

## APPENDIX A

### **The Life and Work of Dr. Nagai**

## **The Life and Work of Takashi Nagai The Man who Loved Others as Himself\***

Takashi Nagai was born in Matsue City, Shimane Prefecture in 1908, the first son of Hiroshi and Tsune Nagai. His father was a physician, and Nagai grew up in an affluent environment. Aspiring to the medical profession, Nagai entered Nagasaki Medical University (predecessor of Nagasaki University School of Medicine). While a student he was a member of the college basketball team. After graduation he entered the Radiology Department.

Nagai was dispatched to China after the Manchurian Incident. Finding a catechism in his comfort kit, he took a keen interest in Catholicism. He was baptized after his return to Nagasaki and took the Catholic name Paul. It was around this time that he met and married Midori Moriyama. Nagai returned to China as a military doctor but came back to Nagasaki in 1940 to become associate professor at Nagasaki Medical University and chief of the Radiology Department. Takashi and Midori Nagai had to live apart from their two children during World War II. In June 1945, Dr. Nagai was found to be suffering from leukemia and given only three years to live. He had developed the disease as a result of occupational exposure to radiation. This was only the beginning of tragedy.

At 11:02 a.m., August 9, 1945, an atomic bomb dropped from an American B-29 exploded over Nagasaki and assailed the city with a ferocious blast and blinding flash of light. Dr. Nagai was in his office at Nagasaki Medical University, only 700 meters from the hypocenter. Despite his own illness, he had devoted himself to the care of the many people injured in past air raids.

"The explosion of the atomic bomb came altogether unexpectedly. I saw the flash of light in the radium laboratory. Not only my present but also my past and future were blown away in the blast. My beloved students burned together in a ball of fire right before my eyes. Then I collected my wife, whom I had asked to take care of the children after my death but who now had become a bucket-full of soft ashes, from the burnt-out ruins of our house. She had died in the kitchen. For me, the injury to the right side of my body and acute atomic disease caused by the atomic bomb were added to my chronic radiation illness, disabling me far sooner than expected." (from Kono Ko wo Nokoshite [Leaving These Children Behind])

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Dr. Nagai suffered a tremendous loss in the atomic bombing. But faced with the reality of the situation, he resolved to devote himself to the relief of the survivors. Waiting for him was a subject of study that no one before him had ever tackled : atomic bomb disease. There were immense numbers of injuries and cases of atomic bomb disease, and people were dying left and right. Dr. Nagai strove to help the victims but soon succumbed to injuries himself and had to suspend his relief activities.

Dr. Nagai suffered numerous cuts on the right side of his body as a result of flying splinters of glass. The cut on his right temple was so deep that it severed an artery and caused blood to spurt out like a fountain. Dr. Nagai continued his relief activities with a bandage around his head but finally collapsed as a result of blood loss. The symptoms of atomic bomb illness appeared around September 10, and Dr. Nagai lost consciousness as a result of the necrosis of his wounds and high fever.

Miraculously surviving, Dr. Nagai resumed relief activities and returned to the lectern. He continued to go out on rounds even after becoming a professor in 1946. During one of his trips he collapsed at Nagasaki Railroad Station and had to be carried home by a friend. After that he was confined to bed and his condition worsened day by day.

"From that day to the present the illness has gradually gained momentum. Now I have to rely on other people even to fetch pieces of paper for me. I barely have the strength to look into a microscope, let alone to examine patients. Fortunately, though, my topic of research atomic bomb disease-is right here in my own body." (from *Kono Ko wo Nokoshite* [Leaving These Children Behind]) Dr. Nagai continued his battle with atomic bomb disease by placing his own body on the research table. Although confined to bed, Dr. Nagai continued his research and writing on atomic bomb disease.

Nyokodo (As Yourself Hermitage) was constructed in the spring of 1948 when people were beginning to put up makeshift shacks on the atomic wasteland. It was built by donations from the church and from the people of Urakami. The tiny house was called *Nyokodo* (As Yourself Hermitage) after the Christian maxim "Love others as you love yourself." From the tiny two-tatami-mat room (about four square meters in area), Dr. Nagai produced one famous work after another as a way to encourage the people of Urakami. He published paintings and collections of Japanese poetry in addition to novels and essays such as *Rozario no Kusari* (The Rosary Chain), *Kono Ko wo Nokoshite* (Leaving These Children Behind), *Seimei no Kawa* (River of Life) and *Nagasaki no Kane* (Bells of Nagasaki). *Kono Ko wo Nokoshite* was later made into a movie, and *Nagasaki no Kane* inspired a hit song that is still popular today.

