.5	84.0
818	52.2	14.2	18.3	72.1	65.0	26.8	----	21.5	71.0
819	53.5	15.0	17.6	81.0	76.5	33.5	> 30.0	25.4	80.2
820	50.7	14.5	16.7	78.6	74.7	31.4	----	24.6	81.2
821	55.8	14.3	19.3	80.3	----	34.8	----	27.8	90.0
822	55.0	15.0	18.9	82.0	77.5	35.0	----	28.5	83.5
863	51.8	14.4	17.5	70.5	68.2	27.9	29.5	21.6	70.4
866	49.2	14.0	17.0	63.5	55.4	22.3	23.4	18.2	56.8
870	49.0	14.0	16.7	60.0	54.0	22.4	24.7	19.1	55.2
874	54.0	14.8	18.3	----	79.0	31.7	----	27.0	84.3
891	52.5	13.4	17.7	78.5	----	28.2	28.7	23.0	80.5
900	48.8	13.0	17.0	----	53.5	21.2	23.1	18.0	54.5
901	48.6	13.3	16.5	58.5	51.3	21.3	21.4	17.3	53.5
902	48.2	13.3	16.6	57.5	50.0	21.5	21.0	16.0	52.5
903	46.8	13.0	16.0	55.5	53.0	20.7	20.6	16.5	54.0
904	49.8	13.8	16.4	58.4	54.8	21.5	22.0	18.0	54.0
905	48.6	13.5	16.9	58.2	50.0	20.8	20.3	16.9	49.5
906	46.8	14.3	14.5	55.0	49.4	20.2	21.2	17.0	51.0
909	52.0	13.6	18.1	73.3	----	27.6	26.2	22.0	75.0
911	51.2	14.2	17.2	68.5	62.2	28.2	26.8	20.0	68.0
912	51.2	13.5	18.1	69.7	58.8	24.3	26.3	20.6	63.0
913	51.4	13.1	17.8	69.0	61.5	25.6	26.9	22.7	67.8
919	49.3	12.6	17.0	77.0	62.5	27.7	31.0	23.7	72.5
921	50.8	13.3	18.2	66.0	62.8	24.0	26.2	20.0	62.3
923	50.7	13.2	18.0	58.4	52.1	21.5	22.5	17.6	56.6
925	63.0	13.9	18.1	74.2	----	27.2	29.5	23.3	71.0
926	51.0	12.8	17.9	73.0	61.7	25.3	27.1	20.5	68.5
930	48.6	13.9	16.7	60.9	54.0	22.9	23.0	17.6	59.0
931	50.4	14.1	16.9	62.5	57.2	24.8	26.0	18.6	58.7
937	50.5	13.5	17.0	69.0	61.8	25.1	26.5	21.2	72.0

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1963 (cont.)

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
939	53.6	14.6	18.4	87.0	81.3	35.5	----	27.7	86.0
946	52.2	13.5	17.8	74.1	----	28.0	27.2	23.4	73.0
950	56.5	15.2	18.6	82.3	----	33.5	----	----	91.0
952	48.3	13.1	16.7	58.8	53.8	21.8	22.9	18.5	55.3
955	51.2	13.5	17.4	71.6	68.5	29.1	27.5	21.7	74.5
959	54.0	14.8	17.8	80.6	----	32.0	31.0	26.5	92.4
960	52.1	13.5	18.3	77.0	----	30.7	28.3	23.1	77.5
962	53.0	13.6	18.4	67.0	58.8	24.1	26.0	20.0	61.5
972	50.4	13.0	18.3	62.1	57.1	22.5	24.2	18.4	57.5
981	47.7	13.0	16.3	65.0	54.6	23.2	24.9	18.5	59.0
993	54.5	14.9	18.0	85.0	----	32.6	31.0	25.0	84.0
995	51.6	13.4	18.2	59.3	54.0	21.5	21.9	17.0	55.0
996	49.7	13.2	17.0	62.0	58.4	25.5	26.4	20.4	63.0
998	54.0	14.1	18.5	81.9	----	31.5	30.6	27.1	84.5
1002	48.4	14.3	16.2	59.0	56.2	21.2	24.7	17.5	53.3
1004	50.0	13.5	17.5	54.9	50.0	20.5	21.5	17.6	50.8
1006	49.0	13.5	----	55.8	50.0	20.5	21.3	16.3	50.8
1009	50.2	13.8	17.0	----	51.7	21.7	19.6	16.5	53.3
1010	49.0	12.6	17.3	53.0	50.5	20.1	18.1	16.7	50.5
1012	49.0	12.7	17.4	57.0	52.0	21.2	20.5	18.2	54.0
1014	48.9	13.0	17.3	58.0	52.7	19.8	22.6	17.1	50.8
1015	----	----	----	----	49.6	----	----	----	----
1017	46.5	12.6	16.5	54.2	50.3	19.3	20.0	16.3	47.5
1020	48.5	12.7	17.0	----	47.5	19.0	19.0	14.3	47.1
1022	45.9	12.7	15.5	----	52.0	----	----	----	----
1024	50.0	13.4	17.7	54.2	51.0	22.2	20.0	17.5	50.5
1025	49.2	12.5	17.6	----	46.5	18.1	17.8	15.6	45.3
1026	45.0	----	----	----	----	----	----	----	----
1027	47.7	12.1	17.1	----	45.2	18.2	----	----	----
1028	45.0	----	----	----	47.3	----	----	----	----
1030	47.7	----	----	----	----	----	----	----	----
1031	47.6	13.1	16.8	----	48.7	19.2	17.5	15.0	47.0
1033	54.3	14.7	18.3	72.4	68.6	27.4	29.0	23.8	77.6
1034	49.6	13.0	17.1	57.8	51.2	20.0	21.6	16.5	53.2
1035	51.6	14.2	16.8	74.9	----	29.3	30.0	23.7	----
1036	52.8	14.5	18.0	69.3	60.5	24.7	26.6	20.5	66.5
1037	44.6	----	----	----	----	----	----	----	----
1038	45.5	----	----	----	----	----	----	----	----
1044	41.7	----	----	----	41.0	----	----	----	----
1045	41.9	----	----	----	40.4	----	----	----	----
1046	40.6	----	----	----	40.0	----	----	----	----
1503	48.2	13.6	16.4	----	48.2	----	19.3	15.5	48.2
					46.5				

