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# TRINITY

R.A. Meade

At 5:29:45 am Mountain War Time, on July 16, 1945, the world's first atomic bomb, codenamed Trinity, exploded in a blinding flash 100 feet over a portion of the southern New Mexican desert known as the Jornada del Muerto – the Journey of Death – temporarily blinding a future Nobel Laureate, Richard Feynman. Forty seconds after the detonation, Noble laureate Enrico Fermi dropped small pieces of paper before, during, and after the blast wave passed him. From the lateral dispersion of the paper, he calculated a yield of ten kilotons. Another laureate, I.I. Rabi, won the betting pool for Trinity's yield. Arriving late, he bought the last available number, eighteen kilotons. The yield was later calculated to be twenty kilotons. On August 9<sup>th</sup>, a copy of the Trinity device, dubbed Fat Man, was dropped on Nagasaki.

The Los Alamos Laboratory was established in April 1943 to craft fission into an atomic bomb. It was expected that a gun could be fashioned to shoot a subcritical piece of plutonium at a second piece of the same material thereby creating a supercritical mass and a very large explosion. However, in the summer of 1944, the discovery of an isotopic impurity rendered plutonium unusable in a gun because the assembly velocity was too slow. The only other method for using plutonium was implosion, the use of the supersonic shock waves created by high explosives to symmetrically crush a subcritical ball of plutonium into a supercritical mass. This novel use of high explosives required a proof test.

Conducting such a test required a unique site – one that could shield the experimental set up and the anticipated explosion from public view. After considering a number of possible sites, including the lava beds south of Grants, New Mexico, and the Great Sand Dunes of southern Colorado, Robert Oppenheimer and Kenneth Bainbridge chose the Jornada del Muerto because it could easily be reached from Los Alamos, yet was remote enough to provide security, and, as part of the Army Air Corps Alamogordo Bombing Range, easily acquired. A 100 foot shot tower was erected at ground zero to minimize soil uptake as well as to provide a fixed point in space for visual observation and photography.

Although, a large number of experiments were conducted to measure heat, light, neutrons, and gamma rays, the spectacular fireball, framed by the dark sky, was instant proof that the device worked. Calculating the bomb's efficiency and yield was accomplished by Los Alamos radiochemists, whose science and technology became the basis for evaluating all subsequent nuclear tests.

Trinity will always be remembered as the world's first atomic bomb. And rightly so. However, it should also be remembered for its contributions to the science and craft of nuclear testing that included the use of shot towers to provide a fixed point in space, the timing of detonations just before dawn to allow for visual observation of fireballs, and the science of radiochemistry to accurately assess bomb performance.

