

Ghosts of Hiroshima

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You could not make these landscapes up and have people believe it. Even as fiction, no one would believe it. That is why, for over sixty years, I kept what I saw to myself... until the day others [who] spoke about it, were called liars, [supposedly] because the atom bombs could not have happened that way. For people underneath an A-bomb to have become shadows on the wall, and charcoals, before they could fall to the ground, no one wanted to believe it. But it happened.

- Miyuki Broadwater, a child of Nagasaki

Prologue: BEYOND THE SPECTRUM

In 1948, a former OSS agent named Walter Lord—who had interrogated (or, from a certain point of view, “interviewed”) many of Japan’s surviving naval officers—was struggling to turn a series of non-job-related interviews into his first book: *A Night to Remember*.

The book itself was defeating Walter. Although he now had enough material for a second book (fated to become the basis for a film titled, *Tora! Tora! Tora!*), he feared that neither book would ever be published. Walter had not yet found “the music of the words,” had not yet found his voice.

About the spring of that same year, he came across a novel by another struggling writer, named Morgan Robertson, who in 1898 had published a science fiction story about a futuristic luxury Atlantic steamship—the largest floating object ever built by human hands, destined to make its acquaintance with hubris and an iceberg on a cold April night, during its first and last voyage.

The novel was an obscure “penny dreadful” —which, commercially, had failed miserably. It was regarded in its day as a story-line so improbable and so contrived that no reader could be expected to suspend disbelief. As it turned out, scientific and historical reality eventually caught up with and exceeded science fiction.

On a cold April night in 1912, the Royal Mail Steamship *Titanic* struck an iceberg during its maiden voyage, just like Morgan Robertson’s fictional ship. It struck on the starboard side, just as Robertson’s ship did. It was filled with some of the world’s richest and most famous people, just like Robertson’s ship.

The science fiction ship was 800 feet long; Walter’s real-life *Titanic* was 882.5 feet long.

Both ships were nearly 70,000 tons displacement with three large and remarkably powerful propellers, capable of accelerating each vessel above 22 knots. The crews of both ships were complacent about racing ahead at nearly full speed into the night toward an ice field they'd been warned lay directly ahead—because each ship was believed “unsinkable.”

And stranger still, Walter Lord thought, that Morgan Robertson had named his science-fictional ship, the *Titan*.

And it happened again.

Decades later, after interviewing Walter about the Japanese experience of World War II, a colleague stumbled upon another strange science fiction novel—a two-volume story, in fact, published by the firm of M.F. Mansfield, in 1908.

Titled, *Beyond the Spectrum*, the tale read as if someone had thrown open a window, showcasing technology that did not exist in 1908. In that year, the most advanced airplanes in the world were “spit-and-glue flimsies” —barely more than glorified kites with motors; and yet the author wrote of a great human change arising from a global war fought in the air, on the high seas, and deep under them. The skies became filled with flying fortresses and gleaming metal fighter planes. At the war's start, Japanese-Americans were herded out of U.S. cities and driven like cattle to internment camps, where whole families were held behind barbed wire and machine gun towers. In the fictional *Beyond the Spectrum* war, America's entry into the conflict began on a December morning, when naval forces from the Empire of Japan bombed Manila and Hawaii from the air.

The war itself, as it stimulated technological advance, led up to a split second that ended up mirroring, as if by prophetic warning, key aspects of the moment in which our species entered its nuclear adolescence.

Beyond the Spectrum concludes its war with America's development and threatened mass-manufacture of a weapon that blazes forth with a fearful light (including deadly wavelengths beyond what the human eye can normally see—exactly as occurred above Hiroshima and Nagasaki). The fictional weapon's light was capable of inflicting burns out to a distance of several miles. The 1908 novel described smoldering ships limping into port, driven by stokers or anyone else who happened to be located below deck at the moment of detonation, because the flash was so intense that it burned or blinded officers and crew who had been on the bridge or anywhere else topside.