APPENDIX 15

Supplementary Anthropometric Data on Children Born to Exposed Parents

1957

Subject No.	Sitting ht., in.	Lower extremity length, in.	Upper extremity length, in.	Arm span, in.	Biacromial width, in.	Intercristal width, in.	Head circ., in.	Chest circ., in.	Left calf circ., in.	Buttocks circ., in.
87	18	14.5	12	29.5	7.5	5	18.5	18.5	7	17
88	16.5	15	12	27	7.5	9	17.7	18	7.5	17.5
89	17	14	11	27.5	6.5	5.5	16	18	7	17.7
90	18	15	12.2	30	8	5.5	18.5	19	7.5	17.5
91	20	16.5	13.0	31.5	7.5	6.0	19.0	20	7.5	8
92	17.5	13.5	11	27	6.5	6.0	17.2	18.5	7.2	19.7
93	--	9	8	20	5	4	14.7	12.5	4.5	11.5
94	15	12.5	10	24.5	5.5	4.5	16	14.7	5.2	15
95	17	14	11	25	6	5.5	17.2	16.5	7	17
100	18.5	12.7	10.5	27	7	6	17.5	19	7.2	18.5

1958

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
87	47.5	13	16.2	--	47.1	18.1	16	13.7	47
88	47.0	13.5	16.1	47.9	49.8	20.5	19.0	15.0	48.2
89	48.5	12.9	17.0	47.3	46.5	18.5	18.5	14.1	44.6
90	48.5	13.3	16.8	50.7	49	20.5	19.8	15.2	48
991	49.3	13.5	16.6	52.2	51.3	20.0	20.5	15.3	48.2
92	46	12.5	16	--	48.3	19.0	18	14.5	--
93	46.3	13.1	15.5	44.8	44.5	17.5	16	13.5	--
95	45.9	12.7	15.5	--	48.5	20.1	17.6	14.7	--
96	36.0	--	--	--	--	--	--	--	--
97	40.2	12.0	13.2	--	42.2	16.5	16	13	--
100	46	13.5	15	--	48.5	18.2	17	14.3	--

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
1959									
88	48.4	13.4	16.7	50.9	52.0	21.3	20.0	16.0	50.3
89	49.6	13.3	17.6	49.4	48.4	19.4	19.8	15.7	46.4
90	49	13.4	17.2	52.0	--	21.4	20	16.2	--
91	49.5	13.6	17.0	56.3	54.0	21.4	21.6	16.8	50.5
92	46.7	12.7	16.3	50.0	--	19.5	19.4	15.3	--
93	48	13.6	16.2	51.9	48.9	19.4	19.2	15.0	48.0
94	46.7	12.2	16.7	49.2	47.5	19.2	18.8	14.3	49.3
95	47	12.8	15.8	51.1	48.2	20.2	18.8	16.4	48.5
96	44.8	13.1	14.8	--	46.6	19.7	18.0	13.6	47.0
97	44.5	12.5	14.7	--	46	18.4	16.6	13.2	44
98	45.2	12.7	15.4	--	44.5	18.7	17.4	14.2	47
100	47.8	14.2	15.7	52	52.1	21.2	19.6	16.3	52.8
102	42.1	12.9	13.4	--	44.8	--	17.0	13.7	--
103	43.2	12.2	15.0	--	41.5	--	14.5	12.8	--
104	41.5	11.3	13.8	--	39	--	13.8	13	--
105	40.5	11.3	14	--	41	--	15.0	12.1	--
1961									
87	49.5	13.5	16.7	59.6	51.5	20.7	22.5	15.9	53.0
88	49.5	14.0	17.2	57	55.5	22.8	23.0	17.5	54.5
89	51.0	13.7	17.8	55.5	50.5	21	20.6	17.3	53.0
90	50.5	13.8	17.6	60	55.5	23.6	23.7	18.4	54.5
91	50.8	14.2	17.5	60.7	57	23.6	24.2	18.5	55.5
92	48.5	13.3	16.9	57.3	53.3	21.6	22	16.8	54.0
93	50	14.2	16.9	56.3	52	21.3	21.5	17	53.0
94	48.3	12.2	16.9	53.5	51	21.3	19.9	16.3	53.5
95	47.4	13.0	16.5	58.8	51.4	21.1	18.5	17.0	55.0
96	48	14	15.8	52.3	54	23	20.6	16.2	53
97	46.3	13.3	15.4	53	50	21.1	21.3	16	53.5
98	47.7	13.5	15.5	--	48.8	20.4	19	14.7	50.5

