

## The Rising Sun

1937, July 7: Japan invades China. Ultranationalist military leaders justify plan to occupy China, Manchuria and Korea under pretext of *Hakko Ichiu* – ancient *Shinto* concept of “all the world under one roof”, ruled by Japan’s divine Emperor. Invasion sets Japan on course for World War Two

Emperor Hirohito (right). Believed to have opposed Japan’s drift to war

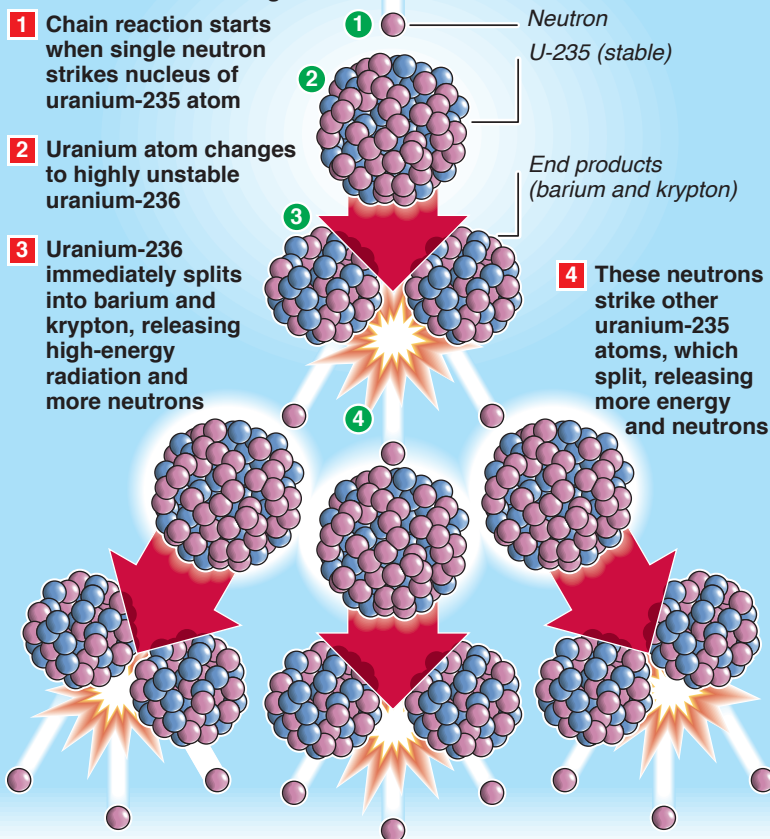
1938: German scientists *Otto Hahn* and *Fritz Strassman* demonstrate nuclear fission – splitting the nucleus of a uranium atom and converting some of its mass to energy.

Japanese atom bomb project begins under direction of physicist *Yoshio Nishina* (right). Japan purchases cyclotron – to enrich uranium – from University of California

1939: Germany starts project to build atom bomb. Rival teams led by physicists *Kurt Diebner* and *Werner Heisenberg* (left) explore uranium and plutonium devices

Aug: Scientists led by *Albert Einstein* (left) write to U.S. President *Franklin D. Roosevelt* (right), warning of Nazi Germany’s A-bomb project. Letter recommends that U.S. develops its own atom bomb – the *Manhattan Project* is born

**Chain Reaction:** The power of an atom bomb comes from the release of energy holding together each individual atom of uranium. When sufficient fuel is brought together a chain reaction occurs – energy released is a hundred million times greater than that from a chemical reaction



# The race to build the bomb

On August 6, 1945, a single American aircraft dropped an atom bomb on Hiroshima.

Three days later Nagasaki met the same fate. Japan surrendered within a week, ending World War Two. More than 120,000 of the 450,000 people in the two cities were killed – a further 100,000 died from radiation-related illnesses within months

## Blitzkrieg

Sep 1: *Adolf Hitler* invades Poland. Britain and France declare war on Germany. Britain begins *GEN75* project to build atom bomb

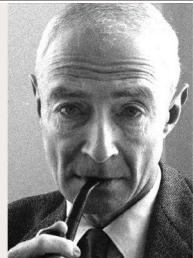


1941: Heisenberg’s team files patent for plutonium bomb in Germany  
Dec 7: Japan attacks Pearl Harbour, bringing America into war



Oct 1942: Soviet leader *Joseph Stalin* (above left) learns of U.S. and German A-bomb projects. Soviet atomic weapons programme begins under leadership of physicist *Igor Kurchatov* (right)

1944: Manhattan Project employs almost 129,000 people – including British and Canadian atom scientists – under leadership of *Robert Oppenheimer*



