Book Review

1. **Heisenberg's War, The Secret History of the German Bomb**
   Thomas Powers
   Knopf, New York, pp 608, 1993.

2. **Uncertainty, The Life and Science of Werner Heisenberg**
   D C Cassidy
   Freeman & Co., New York, pp 669, 1991

3. **Nazi Science, Myth, Truth and the German Atomic Bomb**
   Mark Walker
   Pienum Press, New York, pp 325, 1995

4. **The Farm Hall Transcripts, Operating Epsilon**
   The Institute of Physics Publishing, Bristol, 1993.

Why didn't Hitler get the atom bomb? Was there a serious effort in Germany during World War II to develop an atom bomb to win the war? Why did it not succeed? A German victory would have meant, even in the opinion of many Germans, a terrible tragedy for mankind as a whole. Did scientists in charge of nuclear research deliberately hinder the acquisition of the deadly weapon by the Nazi regime on moral grounds? Or, did the German scientists try their best to build the bomb but failed? What was the role of Heisenberg (1901–1976)? As the leading nuclear scientist during the war, Heisenberg has been the subject of controversy and debate ever since. Why did Heisenberg become involved in the dangerous nuclear project at all? He did not leave Germany to escape the Nazi regime although he had enough opportunity to do so just before the start of the war. Secondly, why were the results of the German effort so minimal? After all, nuclear fission was discovered in Germany (in 1938). During the war the German army had captured the world's largest supplies of uranium, heavy water and other materials. Yet by the end of the war, Germany was nowhere near attaining a bomb and had not even achieved a chain reaction.

A number of books have been published since the war dealing with these questions. We have selected the above four for review because they are relatively recent and take into account earlier work, eg, books by David Iriving, Samuel Goudsmit, Robert Jungk, Leslie Groves, post-war writings of Heisenberg and Weiszäcker, etc.

Thomas Powers, a Pulitzer Prize winning writer, has produced an extremely well-documented, unbiased work (1) which is a pleasure to read. He opens his book with the following sentence : *A single lurid fear brought the American decision to undertake the vast effort and expense required to build the atomic bomb—the fear that Hitler's Germany would do it first.* In the end Germany did not succeed and it was the Americans who first assembled the uranium and plutonium bombs in Los Alamos and used them against Japan (6 and 9 August, 1945) to bring the War to an end.

Both (1) and (2) are scholarly, well-documented books which illuminate an ambivalent chapter of German history. While

Power's book (1) deals mainly with Heisenberg's wartime work, Cassidy (2) covers also Heisenberg's revolutionary work in quantum mechanics, for which he was awarded the Nobel Prize in 1932. It is interesting to read in (1) about the American Secret Service (OSS—Office of Strategic Services) plans for kidnapping or murdering Heisenberg in 1943/44 when he visited Switzerland. At least twice during the 8 or 9 days in Zürich in December 1944, Heisenberg brushed by an agent of the OSS armed with a pistol and authority to kill him. [p. 395] Since December 1943 Leslie Groves, in overall charge of the Manhattan Project, had been pursuing the proposal to organise the kidnapping of Heisenberg. (p 287).

The first three books under review deal with a controversial visit by Heisenberg to German occupied Copenhagen and his conversation with Bohr in 1941. Heisenberg was accompanied by von Weizsäcker and other German scientists. Robert Jungk– a proponent of the conspiracy theory, now perhaps discarded—says Heisenberg wanted to hint to Bohr that he, Heisenberg, would hinder the development of the German bomb because it was such a terrible thing. On the other hand Arnold Kramish, quoted by Walker in (3, p 261), considers Heisenberg and Weizsäcker as willing tools of the Nazis. They went to Copenhagen as spies to find out from Bohr information about the Allied Atom Bomb Project. This view, called the polemic thesis, too is considered by Walker to be unfounded and incorrect.

In short, one can say there were two schools of thought. According to one, called the apologetic thesis or the conspiracy theory, Heisenberg and von Weiszsäcker concluded that an atom bomb could not be constructed in Germany during the course of the on-going war, but they still went on carrying on nuclear research to provide protection to many scientists employed in various projects and giving the impression to the authorities that they were seriously contributing to the war effort. Their goal in reality was not a bomb but a nuclear reactor for producing energy. In other words, Heisenberg practically killed the German nuclear bomb project. The opponents to this school are said to support the polemic thesis according to which all these whitewashing arguments are not convincing. The German scientists did not produce nuclear weapons because of scientific incompetence not moral scruples [3]. Also the Germans lacked the vast resources necessary and the huge factories required for producing the materials and for developing the detonating device.

In conclusion, we may agree with Frederick Seitz who writes in *Stalin's Captive* (1996) : *The way one evaluates the wartime effort of the German scientists to achieve a nuclear chain reaction, depends on the mindset of the analyst or judge.....It is difficult to ascertain how much they desired to aid the political leaders in the pursuit of the war.* We also accept Walker (3) : *Did the Germans try to build an atom bomb, has no simple answer.* Walker further writes : *Heisenberg may have resisted Hitler in his own mind. Heisenberg's behaviour was not so different from most of his colleagues in Germany, the United States, or the Soviet Union who*

worked on nuclear fission. Almost all of them co-operated with their governments under very different conditions, either out of conviction, ambition or fear. There was an important difference, but that lay with the political, ideological and moral nature of the regime, not the scientists.