1962

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
87	49.5	----	----	----	----	----	----	----	----
88	49.7	14.0	17.2	58.2	56.8	23.5	23.7	17.8	56.0
89	51.0	13.7	18.1	57.8	52.6	21.2	23.0	18.0	53.0
90	51.2	14.0	17.6	60.6	58.0	24.2	25.3	19.0	55.5
91	51.4	14.2	17.5	63.0	58.8	24.2	25.0	18.7	56.5
92	49.0	13.5	16.8	59.9	55.0	22.3	23.5	17.7	57.0
93	50.3	14.2	17.0	57.7	53.1	21.5	22.0	17.7	53.2
94	48.4	12.5	17.1	56.3	52.5	21.7	21.1	16.6	52.2
95	48.0	13.2	16.1	60.5	52.8	21.2	22.1	18.0	54.0
96	48.9	14.3	16.1	53.5	55.5	23.2	21.4	16.7	56.3
98	48.2	13.5	16.0	52.0	51.5	21.0	19.8	16.5	52.0
102	46.8	14.1	14.8	53.4	50.9	19.4	22.6	16.8	49.8
103	48.0	13.1	12.0	----	46.5	20.1	19.8	15.4	48.5
105	46.8	13.0	16.5	52.6	49.0	20.0	20.1	15.8	49.5
106	48.0	13.1	17.0	----	48.1	20.1	20.5	15.1	46.4
108	46.5	----	15.3	46.0	52.0	19.0	----	----	----
110	----	13.3	16.9	----	46.0	19.7	19.0	15.0	46.0
111	47.0	12.8	16.0	47.9	46.3	17.0	17.6	14.9	43.8
112	46.0	12.2	16.2	----	48.1	18.4	18.0	14.5	45.0
113	45.6	----	----	----	44.0	----	----	----	----
117	42.0	13.5	----	----	42.0	----	----	----	----
118	45.0	12.3	15.2	----	43.5	16.8	17.2	13.2	42.0
120	46.3	12.3	16.3	----	46.0	17.8	----	----	----
122	46.8	12.4	16.6	----	44.0	18.2	15.8	13.0	44.0
124	41.3	11.3	13.9	----	42.5	----	----	----	----
125	44.7	11.7	16.3	----	41.0	----	----	----	----
126	42.5	11.2	15.1	----	39.7	----	----	----	----

1963

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
87	50.2	13.5	17.3	63.5	54.7	22.2	24.0	18.2	56.0
88	50.2	14.1	17.3	58.2	59.0	25.0	24.2	18.3	58.5
89	51.5	14.0	18.2	58.0	54.0	21.8	25.3	18.0	52.0
90	51.5	14.1	17.7	62.3	60.0	25.7	26.5	20.0	59.7
91	51.5	14.5	17.6	65.1	60.4	24.9	26.1	19.3	59.9
92	49.1	13.5	17.0	61.0	56.0	23.0	23.4	18.8	57.2
93	50.8	14.3	16.7	58.1	55.0	22.0	21.4	18.5	54.3
94	48.5	12.5	17.2	56.7	51.7	21.5	22.0	16.6	53.5
95	48.3	13.4	16.4	61.0	54.0	22	24.0	18.5	56.7
98	48.5	14.7	16.0	----	51.3	21.2	20.0	17.3	53.4
101	48.4	12.8	16.8	57.0	50.2	20.8	20.9	15.2	54.5
102	47.2	14.2	15.6	54.8	50.6	20.0	22.5	17.0	50.5
103	48.7	13.2	17.0	56.0	47.8	20.2	21.2	15.8	47.0
104	47.1	13.0	16.0	----	49.1	20.2	21.0	16.0	51.0
105	47.7	13.2	16.7	55.8	51.4	21.2	21.3	16.8	51.8
106	49.5	13.4	17.6	----	50.7	----	22.1	15.7	48.5
108	47.9	12.5	17.1	56.2	49.7	19.5	18.9	17.5	53.0
109	49.0	13.7	16.5	55.2	51.8	20.8	22.3	15.9	51.2
110	49.8	13.7	17.0	----	51.4	20.5	17.8	16.3	49.8
111	47.7	13.0	15.6	----	48.3	18.0	19.5	15.6	45.5
112	46.8	12.3	16.4	----	47.4	19.5	19.0	16.0	48.0
113	48.0	----	----	----	48.0	----	----	----	----
115	47.2	12.9	16.1	----	52.0	20.3	19.4	15.1	----
117	44.3	12.0	15.4	----	46.5	----	----	----	46.0
118	47.2	13.0	16.5	----	47.8	----	----	----	----
119	46.8	12.1	16.8	----	47.6	20.2	17.2	----	----
120	48.0	----	----	----	49.0	----	----	----	----
122	47.7	----	----	----	----	----	----	----	----
124	45.0	----	----	----	48.2	----	----	----	----
125	48.2	12.2	16.7	----	44.5	----	----	----	----
126	47.4	12.6	17.0	----	46.7	----	----	----	----
127	44.0	----	----	----	40.0	----	----	----	----