And, how strange to think that the author of *Beyond the Spectrum* died in frustration and obscurity, in much the same way that an 1898 novel about “the wreck of the *Titan*” went out of print almost as soon as it hit the bookshelves: A tale too fantastical to seem believable, even by the likes of H.G. Wells or Jules Verne. “And strangest of all” Walter remarked, “to see, on the cover of *Beyond the Spectrum*, Morgan Robertson's name—again.”

The fictional weapon was called a “sun bomb” and it marked the moment at which humanity was forcefully awakened to the possibility that civilization would die of civilization.

The real weapon was called atomic—“unleashing the power of the sun” —and it marked the beginning of a challenging new phase for civilization, filled with peril, but also with a certain amount of promise. This is a phase through which we seem on the verge (if we are wise, and

pay attention) of being able to sustain the kind of civilization that can actually thrive on Earth—and afterward, as H.G. Wells once envisioned our kind, we may stand up as a child stands upon a footstool, and reach out among the planets, and beyond.

Thus begins an inevitable stage in the life of any electronic civilization's history, a phase that (succeed or fail) must be so brief and so rare as to now be happening only once among all the stars in our galaxy (if other civilizations have evolved, they long ago succeeded or failed). With such grace do we move forward, as probably the newest, brightest, and most interesting creatures around.

This is the story of a human awakening, of a clock that began ticking at 8:15 AM, August 6, 1945—toward what end, no one knows. Truly no one. Our odyssey begins precisely where it began for our entire species—during that first one hundred millionth of a second above Japan.

I remember the very strong scent of cherry-wood sap. I remember the cherry blossoms in spring. On August 6, I saw the orchards of Hiroshima aflame. It smelled like cherry pie.

- Memories of a young girl, Case # 2016-B (1985)

SUNRISE

The day *Homo sapiens* became adult began with unsettling calm and beauty.

As dawn approached, only gentle breezes stirred. Even the usual buzz of cicada song seemed oddly subdued. Southward, the sea sparkled like a field of polished beads, brass bright against the universe. On an inland lake, the air was still, with the reflection of a castle reproduced in such exquisite detail, that if koi were not occasionally gulping at the water's surface, the lake would have been indistinguishable from a carefully polished mirror¹.

Near the lake's shore, during that first chip of time, turtles were raising their golden eyes above the koi—each turtlehead, a set of twin periscopes gazing in opposite directions. Even reptilian brains would have registered almost immediately that something had gone terribly wrong with the sunrise—the second dawn of the day. Faster than nerves could respond, faster than water could begin to ripple, the turtles were blind and the tops of their shells were bleached. The mirror-lake reflected cicadas in flight, and dragonflies, and birds, all blazing forth like dazzling diamonds. One whole side of Hiroshima Castle also flared, in eerie, stunning silence.

From young Matsuda Toshihiko's perspective, more than fifteen city blocks south of the castle, the sun was shining from the north, so brightly that the Matsuda boy was about to leave his shadow on a wall in his mother's garden. He appeared to be bending down to reach for his jacks and marbles, or to pull out a weed. During the next few milliseconds, the wall behind the boy was flash-printed with his shadow, and also with ghost images of the plants that surrounded him. The leaves, though barely more than paper-thin, were providing his skin with some small measure of protection from the searing white glare. On the wall print behind him, marking the moment of the sun's awakening, could be seen the shadow of a leaf that had just detached from its vine and though falling, would never reach the ground. Nearby lay five glass marbles. They would be found days later—melted and re-solidified into

green blobs.

Deep within the Matsuda boy's radius from the hypocenter, young Aoyama Nenkai's mother must have been outdoors and already at work, on the same patch of ground she had been working every other morning by 8:15. She tended a temple garden with a half dozen monks. The vegetable patch was adjacent to an eerily shock-cocooned landmark that history would one day name, "the Peace Dome." On this particular day, Mrs. Aoyama had saved her son's life by having suddenly, as if in a panic, rushed him out of their home and away to his school's work detail nearly an hour early. Nenkai's last memory of his mother was her inexplicable command, "You must hurry."