"Nyokodo, my place of lodging, has an area of only two tatami mats. My bed takes up one mat, and Makoto and Kayano live on the other... I happily came to live here, considering it God's blessing. The people of Urakami love1 others as they love themselves, truly a blessing for a person far from home and weary from the hardships of the way. That is why I

called this house "As Yourself Hermitage" and why I constantly offer prayers of thanks." (from *Kono Ko wo Nokoshite* [Leaving These Children Behind])

Dr. Nagai's two children Makoto and Kayano escaped the atomic bombing because they had been evacuated to the countryside. His deep distress over the fact that they had lost their mother and would soon lose their father as well became the driving force behind his prolific writing.

"I have to postpone the moment when these children become orphans, even by one day or one hour. Even if it is only one minute or one second I want to reduce the length of time they must suffer loneliness." (from *Kono Ko wo Nokoshite* [Leaving These Children Behind]) Dr. Nagai wanted to stay with his children for as long as possible.

"I was pretending to sleep and Kayano relaxed and put her cheek against mine. I could feel my cheek gradually warming. Then, as though enjoying a tiny treasure that she did not want anyone else to know about, she whispered, "Daddy." She was not actually calling me. Some delicate thought was just spilling, barely audible, from the depths of her heart." (from *Kono Ko wo Nokoshite* [Leaving These Children Behind])

Dr. Nagai's spleen swelled as a result of the leukemia, causing the danger of internal bleeding and making it impossible to share contact with his children. Most of Dr. Nagai's income went for the benefit of poor children and people suffering from atomic bomb disease. In the midst of extreme chaos and poverty after the war, there were many children in Urakami who had lost their parents in the atomic bombing or who were too poor to receive a proper education.

Dr. Nagai led the effort to establish a private library for these children. Called *Uchira no Honbako* ("Our Book Case"), the library provided a place for children to play and read books. Dr. Nagai's philosophy of "Love others as you love yourself" affected many people and resulted in contributions from as far away as Brazil. The works Dr. Nagai produced in his tiny room in Nyokodo touched the hearts of people around the world and brought fame both in Japan and abroad. Among his visitors were Emperor Showa, Helen Keller, a messenger of the Pope and many other friends, acquaintances and well-wishers.

The end came suddenly on May 1, 1951. With his children at his side, Dr. Nagai died in his former work place, Nagasaki Medical University Hospital, after praying in a strong voice. He was only 43 years old.

"From here I can see Makoto preparing to carry away broken roof tiles in a straw basket, and Kayano playing house by herself and using the fragment of an Arita vase to arrange flowers. I wonder how these children will comment on my way of thinking after they grow up. In 50 years time they will be much older than I am today. Perhaps when they read this book they will sit together and rattle their false teeth, saying things like 'Dad certainly had a youthful outlook.' " (from the final chapter of *Kono Ko wo Nokoshite* [Leaving These Children Behind])

## Publications of Takashi Nagai

### Books

*Nagasaki no Kane* (finished August 1946, published 1949)

English version is available :

*The Bells of Nagasaki*, translated by William Johnston, Kodansha International, Tokyo, 1984

*Rozario no Kusari* [The Rosary Chain] (finished March 1948)

*Kono Ko wo Nokoshite* [Leaving These Children Behind] (finished April 1948)

*Horobinu Mono wo* [Something Imperishable] (finished January 1948)

*Seimei no Kawa* [River of Life] (finished August 1948)

*Nyokodo Zuiso* [Essays from *Nyokodo*] (published December 1957)

*Otome Toge* [Otome Pass] (finished April 1951, published September 1952)

*Itoshigo Yo* [Beloved Child] (published October 1959)

*Genshiya Rokuon* [Recordings on the Atomic Wasteland] (published as a series in *Seibo-no-Kishi* journal 1947 to 1951)

*Heiwato* [Peace Tower] (published in November 1979)

*Son'i* [Village Doctor] (published in April 1978)

*Nagasaki no Hana* [Flower of Nagasaki (Vol. I, II, III)] (published as a series in *Tokyo Times* in 1950)

*Genshigumo no Shitani Ikite* [Living Under the Mushroom Cloud] (published in 1949)

*Watashitachi wa Nagasaki ni Ita* (published in October 1952)

English version is available :