APPENDIX 16

Supplementary Anthropometric Data on Rongelap Exposed Children

September 1954

Subject No.	Sitting ht., in.	Lower extremity length, in.	Arm span, in.	Biacromial width, in.	Upper extremity length, in.	Chest circ., in.	Left calf circ., in.
2	18.2	9	27.5	6.2	21.2	19.5	7.2
3	20.2	12.2	30.2	7.2	23	20	7.7
5	20	12	31.5	6.0	25.5	19.5	8.0
15	22.5	23	44	7.0	37	21	8.0
17	21	21	37.5	7.5	30.5	20.7	8.0
19	22	19.5	39.5	7.0	32.5	21.0	8.5
20	24	20	44	7.5	36.5	23.1	9.5
21	19.7	15.7	34.5	7.2	27.2	21.5	7.5
22	31	30.2	63.2	10	53.2	32.7	13
23	17.5	21	37.5	7	30.5	22	9.5
24	30.5	26.2	57	11	46	31.7	12.3
26	30	27	58	9	49	31	13
32	22	15	37.2	6.7	30.5	19.7	8.2
33	21	21	42	5.5	37.5	20	8
35	29.2	29.2	62.7	11.2	51.5	29.5	11.5
36	23	25.5	47	8	39	24	10
39	31.7	27.7	62	8.5	53.5	32.5	12
42	21	14.7	35.5	5.2	30.2	19.2	7.5
47	26.2	23.2	48.2	8.5	39.7	23	9.5
61	27.2	23.2	50.5	8	42.5	27.5	11.5
65	17	7	30.5	5.5	25	18.5	8
67	32.5	28.2	62.5	11.5	51	32.5	12.5
69	21.5	18.5	40	6.5	34.5	20.5	9
72	23.2	22.2	39	8	31	21.5	8.5
75	23.5	31.7	57.7	11.2	46.5	28.7	11
76	26.7	25.2	53.7	9.2	44.5	25.5	10.5
83*	13	13	25	4.5	20.5	17	7
			Ailingnae				
8	25	15	30	5.5	24.5	19.5	7.5
44	21	18	39	5.5	34.5	20.5	8.5
48	25	20.5	47	7.5	39.5	22	9.0
53	25	23	45.5	7.2	38.2	22	9.5
70	29.7	27.7	58.5	9.7	49.2	32.5	11.5
81	24.2	23	47.2	9	38.2	20.7	9

*Exposed in utero.

1955

Subject No.	Sitting ht., in.	Lower extremity length, in.	Arm span, in.	Biacromial width, in.	Upper extremity length, in.	Chest circ., in.	Left calf circ., in.
2	21	17.7	34	7.7	12.5	19.5	7.7
3	20.7	15.7	32	8.5	13.5	21	7.5
5	19.0	17.5	31.5	7.0	12.5	19.5	7.0
15	26	26.5	45	9.2	18.0	21.0	8.0
17	22	21	37	8.5	16	20.2	7.2
19	22	22	38	9.5	14.5	22	8.0
20	25	25.5	44	10	16.5	22.5	9
21	22	19	35	8.5	13	20.5	6.5
22	30	35.7	61.5	13	26.7	33	12.7
23	21.5	20	39	20.7	16	23.5	9.2
24	32	35.5	60.2	13	23.5	29.5	10.2
26	31	—	62	13	26.5	31.5	12.7
32	22	19.5	38	8	14	20	8
33	22	18	32	7	13.2	18.7	8
35	33	35	61.5	13.7	24.5	31	12
36	24.5	26.5	47.2	11	19.2	24.4	—
39	30	36	60	12.2	24	31	11.2
42	22	19	32	7.7	12	19	7
47	—	27.7	50	10.4	20.7	24.5	9.5
54	19	18	31	7.7	12	20	7.7
61	30	31	52	11.5	20.5	27	11.7
65	19.5	16	28	7.2	11	19	7.2
67	34	34	56	14	23	31	10
69	23	22.5	39	8.5	18	20.5	8.7
72	26	22.2	44.5	9.5	18	21.5	8.5
75	31	32	55	12	23	27	10.5
76	26.5	29.5	55.5	10.5	23	26.5	10.5
83*	16	12.2	23	6.5	9.5	18	5.2
84*	19.5	17.5	32.5	7	13.5	20	8
85*	—	12.5	26.5	5.7	9.5	17.5	6.5
86*	12.2	10	20	5.2	8	15.5	6.5
			Ailingnae				
6	20.5	17	30	8	12	20	7.25
8	18	18	31	6.5	12	18.5	7.5
48	24	26.7	46.2	10	18.2	21.5	8.2
53	25.5	28	48	10	19	27	9.2
70	32	33	56	13.5	23	33	11
81	26	27	47	10.5	18	23	8.5