"Maybe she had a premonition," Nenkai would reflect, years later. "I just don't know." At Moment Zero and nearly a mile behind the boy, ash and blood-derived steam exploded away from the place where his mother had been standing, and from anyone else working in the garden². The jets of carbon and steam erupted at more than five times the boiling point of water. Atoms of iron separated from blood. Bones became incandescent. And a moment later Mrs. Aoyama was not. And the monks were not. And during the last third of a second before a wave of plasma and compressed air reached the ground, save for shadows of newly forged carbon steel boiling like coffee on the pavement, save for flaring ash, the people walking nearby were not. And as the blast wave plowed roof tiles into the river and the water flash-froze many thousands of tile surfaces turning suddenly to lava, the tiles themselves recorded for futurity, the thermal shock that melted their outermost layers within only one small part of a second. And within that same tiny chip of time, the outline of someone sitting on the steps of an office building was traced on the stone surface lying outside the person's shadow—traced by a hundred thousand steam-catapulted granite flakes that sprang from the rock like kernels of popcorn, almost directly beneath the false sunrise. The effects on slabs of stone and tile revealed much about what happened to people near the heart of the detonation.

Only a short walk from the garden where Mrs. Aoyama and the monks became a vapor in the heavens, in a house where no one and nothing should ordinarily have survived, Shigeyoshi Morimoto received a quick and intensive education in the strange physics of shock cocoons. Morimoto was one of Japan's four champion kite-makers—which was why he and the three other "kite-men" had been drafted and transported to Hiroshima to design high-altitude observation platforms for ship convoys. At a quarter past eight on the morning of August 6, 1945, Morimoto was so close to the bomb that had he been located outdoors and unshielded, the gamma rays and the neutrons that fell upon him would have killed him even without a flash strong enough to burn shadows onto walls and concrete walkways. The multi-tiered, heavily tiled mansion in which Mr. Morimoto was standing, shook and compressed around him and the two cousins he had been visiting; but the combination of roof tiles and three layers of thick wooden beams overhead attenuated the gamma ray bursts by a factor of about seven, and possibly as high as ten. Rooms filled floor-to-ceiling with shelves of books further attenuated the rays, and also the blast of compressed air that quickly followed. In a sense, the cousins were being safeguarded by their thousands upon thousands of books. They were safeguarded by culture. The compression of the upper three floors occurred as if the building had been designed with lifesaving crumple zones of wood and shelves (or protective shells) of thick paper in mind, simultaneously absorbing and deflecting the force of the uranium fist, and cocooning the Morimoto family so gently that they survived near the center of Hiroshima with only a few minor bruises³.

Another Morimoto relative, thirteen-year old Tomiko, had left her mother's one-story house in a hurry that morning, after exchanging some harsh words, and slamming the door behind her. At Moment Zero, Tomiko was at a school factory-work assignment, 1.2 miles away from the detonation point and preparing to go indoors. She heard a plane's engines growing suddenly very loud, and when a silent flash enveloped the world, her entire body was shielded in shadow. To her, the flash was red—"like morning sun reflecting off the ocean." Her school training, though intended for protecting oneself from a much smaller conventional bomb falling much nearer, acted in conjunction with a shadow thrown propitiously over her body. She had dropped immediately to the ground, opened her mouth to let the blast from any sort of bomb press the air out of her lungs without rupturing them, while closing her eyes as tightly as possible, pushing her eyelids into cupped hands. When she looked up again, the factory was gone—not just hidden behind a sudden storm of smoke and black dust, but simply gone. The building had nonetheless served a purpose, in shielding her.

