"Strange Weapon: Past and Future of the Atomic Bomb"
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I call the "Atomic Bomb," that is, nuclear weapons, "strange" because, unlike other weapons that have been developed in the past, have a dual nature. In fact, they have a "dual dual" nature.

One aspect of the duality is the obvious one: On the one hand, they are weapons, but they have the capability of being used as well for peaceful energy and, perhaps, for helping with the negative aspects of climate change, i.e., global warming.

The other aspect of the duality is that, on the one had they have the capacity to change warfare in a radical manner (and they have), because they can destroy the world; but on the other hand, they have been credited with creating a situation in which a major war has been avoided for 65 years, precisely because they can destroy the world.

Let's look at some of these contradictions.

The Past—Nuclear Research; the Bomb, and Nuclear Energy

- Idea of the atom as "indivisible"—Democritus
- 1897—discovery of the electron by J.J. Thompson—meaning: the atom is not indivisible
- Emergence of the quantum (Max Planck) and of quantum mechanics (the explanation of the behavior of matter and its interaction with energy on the atomic or sub-atomic scale)
- Discovery of the neutron (1932)—beginning of nuclear physics
- Idea was research on the nucleus of the atom
- Fermi group in Rome—bombardment of the nucleus with neutrons rather than alpha particles (as had been done in Paris by the Joliot-Curies) to induce artificial radiation; probably split the atom, although they failed to explain it; important also for isotopes
- Splitting the atom produces a huge amount of energy; beginning of a new energy source; Einstein thinks it is not possible in practice
- World War II—fear of development of a German bomb
- Britain and U.S. think start development of a bomb
- Question of "cross sections" and a self-sustaining chain reaction
- Difference between "gun-type" and "implosion" bombs (U235 and Pu239)
- German surrender

- Proposal of nuclear scientists to prevent atomic war in future, to "internationalize" them and bring peace

The Future

- Uncertainty between nuclear energy and nuclear weapons
- Ease of making gun-type bombs
- Enriching uranium—reactor grade (3%); bomb grade (90%+)
- Nuclear proliferation?
- The "Second" nuclear age opens; the "First" nuclear age was the development of the atomic bomb by the US and its use against Japan. However, the bomb was not used thereafter.
- Terrorism? This is part of the "second" age, which is supposed to have opened with 9/11, its recalling of the atomic bombing, and the possible use of nuclear weapons by terrorists. (Possibility of getting Pu239 with Pu240 "impurity" that causes a "fizzle," (predetonation) but that could cause an explosion of 1-2 kilotons. This might be attractive to a terrorist who is willing to sacrifice his life).
- Can the world still remain war free in the "second" nuclear age? Besides the possible use of nuclear weapons by terrorists, there is the proliferation issue (uncontrolled spread of knowledge of atomic technology and the building of atomic weapons by states such as North Korea and Iran; remember the other states that were working on atomic weapons, such as Iraq before 1991; those that had then and renounced their program, such as South Africa; and those that have them but don't advertise it, such as Israel that supposedly has 200 bombs; those that might decide to build them because their neighbors might have them, such as Saudi Arabia; and those that are capable of building them but don't, such as the European countries.
- Nuclear energy and its promise—help in curbing global warming; possible accidents—Three mile island; Chernobyl; Japan
- **T**he future of a nuclear world: many nuclear-armed nations vs. control; nuclear reactors and their proliferation?
- What would happen if the "nuclear taboo" against using nuclear weapons is broken?
- We might have to get used to living in a completely different kind of world.