1956

Subject No.	Sitting ht., in.	Lower extremity length, in.	Arm span, in.	Biacromial width, in.	Upper extremity length, in.	Chest circ., in.	Left calf circ., in.
2	21.5	14.0	33	8.5	10.5	20.0	—
3	—	17	34	9.5	14	21	8.5
4	21	—	33.5	8.5	13.5	20	8.0
15	25.5	26	47	9	18.5	21	9.5
17	23.5	24	43.5	10.2	18	21	8.5
19	25.5	24	40.5	9.5	16.5	21	8.5
20	25.5	26	47	10	20	23	9.5
21	23	—	36.5	8	15.5	20.5	8
22	31	38.5	62	14.5	27.5	33	12.5
23	25	21	39.5	9.5	16.5	22	9.5
24	31	34.5	61	14	27	31	12
26	31	36.5	64	14	28.5	32	14.5
32	24	21	38	8	16.5	20.5	8.5
33	22.5	18	37	--	14.5	20	8
35	31	36	64	16	27	31	13
36	29	27.5	49	12.5	21	26	11
39	32	34.5	62.5	13	27.5	32	12
42	22.5	21	35.5	8.5	15.5	19	8
47	27	29	50.5	9.5	22	24.5	10
54	—	17	34	8	13.5	21	9
61	—	32	56	13	24	27.5	13
65	20.5	16	31	8	12.5	19.5	7.7
67	—	35.5	61	15	26	32	12
69	21.4	24	42	10.5	18	21.5	9.5
72	—	24	44.5	9	18.5	22	9
75	31	32	58	10	26	30	11.5
76	28	31	57	10	25.5	25.5	10.5
83*	21	17	30	7.5	12	20.5	8.5
85*	--	16	31	8	12	19	7.5
			Ailingnae				
6	22	17.5	34	9	14	20	8
8	—	19	34	8	13.5	21	8
44	23.5	22.5	42.5	—	18	22.5	9
48	26.5	29	48	10.5	—	23	9.5
53	27.5	27.5	51	9.2	22	23	9.5
81	—	26.5	50	10	21	23	9.5

*Exposed in utero.

1957

Subject No.	Sitting ht., in.	Lower extremity length, in.	Upper extremity length, in.	Arm span, in.	Biacromial width, in.	Intercristal width, in.	Head circ., in.	Chest circ., in.	Left calf circ., in.	Buttocks circ., in.
2	22	21.2	15.7	37	7.5	6.5	20.5	20.5	8.5	20.5
3	21	20	15	26.5	8.5	5.7	19	20	8.0	
5	20	20.5	15	35.5	9	7	19	20.5	8.0	20
15	24.7	29	21.2	49	11	7.5	19.2	22	9.0	23.2
17	23.5	24	18	43.5	10.2	6.7	19.7	22	8.5	23.2
19	24	26	19	43.5	9.5	8.0	19.2	22	8.5	22.7
20	26.2	30.2	20	50	12	8.0	20.5	24.2	10	26
21	22.5	23	17	38.5	10.5	8.0	19	21.5	9	22.5
22	32	36.2	27	61	13	9	19.7	27.5	11	—
23	23.5	24.5	18	42	11.5	8.5	20.5	23	10	23.7
24	29.2	36	26.5	59	14	9	21	30	12	33
26	33.2	39	30	67.5	14.5	10	21.7	33.5	14	36
32	22.2	23	16.5	41	10	6	19	21	8.7	21
33	21.5	22.5	17	38.5	8.5	7	19	20	9	20
35	32.2	36.5	28	63.5	15.5	9	21	32.5	12.5	32
36	28	30	22	50.5	11.5	8.5	19.7	25.5	10.5	26
39	31.5	37	28	62	14	9.2	21	29	11.5	—
42	22	22	16	37.5	9.5	7	19.5	20	8	21
47	27	31.5	23	53	12.5	—	21	24.5	10	26
54	22	21.2	16.5	38	8.2	7	19.5	22	9	21.7
61	31	34	26	58	14	9.5	21	29	13.5	35
65	20.5	19	14	33	7.7	6	18	20	7	20
67	32	37.5	27.5	60	14	10	22.5	32.5	12	34
69	24.2	26	20	45	9	8	19	21.5	9.5	23.5
72	26.5	28	21	47	11	7	20.2	22.5	9.5	25
75	31.7	34	25.5	58	13.5	8.5	21.2	31	12	35
76	28.7	35.2	26	58.5	12	8.5	20	27	11	28.5
83*	21.2	19	14	34	9	6.5	19	19	8.5	20
84*	—	18.5	14.5	34.5	8.5	6.5	19	20.5	8	20
85*	19	19	14	35	7.5	6.5	18	19.5	7.5	19.5
86*	18.7	17.5	12.5	31	7.5	5.7	18.2	19.2	8	—
					Ailingnae					
6	21.5	20.5	15	23	9.5	6	19.2	20.5	8	21
8	22	19.5	15	35	7	6.5	19.5	19.5	8	21
44	23	24.5	19.7	43	10.5	7.5	19.5	23.5	9.5	23.5
48	24.2	30	21.2	49	11.5	8	20	23.5	9.2	25
53	27	32	22.5	52	10.5	7	19.2	24	10	24.5
70	29.5	36	25	57	14	10.5	21.5	32	12	35
81	26	30	22.5	50	11.5	8	20	24	9.5	26