Within this very same neighborhood, Morimoto Tomiko's house was also gone, and her mother with it. She remembered how even in these days of strict rationing to the point of a hunger that never went away, her mother had managed to hoard a small amount of rice, and serve her a breakfast of miso soup and seaweed. She would only realize much later that her mother, while claiming each morning not to be hungry, must have been giving Tomiko almost all the food she had saved.

(I'm not hungry, Mother had said, sending me away to school with what must have been the only lie she ever told me.)

And while putting on her shoulder bag for the school work detail—"I'm so sorry," Tomoko would lament, decades later, "I was only thirteen, and as many at that age, often in a bratty mood. I had unkind words. And, oh—I never wanted to tell this: All my life, I have been sorry that the last she saw of me, putting on my shoulder bag, I was angry and slammed the door. That's why I want to say to everyone, when you walk out that door, please, *please*, leave only with a hug, or some word of love. I had no idea; but you do not want to be like me. I always, always feel remorse."

The silent false sunrise did not only smash factories and crack concrete in Hiroshima. It sometimes left a crevice one's soul.

Those witnesses nearest the hypocenter, like the Morimoto child who would forever regret her last words to her mother, seemed never to have heard the blast. The kite-maker, Morimoto the Elder, was among those who insisted that the shockwave, when it crushed the mansion, arrived as a disconcertingly silent explosion.

Another to whom the false sunrise came in silence was seventeen-year old Kuabara Kimiko. She happened to be no more than a fifteen minute walk from the Morimoto mansion, at the city's Central Broadcast Center. Much military-related information was passing through the center, including coordinates for B-29 sightings. The structure was therefore "bunkered up," or "hardened" against attack; and all of the glass was bulletproof.

Kimiko had been made late for work by a series of B-29 air-raid alerts—not her fault, but she had been reprimanded anyway. In this particular station, men operated all of the electronic equipment and the young female conscripts from local schools were obliged to clean the offices, polish the glass, and trim the many rapidly growing bushes that were obscuring the

view outside. On this morning, Kimiko would ordinarily have been outdoors by 8:15 AM, exposed to the full fury of the rays and the surge of superheated air; but earlier fly-overs by B-29s, surveying and radioing out weather conditions over the target, had done more than leave Kimiko quietly seething over a humiliating and undeserved scolding. The planes had altered her schedule, and put another person outside in her place. And thus was Kimiko tidying the station manager's office when she heard a voice call excitedly from the courtyard: "It's a B-29 flying up there!"

A woman went to the window and saw a commotion in the sky that apparently frightened her. She managed to blurt out fragments of sentences—about seeing something like a long silvery light-bulb gleaming in the sunlight and falling fast, falling *really* fast somewhere in the direction of the Dome—before she ducked from the window and dove toward the floor, shouting to everyone, "Get down!"

A plane's engines were droning out there, droning loud, as if it might crash. Kimiko dismissed the *Get down!* order as just another of many false alarms she had heard lately, so in the final countdown to Moment Zero, she simply wanted to see the plane that had been making all the commotion—becoming more distant, and less noisy, and doubtless less easy to see with each passing second. A siren started to wail and went dead.

She never reached the window.

"The flash was red," Kimiko would record—"the same light that occurs the moment you strike a match, but far more intense." In immediate obedience to her air raid training, she covered her eyes and ears and squatted down on the floor. The transition from flash to smoky darkness seemed to have occurred within the same instant, accompanied by the strangest of sensations: "In the darkness, I felt as if in a state of weightlessness, with a crackling feeling spreading throughout my body. Not that it was painful, but it was such a bizarre sensation that I thought I must be dying." During these seconds, Kimiko did not notice the bulletproof glass coming apart or that it had, itself, been transformed into uncountable thousands of little bullets. At least three of the speed-slung fragments cut through her left cheek, but people in front of, behind, and beside her were shot dead.