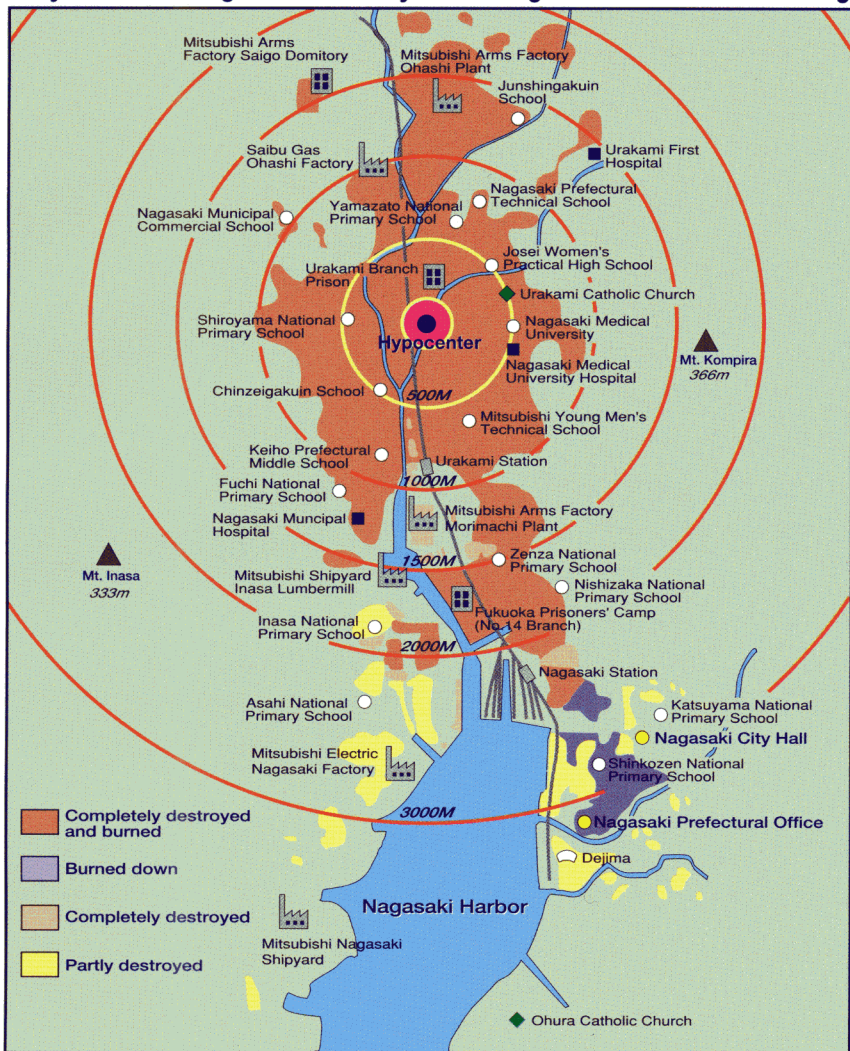
*We Of Nagasaki The Story of Survivors in an Atomic Wasteland*, translated by Ichiro Shirato and Herbert B. L. Silverman, Victor Gollancz Ltd., London, 1951

All of the above titles are now published by SAN PAOLO (1-5, Wakaba, Shinjuku, Tokyo 160-00ri, Japan; Tel: +81 3 3359 0451; Fax: +81 3 3351 9534) except for *Nagasaki no Hana* which is published by *Seibo-no-Kishi* (196 Hongochi-machi, Nagasaki 850-0012, Japan; Tel: +81 95 824 2080; Fax: +81 95 823 5340).

## APPENDIX B

### **The Nagasaki Atomic Bombing**

# Physical Damage Caused by the Nagasaki Atomic Bombing



The foremost characteristic of the physical damage caused by the Nagasaki atomic bomb was the tremendous, instantaneous destruction wreaked by the blast wind and the subsequent fires. These fires broke out simultaneously with the destruction of buildings over a wide area. The complete destruction and burning of buildings extended a distance of two kilometers beyond the hypocenter.



The Ruins of Urakami Catholic Church (upper panel) and Nagasaki Medical University (lower panel).



## The Nagasaki Atomic Bombing\*

### Circumstances of the bombing

At 11 : 02 a.m. August9, 1945, two B29 bombers flew from Kumamoto north towards the west over the Shimabara peninsula and intruded from the northeast of Nagasaki city and dropped an atomic bomb at the north of the city, then flew out immediately. The atomic bomb was dropped at an altitude of 9,600 meters, and it exploded at a point approximately 500 meters above ground. On that day, it was a clear sky, also quite hot, but almost calm.