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
2	52.4	14.0	18.2	59.2	54.5	22.5	21.8	17.0	55.0
3	49.2	12.7	17.4	56.3	54.0	21.7	20.8	15.9	52.9
5	48	13	16.8	53.9	53.3	21.8	20.6	16.3	51.5
15	49.5	13.2	17.1	69	58	25	25.5	19.5	62.5
17	51	13.6	17.5	64.7	57	23.2	24.3	18.3	59.5
19	49.1	14.1	16.5	66.9	58	23.0	24.5	18.8	59.3
20	52.5	15.1	17.0	70.9	64	26.5	27.7	20	26.5
21	49.5	13.5	17	61	55.8	22.7	24.2	18	59
22	50.5	13.3	17.4	79.7	—	27.3	>30	23.8	—
23	51.5	13.8	18.1	65.8	61	27.5	25	19.4	62
24 Preg.	52	13.7	17.1	78.8	—	30.3	>30	24.7	—
26	55.6	14.4	19.1	90.3	85.9	36	>30	28.6	—
32	48.8	13.2	16.9	62.9	56.5	23.3	24.2	17.6	56
33	49.1	13	17.5	60.6	51.5	23	22.9	17.3	55
35	53.2	14.7	17.7	84.6	82	32.5	>30	25.2	--
36	50.5	14.8	16.5	74.1	65.8	29.6	26.9	21.8	72
39	53.4	14	17.9	82.8	—	32.1	>30	21.4	--
42	50.2	14.1	16.5	61.1	51.5	21.5	22.2	17.4	55
47	54.2	14.4	19.0	74.3	66	27.3	29	21.7	70.3
54	50.7	13.4	17.5	61.3	58	24	23.8	17.8	58.7
61	53.5	14.2	18	84.2	—	34.7	30.2	21.5	86
65	46.7	12.9	15.6	52.5	52	19.7	19.3	15.5	53
67	55	14.2	18.0	84.4	—	32	>30	27.2	—
69	49.4	13	17.3	65	57	25	24.9	19.1	60
72	51.5	14.1	17.5	72.7	61	25.6	27.6	21	61
75	53.7	14.4	17.5	81.3	—	29.9	>30	26	--
76	50.6	14.4	17.1	79.4	75	31	>30	24	74
83*	49.6	12.9	17.6	54.6	50.7	22.8	21.2	15.9	53
84*	48.2	14	16.2	53.3	51.5	21	21.5	16.4	51.5
85*	45.7	12.7	15.6	53.1	50.8	20.2	20.3	16.9	51
86*	47.5	13	16.3	52	49.7	20	21.2	15.8	—
					Ailingnae				
6	49	14	16.4	57	54.3	22	21.7	16	55.7
8	50.7	13.4	17.7	58.9	51.5	21.2	21.8	16.9	57
44	49	14.3	16.0	63.6	56	23.5	24.6	18.6	59.4
48	52.1	14.1	17.8	68.9	60.7	25	26.6	20.9	67.5
53	49.3	13.2	16.7	75.4	62.7	27.3	28.5	21.4	67.5
70	53.8 (hair)	14.3	18.1	81.6	--	30	<30	28	--
81	50.5	14.7	16.0	72.1	63	26.3	27.5	21	67.5

*Exposed in utero.

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
				1959					
2	52.7	14.2	18.4	60.3	54.5	22.6	22.8	18.0	54.6
3	49.3	12.9	17.4	57.4	56	22.6	22.3	16.9	56
5	48.3	13.2	16.7	54.6	54.5	22.0	21.6	17.0	53.4
15	49.6	13.2	17.1	72.3	60	26.1	26.5	21.3	68
17	51.1	13.7	17.7	66.1	58.1	23.5	25.7	19.5	62.5
19	49.6	14.1	16.8	67.3	58.5	23.4	25.7	20	60
20	52.6	15.3	17.1	71	64.5	26.1	29	20.8	66.5
21	50	13.6	16.9	64.3	59	23.6	25.3	18.8	61
23	51.9	13.7	18.1	68.1	61.7	27.7	26.2	20.5	65
24	51.5	13.7	17.2	76	—	29.4	> 30	25.4	—
26	55.3	14.5	19.4	90.8	87	34.4	—	28	92.5
32	49.1	13.3	16.9	64.2	56	23.7	25.2	18.2	57
33	49.8	13.2	17.7	63.8	52.6	24.1	21	18.1	56
36	50.8	14.7	16.4	75.5	68.4	30	29.1	22.2	71
42	50.5	14.2	17	63.9	52.7	22	23.1	18.1	54.8
47	54.2	14.5	18.8	75.5	66	27.7	30.5	22.4	70
54	51.1	13.9	17.8	63.1	59.4	24.2	24.6	19.3	59.4
61	54.3	14.5	18	84	--	36.4	> 30	—	93
65	47.2	13.2	16.1	55.8	50.5	20.1	20.8	17.5	52
69	50	13	17.4	67.2	57	25.6	25.5	20.3	60.5
72	52.2	14.3	17.9	76.9	65	27.9	27.8	22	68.7
75	--	14.3	17.2	81	—	28	31	25.2	--
76	51.5	14.6	17.2	83.5	76.1	33	> 30	25.8	74.2
83*	50	13	17.9	59.5	53.1	23.6	22.3	17	53.5
84*	48.3	13.9	16.3	55	53.2	21.3	21.6	16.5	51.5
85*	46	13	15.9	56	51	20.8	22	17.8	52
86*	48.4	13.5	16.2	54.5	49.4	20.1	22	16.6	48.4
					Ailingnae				
6	49.3	14.1	16.6	59.3	55	22.4	23	17	56.2
8	51.6	13.7	17.9	62.3	53.5	22.1	22.8	18.6	55.4
44	49.3	14.4	16.3	66.5	56.5	24.2	26.3	19.3	61.5
48	52.1	14.1	17.8	72.2	61.2	25.6	28.3	21.5	69.5
53	49.7	13.5	16.9	79.2	68.4	29.7	29.0	22.8	74
81	51.3	14.8	15.9	76.2	--	28.0	29.9	22.9	74.0

*Exposed in utero.