When she climbed out to the other side of a broken steel door, there were huge clouds where minutes before had been nothing except blue sky. And the lighting! The clouds, and the colors, belonged to another planet. And then, as if to emphasize the point, half of a basketball scoreboard crashed to earth like a meteor. Other meteors followed: the lid of a grand piano... part of a wagon, still attached to a harness and the hindquarters of a horse... the roof of a streetcar... A tennis ball bounced down from above... A roasted turtle pounded down, along with dozens of other objects that had no business being in the sky.

All of this, Kimiko was certain, had begun in silence. She was located just within a one-mile radius from the hypocenter.

"I'm certain," she would tell history. "It began with no sound of an explosion. No sound at all."

With increasing distance, the noise did grow perceptible, then bone-rattling. Almost two miles away from the hypocenter, almost a mile past Morimoto Tomiko and Kimiko, sixteen-year-old Haruno had been an engineering student at the railway's streetcar division, where young women were treated with much more respect than at Kimiko's location. At Moment

Zero, Haruno was taking a quick breakfast break in the girl's dormitory when a blast that she thought might deafen her, nearly ripped the roof off the building. Outside, a cloud in the shape of some hellishly deformed flower was thundering six miles high and still rising—and below it, in the direction of home, the center of the city was swirling and boiling, and sending up whirlwinds of flame. Perplexed, and with her ears still ringing, Haruno knew only two facts. First: "People are injured and dying everywhere, and will need help." Second: "My mother is directly beneath that cloud."

On the other side of the mushroom cloud's stem, at Haruno's same radius from the detonation point, a ship designer named Yamaguchi Tsutomu was permanently deafened in one ear by the blast wave.

He had been living in the city for only a few weeks, and during each of those weeks, a foreboding grew within him: *Hiroshima will be destroyed today*. It seemed to be the last thought he had before falling asleep, and the first thought that came to him when awakened by uneasy dreams. In those dreams, the Emperor was the harbinger of death. It was madness. Incongruous. Madness. Yamaguchi's parents, like the parents of everyone else he knew—and like most everyone in his own generation—had worshipped photos of the Emperor and his family, in much the same way that ancient Romans worshipped their emperors as living gods, before their empire fell in flames and ruin. He could not understand why during an earthquake or an air raid, each family grabbed and protected its photo or painting of the Emperor before grabbing its own life-saving evacuation rucksack. He could not fathom how people worshipped a man and his children, as descendants of the sun itself, based on the mere luck of family rank.

Yamaguchi kept his failure to comprehend to himself, naturally. Here in Hiroshima, based merely on rumors that he once questioned the wisdom of war, the artist Nakazawa Harumi had been abducted by the police for many months of foot-breaking and finger-breaking torture. The artist's whole family was cut off from food rations, and shunned. Possibly because his paintings were once hung in the great Industrial Hall (the same building whose dome now stood defiantly against the sky), Nakazawa's family was among the lucky ones. Elsewhere throughout the city, other families, having been pointed at and judged guilty by accusation alone, simply disappeared.

Yamaguchi, too, was among the lucky ones. Now nearing the end of his twenties, his scoring on IQ tests and his talent for drawing, combined with his ability to work out the physics that simplified hull structures even before he sat down to "show the math," had compelled one commander or another to pull him out of the military reserves, and assigned him to design ships at various naval yards south of Hiroshima. From his many work stations, Yamaguchi concluded, based on the increasingly primitive materials from which he was being asked to contrive designs, that Japan had been running out of everything for more than two years, and would soon be down to wooden hulls and oars—while America, with its industry revved all the way up, must be cranking out new ships and planes at an obsessive-compulsive rate.

And I'm a lucky elite, he thought acidly, at least once each day.

Two very long years ago, his infant son died from a common cold that degenerated into bacterial pneumonia—which could easily have been treated if not for a lack of medicine, even for the families of "elites".