#### 1. The energy of the atomic bomb

The energy of the plutonium bomb dropped on Nagasaki is estimated to be 21 kilotons of TNT. A huge fireball was created immediately after the explosion, an extremely powerful heat wave and radioactivity were emitted from the epicenter and the great expansion of air around the epicenter became the bomb blast. Those energy yields were estimated to be about 35% heat wave energy, nearly 50% blast energy, and the rest of about 15% radioactive energy.

#### 2. The power of the heat wave

As explosion of the bomb occurred, the fireball reached millions of degrees Celsius at maximum and its volume rapidly expanded, then after 10 seconds, it lost brilliance. From the instant of explosion, the size and temperature of the fireball increased as follows : 0. 1 milliseconds later, the diameter was about 28 m and the surface temperature was uniformly distributed at about 300,000C<sup>o</sup>; 10 milliseconds later, the diameter was about 180 m and the surface temperature was about 1,700C<sup>o</sup>; 0.3 seconds later, the surface temperature again increased to about 7,000C<sup>o</sup>; 1 second later, the diameter reached its maximum of about 280 m at 5,000C<sup>o</sup> surface temperature, and the temperature gradually diminished reaching 1,700C<sup>o</sup> by 3 seconds later. About 99% of the heat wave emitted from the fireball severely affected the ground only from 10 milliseconds to about 3 seconds after the explosion.

It was infrared rays emitted from 0.3 to 3 seconds after the explosion that caused burns on human bodies. The thermal burns on uncovered parts of the body were observed in people exposed to the bomb up to 4 km from the hypocenter. Furthermore, people who were exposed to the bomb without any shielding suffered lethal thermal burns and approximately 20 to 30% of deaths are estimated to be due to thermal burn injury.

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### 3. The power of the bomb blast

Hundreds of thousands of tons of impact pressure was instantly created by the explosion, and expanded air formed the bomb blast. The fringe of the blast developed as a shock wave which is a wall of high pressure air propagated at the speed of sound or faster. Ten seconds after the explosion, the shock wave reached approximately 3.7 km, and by 30 seconds, it reached about 11 km distance from the epicenter, eventually losing power.

The deaths and external injury cases caused by blast mainly came from collapsed structures and flying fragments. Within a 1.3 km radius distance from the hypocenter, casualties by blast were significant and 20% of the deaths there are considered due to the blast.

Furthermore, the damage was amplified by composite effects of heat wave, blast and secondary fires and many people burned to death under collapsed buildings.

### 4. The power of the radiation

In addition to the above-mentioned damages caused by heat wave, blast and secondary fires, the atomic bomb added a new type of scourge, never experienced by a conventional bomb, that of radiation exposure. Radiation itself could kill many of the people who were irradiated at greater than or equal to 4 Gy over their whole body. The atomic bomb survivors have persistently suffered mentally and physically due to composite interactions between radiation injury and thermal and external injuries.

## State of damage

The damage reported by the Committee of Atomic Bomb Scientific Data Registry in July 1950 is as follows:

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The dead	73,884 persons
The injured	74,909 persons
Number of victims	120,820 persons <sup>a</sup>
Number of damaged houses	18,409 dwellings <sup>b</sup>
Completely burned down houses	11,574 dwellings <sup>c</sup>
Razed houses	1,326 dwellings <sup>d</sup>
Partially razed houses	5,509 dwellings <sup>e</sup>

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<sup>a</sup>The number of permanent residents whose dwellings were within 4 km radius of the hypocenter and were completely burned out or razed.

<sup>b</sup>Number of dwellings within 4 km radius of the hypocenter and was about 36% of total dwellings in the city.

<sup>c</sup>Number of dwellings within 4 km radius from the hypocenter and was about 1/3 of the total dwellings in the city.

<sup>d</sup>The dwellings within 1 km radius from the hypocenter were regarded as razed houses.

<sup>e</sup>The dwellings between 1 to 4 km radius from the hypocenter were regarded as partially razed houses.

As of October 1, 1950, a total of 131,050 persons in Japan were noted as Nagasaki atomic bomb survivors by the supplementary survey of 1950 National Census, and the population of Nagasaki City just prior to the atomic bombing is estimated at around 210,000 persons.