1961

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
2	53.6	14.4	18.8	63	59.4	24.5	25.5	19.0	60.0
3	50.3	13.2	17.6	60.3	60.8	25.0	23.5	19.0	62
5	49.5	13.4	17.0	59.1	57.5	23.7	22.9	17.4	57.4
15	50.5	13.3	17.4	78.4	—	28.3	29.2	24	73
17	51.3	13.8	18.0	71.3	62.6	25.9	27.5	20.1	66.5
19	50.7	14.2	17.0	71.5	63.5	25.4	27.2	21.2	67.0
20	54	15.5	18	74	70.3	29	30.4	22.5	75
21	51	13.7	17.2	68.3	62	25.2	26.4	20.8	67
23	53.3	14	18.4	72.4	66	30	28.1	22	71
26	56.1	14.8	19.5	91.8	88.5	37.2	—	30	97
32	49.5	13.4	17.0	67.6	60	25.5	27	19.2	61
33	50.3	13.2	17.9	68.6	57	25.8	25.2	19.5	62.7
36	52	15	16.8	80.8	74.2	32	30.8	23.5	75
42	51	14.4	17.2	68	56	23.5	25	19.5	60.2
47	56.2	14.4	19.5	83	> 80	32	—	24.3	84.7
54	51.6	14	18	68.7	62.5	25.8	26.5	20	64
61	54	14.4	18.4	85.5	--	39	—	—	100
65	48.5	13.2	16.4	60.9	54	21.2	22	17.8	57
69	50.5	13.2	17.7	72.5	60.5	28.1	27.4	22	67.9
72	53.5	14.5	18.2	82.4	—	32	31	26.7	85
83*	51.1	13.2	18.2	65.3	56	25.5	24.1	18	59
84*	49.4	14.5	16.8	60.7	58.2	22.5	23.7	18	57
85*	47.1	13.2	15.8	61.3	53.7	22	23.7	19.3	54
86*	49	15.5	16.5	58.5	51.5	21.3	23.5	17.5	53
					Ailingnae				
6	50.4	14.3	16.4	64.5	57.9	24.5	24.8	18.1	61.4
8	52.5	14.1	18.1	67	56.5	24.2	25.8	19.8	61.5
44	50.6	14.5	16.3	70.1	63	25.8	28.3	20.6	67
48	52.8	14.3	18.1	78	—	29	31	24.3	79.5
53	50	13.5	17	81.5	--	30.5	30.5	23.2	76
81	53	15.1	16.3	82.8	—	30.5	30.4	25.1	85.4

*Exposed in utero.

1962

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
2	53.8	14.6	19.0	66.0	59.3	24.8	26.2	19.1	61.5
3	50.2	13.2	17.8	61.6	61.1	24.2	24.5	19.8	62
15	51.5	13.5	17.5	80.2	--	30.0	29.1	25.1	79.0
17	52.4	13.8	17.8	73.1	63.4	26.3	28.5	21.4	68.4
19	50.6	14.3	17.1	72.2	63.1	24.7	28	21.6	67.0
20	54.3	15.7	18.0	79.2	76.5	31	—	24.7	79
23	52.7	13.8	18.5	71.1	67	30	29.3	22.8	72.5
32	50.1	13.4	17.1	67.7	59.3	26	27.7	20.0	62
33	50.7	13.3	18.0	69.4	--	—	27.5	20.6	—
36	52.7	15	16.9	81.5	79.2	34.5	--	25	83.5
42	51.5	14.5	17.1	68.2	56	23.5	25.6	19.4	60.7
54	52.3	14.1	18.1	66.6	62.8	26.3	27.4	21	64
61	54.5	14.4	18	84.4	—	39.3	--	--	99.2
65	48.6	13.2	16.5	60	55.5	21.8	23.5	19.2	58.0
69	51	13.2	17.7	73.7	64.6	29	28.7	25.4	72
72	54.5	14.5	18.0	80.7	—	33.2	31	26	80.0
83*	51.4	13.5	18.3	67.3	58.8	27	25.6	18.8	61.5
86*	49.3	13	16.6	59.5	53	21.8	24.4	17.6	55.1
					Ailingnae				
6	50.5	14.4	16.9	65.1	59.8	24.3	25.7	19	61.5
8	52.9	14	18.3	68.2	58.3	24.9	26.5	18.4	63.9
48	53.4	14.2	18	75.5	—	29	31	25	80
53	50.4	12.4	16.9	82.5	--	30.7	30	24.6	75
81	52.4	15	16.5	83	—	30.1	—	26	83.5

*Exposed in utero.