When the government controls the food and finances of everyone, it quickly runs out of

everyone else's money, and food, and medicine. This thought, too, Yamaguchi kept to himself, and for all the correct reasons. When the government sent him and two fellow engineers north to the shipyards of Hiroshima, almost no one aboard the train had found it possible to disbelieve the never-ending propaganda explaining how suffering was only temporary because Japan was winning the war—notwithstanding certain disturbing revelations. From time to time, the train's windows became a gallery of charred landscapes.

Yamaguchi and his two colleagues, Sato and Iwanaga, saw clearly that America's futuristic "*B-sans*" owned the air, and industrial centers were being fire-bombed out of existence at the mere will of someone who must be saying, "Just pick a target." During the train ride, they had expected to find most of Hiroshima already firebombed—and yet, they had arrived at, "a glimmering oasis of life in a vast, national desert of destruction."

Up to this moment, what had troubled Yamaguchi most about Hiroshima, compared to what he knew was happening to other cities, was precisely the glimmering beauty of the rivers and the undisturbed greenery that surrounded them. Add to this, the *quiet*—"a quiet that could be felt." It was the quiet one knows if imagining a cheetah stalking its prey, padding about in the forests, waiting for the perfect moment to pounce.

What the young engineer had dreaded even more than that dark gallery, was how the train to Hiroshima took him away from his wife, and from his new son—who, this time and at least in this little corner of history, were both staying alive and in good health.

After many a phone call to upper management at Mitsubishi Corp., Yamaguchi and his two friends had convinced at least one sufficiently high-ranking commander that there was little to be accomplished in supply-poor Hiroshima and their skills could be better applied closer to home, on the better equipped south island that included Nagasaki. This morning, final clearance for the trip homeward was finally in-hand.

At breakfast, during this last morning of the old world, Yamaguchi's friend Iwanaga had asked, "Should we buy our train tickets today or just show up at the station?"

Yamaguchi thought about it for a moment. As a general rule, the trains were no longer accessible to civilians. Service was restricted almost exclusively to those traveling on official government business. "I doubt it will be busy," he replied, "so we can just show up at the station and... Oh, *no*. My name stamp!"

Their schedule for the day had changed so suddenly that the stamp was still in a desk at one of the Mitsubishi buildings, and Yamaguchi would need it when he reached the south office.

"Don't worry. I'll be back within a half hour," he said, and rushed out.

"Hope the next train isn't leaving too soon," Sato had called after him. "We don't want to be waiting all day."

"I'll be quick, believe me!" He had thought of adding, *We've plenty of time*, but thought better against saying it, because he really did not believe it. Few people wanted to get away from this city more quickly than Yamaguchi Tsutomu. After running a sixth of a mile along the main road, he decided to take a shortcut through a potato field and was approaching a woman dressed in a black mompe, when three parachutes suddenly bloomed overhead and something like the power of a thousand flood-lamps flashed before his eyes. Responding

instantly with his navy air-raid training, Yamaguchi dove to the ground and rolled into the nearest irrigation ditch, simultaneously protecting his head with his hands. Even with his ears covered, the sound that came to him was Earth-shattering. His eyes were closed and buried in mud but he could see and feel the glare of the fireball, as if the light were shining through the back of his skull and striking his retinas—which, in fact, it was. He would report later that it seemed as though the sun had fallen to Earth, and that even the mountains let out a scream.

The ground roared and quivered, snapped and leaped, tossing Yamaguchi out of the ditch and some four or five feet into the air. In later years, he would be unable to tell for certain whether it was the ground shock or the air blast or some convergence of both that had coughed him out of the ditch and made him airborne. His world became confusion and tumult filled with rushing dust and occasional clearings in the dust, through which he viewed... *"things—irrational things."* At the very moment he seemed on the verge of falling back again onto the potato field, the fireball imploded over the city and rose at stupendous speed, creating a vacuum effect that for a second or two appeared truly determined to draw the engineer further from the face of the Earth and toward the center of the city; but instead the implosion merely levitated him for what would be recalled as an impossibly long time on a cushion of air and thick dust, and he guessed that at no point was he any more than six feet above the ground. Through one of the clear-air openings in the sea of dust—even as he still drifted over the field—Yamaguchi glimpsed distant rows of houses warping out of shape and flying toward him in pieces. He felt like a mere leaf, tossed upon a lake of rushing black fog. Then, abruptly, he and all the larger pieces of the houses (including whole rooms full of furniture in mid-flight) dropped to the ground. Smaller pieces continued flying toward the city center without him—and, miraculously, without ever having struck him along the way.