As the frantic development of the atomic bomb continued in Los Alamos, the Americans were extremely anxious to know how far the Germans had progressed in their efforts. An American intelligence operation, called the *Alsos* mission, was mounted under Boris Pash and Sam Goudsmit to gather information on the status of German nuclear research and to arrest the leading nuclear scientists, their target number one was Heisenberg. *Alsos* entered Germany behind the Allied invading forces in 1944 and by the end of war in May 1945, 14 scientists were located and captured. Four were flown to USA (2), Ten (Bagge, Diebner, Hahn, Gerlach, Harteck, Heisenberg, Korsching, Von Laue, Von Weiszäcker, Wirtz) were detained incommunicado, from July to December 1945, in an English manor house called the Farm Hall, in Goldmanchester, 15 miles from Cambridge. They were interrogated and also encouraged to discuss among themselves, all conversations being recorded secretly on tape. A full transcript of the Farm House tapes were realeased only in 1992 (4). The aim was to find out the real history of the German nuclear programme.

In this book (4) it is interesting to read the German scientists' reaction to the news of the bombing at Hiroshima and Nagasaki. The scientists were treated well in their captivity and their attitude towards post-war Britain and America was friendly. In November 1945, the news came out that Otto Hahn, one of the captives, was awarded the 1944 Nobel Prize in Chemistry. The news was celebrated by the scientists. For Christmas 1945, the inmates of Farm Hall presented their captor, Captain Brodie, an album with their biographical data. On 3 January 1946, the ten detainees were brought to Germany and released. All of them found suitable positions in universities and institutes.

The Nobel Prize for Hahn was celebrated with various speeches, jockes and songs. These are included in [4] with the comment by Captain Brodie dated 26 Nov, 45 : *They are not of operational value but are passed on for interests' sake.* A sample :

Nobel Prize Song

Detained since more than half a year
Sind Hahn und wir in Farm Hall Hier,
Und fragt man, wer ist Schuld daran,
So ist die Antowort : Otto Hahn.

The real reason nebenbei
Ist weil we worked on nuclei,
Und fragt man, wer ist Schuld daran,
So ist die Antwort : Otto Hahn.

&c.

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The following scientific literatures have been obtained :—

1. **IAEA Bulletin**
   Quarterly Journal of International Atomic Energy Agency Vol 40, No 1, 1998, Vienna, Austria.

2. **Building Better Future**
   Contributions of Nuclear Science and Technology, IAEA Department of Research and Isotopes, IAEA, Vienna, Austria.

3. **Radiation, Health and Society**
   by Dr Björn Wahlström, IAEA, Vienna, Austria.

4. **Vidyasagar University Journal of Physical Sciences,** Vol 4, 1998,
   Editor-in-Chief : Sourangshu Mukhopadhyay
   Department of Physics and Technophysics, Vidyasagar University,
   Midnapore 721 102, West Bengal, India.

5. **Scan (Physical Sciences) No 64, 1997** and **No 67, 1998.**
   It is a guide to the contents of current issues of journals published by Gordon and Breach.

   Scan plus (Physical Sciences) No 28, 1997 and **No 31, 1998.**
   These consist of complete abstracts from current issues of new journals published by Gordon and Breach and Hardwood Academic.

problems of science, engineering, industry and medicine. The use of tracers in pure and applied research, process control and medical diagnosis — are some of the triumphs of peaceful use of nuclear energy (atomic energy).

Construction of nuclear power stations using reactors (however, not out of risk) has been started throughout the world. So long and still we use molecular energy by burning fossil fuel — coal, oil and gas — deposited at one time in the womb of the planet long long back. Such fuels will be exhausted one day. By that time it is necessary to produce an alternative method of generating energy. This may be possible by the fusion reaction. Such reactor — which should be free of risk and economically and environmentally viable — is under study and investigation by the international programme called International Thermonuclear Experiment Reactor (ITER). Realisation of such fusion reaction reactor is the challenge of the 21st century to the scientists and engineers.

Chemical Science and Technology

During the eighteenth century, scientists began the systematic study of the properties of various elements and their compounds. Advances in chemistry were continued throughout the nineteenth century. More and more elements were discovered and similarities among certain elements were found. This culminated in the development of periodic table by Mendeleev. Number of chemical elements of the date stands to 109 — mostly stable, some radioactive, a few extremely short-lived. Recently a new carbon allotrope (C60) called fullerene has been discovered.

Chemical sciences have been developed into three major directions in this century. The chemistry of carbon compounds has been called organic chemistry, the study of substances of mineral origin called inorganic chemistry and observation of chemicals and their theoretical interpretations are called physical chemistry.

Development of biochemistry is one of the triumphs of the 20th century chemistry. All living things are as if chemical factories and are constantly degrading and synthesising chemical compounds. Biochemistry has enabled the scientists to decide the molecular structure of proteins, carbohydrates, vitamins, enzymes, hormones and other compounds.

Polymer science has introduced another new field in chemistry and opened a new field of industry. Materials science and technology specially to prepare a tailor-made materials has opened a new vista in the chemistry. However chemical industries have a long history and have made inroads in every aspect of human life. It includes also fertiliser, petroleum and dyestuff industry. Probably no other science has made so much impact in the daily life of common men. Homogeneous or heterogeneous catalysis in the manufacture of industrially important chemicals