Subject No.	Head circ., cm	Head width, cm	Head length, cm	Sitting ht., cm	Chest circ., cm	Left calf circ., cm	Biacromial dia., cm	Bi-iliac dia., cm	Buttocks circ., cm
				1963					
2	53.7	14.7	18.9	65.3	62.0	25.5	26.2	20.7	63.0
3	51.6	13.4	18.0	62.8	70.3	26.7	26.2	21.5	70.3
5	49.5	13.6	17.4	60.3	59.0	23.6	24.0	18.8	59.3
15	52.0	13.7	17.7	81.8	----	31.4	30.4	26.0	83.8
17	52.8	13.9	18.4	73.7	----	28.0	29.8	20.3	73.0
19	51.5	14.3	17.4	71.0	66.0	27.0	29.7	22.4	72.0
20	55.1	15.8	18.0	79.2	77.5	31.1	----	----	81.0
21	52.3	14.1	17.7	72.0	63.0	27.2	30.0	23.8	74.5
23	53.2	14.0	18.4	73.5	69.2	31.4	29.0	24.0	74.0
32	50.0	13.5	17.2	68.7	63	27.2	28.0	20.4	65.3
33	51.7	13.3	18.2	74.5	50.9	28.2	28.4	21.2	68.5
36	53.0	15.2	17.2	87.3	79.0	34.5	----	27.2	85.0
42	51.8	14.5	17.1	70.3	57.0	24.8	25.4	21.4	64.0
47	57.0	15.0	19.6	89.1	79.8	34.5	----	26.8	89.0
54	52.7	14.2	18.4	69.1	69.5	28.1	29.0	21.8	70.5
65	49.7	13.5	16.6	65.0	56.5	22.9	23.6	20.0	62.5
69	51.8	13.2	18.0	76.4	----	30.3	----	24.5	76.0
72	54.6	14.5	18.0	83.8	----	34.0	----	26.0	85.0
83*	51.7	13.4	18.3	87.5	59.5	26.7	26.2	19.1	62.5
85*	47.5	13.3	15.7	61.0	57.5	23.0	25.3	20.4	58.0
86*	49.3	13.7	16.8	62.3	53.6	23.0	24.5	18.2	56.3
				Ailingnae					
6	50.9	14.4	17.1	67.2	61.3	25.0	26.1	19.2	65.0
8	53.0	14.0	18.6	70.0	58.5	25.5	26.1	20.8	66.9
48	53.5	14.3	18.1	77.5	----	30.0	----	25.5	83.2
53	50.0	13.5	17.0	81.0	----	30.8	30.0	25.0	79.0

*Exposed in utero.

APPENDIX 17

Serum Folic Acid Levels, 1963

(normal = 7 to 20 mμg/ml; borderline = 4 to 7 mμg/ml)

Subject No.	mμg/ml	Subject No.	mμg/ml	Subject No.	mμg/ml
1	12.2	72	10.5	895	19.0
3	30.0	73	5.8	896	9.3
4	17.0	75	2.8	900	25.0
5	7.5	77	15.0	906	4.2
7	58.0	81	6.8	915	2.6
10	10.7	83	5.8	916	16.0
11	10.0	87	1.4	919	19.0
13	13.0	95	11.0	924	22.5
14	9.4	813	16.0	926	11.0
16	13.0	814	27.0	928	29.0
18	9.9	817	9.7	932	3.0
19	18.0	819	11.0	938	6.2
21	2.1	821	18.0	940	37.0
23	30.0	823	<1.0	942	5.0
24	8.6	824	3.1	943	16.0
26	22.0	825	22.0	944	4.8
27	5.4	826	8.2	946	11.7
28	9.1	828	19.0	948	18.0
29	21.0	829	7.9	950	14.0
30	11.0	830	8.7	953	7.7
32	12.0	833	<1.0	955	28.0
33	37.0	834	17.0	956	5.2
34	14.0	835	17.0	959	13.0
37	11.0	841	6.5	961	10.0
39	12.5	842	5.4	963	6.9
42	18.5	844	6.5	964	4.0
43	10.0	846	4.1	965	22.0
44	33.5	852	4.0	967	3.7
45	6.5	853	16.0	969	10.5
46	3.8	856	15.0	970	10.5
48	5.1	859	7.2	975	2.2
49	22.5	860	24.0	991	10.5
50	<1.0	864	25.0	993	37.0
52	8.2	865	13.0	996	61.5
53	4.7	867	17.0	998	14.0
55	5.4	868	9.5	1001	1.7
58	8.9	876	<1.0	1005	12.0
59	12.0	882	14.0	1007	2.0
60	17.0	883	<1.0	1035	10.3
61	15.0	884	3.1	1036	47.5
66	20.0	885	12.2	1041	15.0
68	11.0	886	7.6		
69	10.0	887	12.3		
70	25.0	892	4.5		
71	10.3	893	23.5		

APPENDIX 18

Bone Marrow Differential Counts

	Subject No.					
	4	63	68	73	948	1007
SEG PMN	9.8%	14.2%	15.0%	19.8%	16.8%	22.2%
SEG PMB	0.2	0.8	---	---	0.4	0.2
SEG PME	0.6	1.8	2.6	2.8	2.2	0.4
BAND NEUT	10.6	6.4	6.6	10.0	5.8	10.6
BAND BASO	---	---	---	---	---	---
BAND EOS	0.6	0.2	---	0.6	0.4	0.2
META NEUT	16.2	6.4	11.8	13.2	9.8	18.8
META BASO	---	---	---	---	---	---
META EOS	---	---	0.4	---	---	---
MYEL. NEUT	10.0	4.6	9.8	7.2	5.2	7.0
MYEL. BASO	---	---	0.4	---	---	---
MYEL. EOS	2.0	0.2	1.0	0.8	0.2	0.4
MYELOBLAST	---	---	0.8	---	---	0.6
LYMPHOCYTE	18.0	33.0	14.8	21.2	27.0	16.4
LYMPHOBLAST	0.8	0.2	---	0.2	0.2	---
MONOCYTE	---	0.2	0.6	0.2	0.6	0.8
MONOBLAST	---	---	---	---	---	---
NORMOBLAST ORTHO	18.0	23.2	24.2	21.0	21.6	17.0
NORMOBLAST BASO	8.2	6.8	5.4	2.0	5.0	2.8
ERYTHROBLAST	0.4	1.2	1.8	0.2	1.0	0.6
MEGALOBLAST	1.6	---	1.4	---	0.8	0.6
PLASMA CELL	2.4	0.8	1.8	0.4	2.0	1.2
R. E. CELL	0.6	---	1.6	0.4	1.0	0.2