After Yamaguchi regained his composure, he realized he had been dropped into a new ditch, some unknown number of paces from the one into which he had dove. Sitting up, and looking around while checking for fractured bones, he beheld a blizzard of burning paper and shreds of smoldering clothing falling out of the sky, flickering like thousands of tiny lanterns and incense burners in the limbs of knocked-down trees and on the leaves of potato plants. It appeared to him that the contents of an entire office building had been hoisted into the heavens, then ripped up, blown apart, scorched, and strewn about. He could not find the sun—or, at least, not the real sun he had known. The blue sky appeared to have been erased and darkness prevailed, making Yamaguchi feel as if he were in the depths of the ocean. Pieces of buildings were still in flight. "I could hear the sound of flying roof tiles shattering in the air," he would write later – "objects falling, and the noise of all manner of destruction. It was impossible to identify each noise or its cause."

Sitting in a mud pool, Yamaguchi became suddenly aware that one whole side of his body was intensely hot. The exposed skin on his left arm had been literally roasted brownish-black, like the skin of an overcooked chicken. Even then, before he knew anything about atomic bombs, the engineer began to suspect he had just survived a heat ray of some sort; and he realized that his white shirt and his light-colored pants had reflected the rays and spared him much. The woman in the black mompe had run toward the center of the field, where, standing upright, she exposed her entire body to the full fury of the flash, while clothed in the all-absorbing equivalent of India ink. Yamaguchi glanced around in every direction, but he never did see a trace of her again.

When the noise and the black dust subsided and Mr. Yamaguchi looked up again, he saw a pillar of fire and ash reaching into the stratosphere. Only much later would he find a way to

describe it: “Like a giant tornado enclosed within a volcanic plume, but the base of it did not move. Only the top of the monster seemed active, growing higher and wider.”

When this cloud falls to the earth, Yamaguchi told himself, every living thing will die. He realized that even if he survived the cloud—which soon splashed him with oily yellow mist, the B-29s might return. Suddenly, all the burning of his body went away, to be replaced at once by the image of his young wife and child alone at home. He contrived a plan, then, to find a train or an automobile that was still working, or a horse that was still alive and, by any means necessary, to find a way out of Hiroshima, and toward home.

Home, was Nagasaki.

Author’s Postscript: Yamaguchi Tsutomu left Hiroshima to join history’s most exotic minority: The approximately forty people who survived the atomic bombings of both Hiroshima and Nagasaki. Of these forty, he is one of only two known to have been located within the nearly impossible to survive zone of Ground Zero, each time. Of these two, only Yamaguchi was exposed above ground, to the effects of the bomb, both times.



Yamaguchi Tsutomu, The Calming Waters

In December 2009, as his film *Avatar* premiered in Japan, James Cameron and I visited with Mr. Yamaguchi, who by that time had become, to me, one of life’s great teachers. He gave both of us paintings he had created. To Jim: A beautiful dragon in some sort of struggle, to keep near him because something bad was coming. To me, he gave a painting of fireflies near a waterfall, and instructed that I must keep the calming waters of this painting near me, because the storm was coming.



We were honored and surprised to receive these paintings from Tsutomu Yamaguchi in December 2009. He warned that a difficult time was coming - that Jim (center would have to wrestle with the dragon, and that I should always keep his painting of the calming waters, and the fireflies, near (I do).