## Extent of Japanese Empire

June 1945, modern borders shown

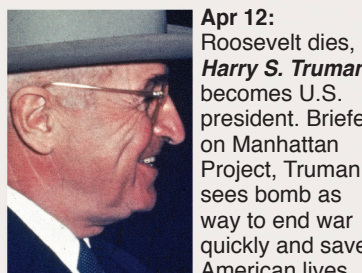


## Superbombs

Mar 1945: According to eyewitness accounts, Germany tests nuclear device at Thuringen concentration-camp, killing several hundred inmates

Apr 1: U.S. invades Okinawa – last stepping stone on road to Japan – 81-day battle claims more than 110,000 Japanese and 14,000 American lives

U.S. firebombing of Japanese cities forces Tokyo’s A-bomb project to be moved to *Hungnam*, in what is now North Korea



May 7: Allied Armies accept unconditional surrender of Nazi Germany – Pacific war continues

German submarine *U-234* captured by U.S. Navy en route to Tokyo. Boat is found to be carrying 560kg of uranium oxide

Mid-Jun: Japan’s Emperor Hirohito prepares *Operation Ketsu-Go* to defend home islands. Instructs Prime Minister *Suzuki Kantaro* and military leaders to find ways – with help of Sweden, Soviet Union, and Switzerland – to end war

Jun 18: Truman approves plan to invade and occupy Japan. Invasions of islands of *Kyushu* and *Honshu* will employ 2.7 million U.S. troops. Strategists estimate one million U.S. and several million Japanese casualties. General *Douglas MacArthur* warns that if Japanese wage guerrilla warfare from mountains, U.S. campaign could last 10 years



## Ruin from the air

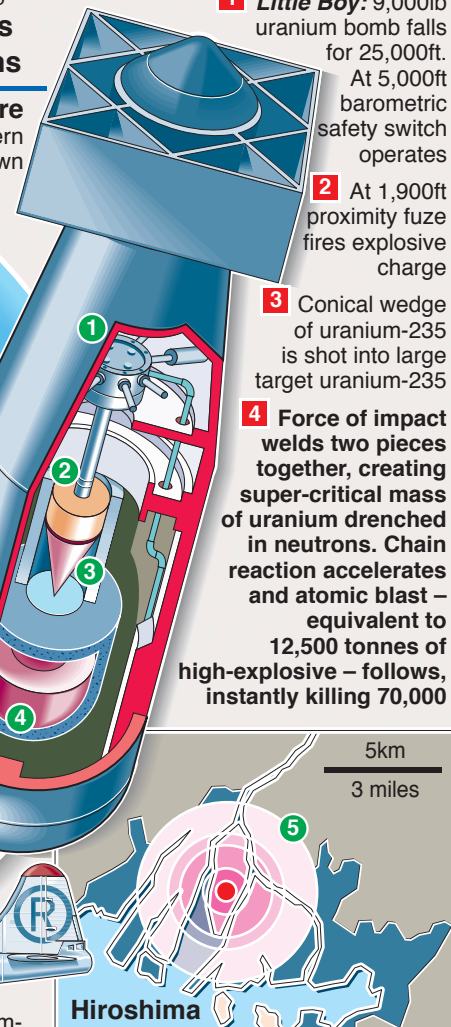
Aug 6, 8:15am: B-29 bomber *Enola Gay*, flying at 30,000 feet, drops first atomic bomb

1 *Little Boy*: 9,000lb uranium bomb falls for 25,000ft. At 5,000ft barometric safety switch operates

2 At 1,900ft proximity fuze fires explosive charge

3 Conical wedge of uranium-235 is shot into large target uranium-235

4 Force of impact welds two pieces together, creating super-critical mass of uranium drenched in neutrons. Chain reaction accelerates and atomic blast – equivalent to 12,500 tonnes of high-explosive – follows, instantly killing 70,000



Everything vaporised  
Total destruction  
Severe blast damage  
Flammable objects burnt  
Serious fires

5 Fireball – with temperature of 300,000°C – kills almost everyone within 3,300ft of ground zero. Blast destroys all wooden buildings within 7,500ft of ground zero. 70,000 people seriously injured. *Black rain* falls heavily for over one hour, depositing radioactive debris over wide area

Aug 9, 11:02am: U.S. drops plutonium bomb on industrial section of Nagasaki, totally destroying 1.5 square miles of city, instantly killing 40,000 people, and injuring 60,000 more. By year’s end, death toll climbs to 70,000



Aug 14: Japan surrenders

## Nations with the A-bomb

1949: *Russia* explodes atomic bomb  
1952: *Britain* explodes atomic bomb  
1959: *France* detonates A-bomb  
1964: *China* explodes A-bomb  
1967: *Israel* reported to have bomb  
1974: *India* explodes atomic bomb  
1998: *Pakistan* detonates five devices  
2003: *North Korea* says it has A-bomb