Maybe, as others in Japan had warned, he knew that it was a career danger to be writing books on this subject in America without the “required” chapter justifying the use of the atomic bombs (as for example, the repeated justifications in Bill O’Reilly’s book, *Killing the Rising Sun*). Maybe he had heard something of the “Nuke Lies” movement in America (whose members claim “shadow people” were painted, and “Hiroshima and Nagasaki did not happen that way”... and, after that, they can start to get nasty). Or maybe, as some say, he had a premonition.

We’ll never know. Mr. Yamaguchi passed away in January 2010.

In any case, his prediction was correct. A storm of nuclear denialism did come; Jim and I survived it. Mr. Yamaguchi’s lessons, and his painting, “The Calming waters,” are close to me, always.

His lessons are also kept close to Jim Cameron's heart. Cameron has written: "Yamaguchi-san felt the blast of nuclear fire twice, and believed that he became one of a handful of double atomic bomb survivors for a reason, so that he could spread a message of hope and forgiveness. He became a more highly evolved human. If he could forgive, having become witness to the unimaginable not once, but twice, then couldn't anyone, anywhere, forgive wrongs, real or imagined, that drive human warfare?"

In May of 2016, as President Barack Obama was preparing for his visit to Hiroshima, James Cameron and I were asked by Mr. Yamaguchi's daughter, Toshiko, to write a paragraph for the visit.

It read: "In Hiroshima there is a 'Tree of Hope'—which survived the first atomic bomb and which is prophesied to continue growing until the day humans banish nuclear weapons from the Earth. One day the tree will be forgotten, either because human civilization has changed its way of thinking and eliminated nuclear weapons, and the tree becomes just another tree—or because nuclear weapons have eliminated us, and there is no one left to water it."

Update on a Film Project:

Currently, two of the *Avatar* sequels are deep into production. The film option (on my Hiroshima/Nagasaki books) was renewed in December 2017. Although Cameron's warning to the future about what atomic bombs really did, will have to await completion of at least the first two *Avatar* sequels, Cameron recently had this to say, during an interview with journalist Ian Punnett: "When I do focus on Hiroshima, then I will huddle with Charlie and whatever experts I can. Charlie put me in contact with a number of people in Japan, and I was privileged to go over and meet a couple of the survivors, most memorably, a man named Tsutomu Yamaguchi, who was a double survivor, who had become a peace advocate. I met him only a few days before his death from cancer, of course. He sort of passed the baton to Charlie and me, so we have a sacred trust to, at some point, make this film."

*

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Charles Pellegrino, with **Jesse Stoff**, produced the original math and modeling that predicted the discovery of icebound seas under certain moons of the outer Solar System—including the water geysers on Saturn's moon Enceladus (verified in 2005). The now-accepted "Europa Theory" —which linked Stoff's and Pellegrino's 1975 math to the 1977 discovery of deep-ocean hydrothermal vent life by Robert Ballard's team, led to Pellegrino joining Ballard during the autumn 1985 robotic expedition to the East Pacific Rise. This expedition also led by chance to Titanic submersible dives, followed by a best selling trilogy about the Titanic expeditions.

Notes

¹ Koi are colored mutations of the common brown carp - interbred for their colors.

²The content of human blood is essentially seawater. At only 500 degrees C (as in the marina, AD 79, Pompeii's sister city of Herculaneum), people vaporize, essentially instantly. At this location in Hiroshima, it was closer to 1500 degrees C (15x the boiling point of water). These are temperatures at which the entire water content in one's body flashes to vapor in 1/20th of a second. Death occurs in 1/200th of a second, with no perception, at all, of pain.

³Crumple zones (originally invented for the Lunar Module) are engineered into cars. They gradually absorb the force, compressing the entire impacting area of a vehicle - or, in this case, a building that serendipitously had crumple zones built into it, facing the blast.

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