**Lecture 6. Outstanding American scientists.**

**Plan:**

1. **Thomas Edison, Alexander Graham Bell.**
2. **Nobel Prize winners.**
3. **The father of space age- Robert Goddard.**

**1. Thomas Edison, Alexander Graham Bell.**

**Thomas Edison (1847-1931)**

When Thomas Edison was born in the small town of Milan, Ohio, America was just beginning its great industrial development. The time in which Edison lived his long life, was an age of inventions, filled with human and scientific adventures; and Edison became the hero of that time.

The boy's education was limited to some months in the public school. Though Thomas was not good at lessons, he was very interested in science. Thomas began experimenting when he was ten or eleven years of age. Several years later, Edison learned telegraphy and became a telegraph operator. He was soon one of the fastest operators in a large telegraph company in Boston. He wanted to improve the telegraph system and worked very hard at it. Soon he built a carbon transmitter that marked a real advance in the art of telephony and helped much in bringing the Bell telephone into practical use.

One of Edison's greatest inventions was the gramophone or the "phonograph or speaking machine" as he called it. For the first time in history a human voice had been captured. Edison's success was immediate in America, but in Europe his invention was met with suspicion. In Russia a government official protested against the "mechanically speaking animal". When the phonograph was demonstrated in the French Academy of Sciences, one of the learned man shouted that it was a shame to deceive people, he couldn't believe that dead metal could produce a living human voice.

Another of Edison's inventions was the electric lamp. On October 21, 1879 Edison passed electricity through a carbonized cotton thread in a vacuum glass bulb. The lamp gave off a feeble, reddish glow, and it continued to burn for 40 hours.

There is scarcely a field of technical life in which Edison did not break fresh ground or at least stimulate discovery. He not only developed an improved dynamo to provide the power for electric lighting, but he also perfected other electric power equipment such as the generator, conductors, and underground power cables. The carbon filament lamp and the system of electrical distribution which he devised were key developments in the modern electronics revolution.

Thomas Edison, the world's leading inventor, patented over 1000 inventions, which changed our way of life. Among all his fame Edison remained a modest man. His motto was: "I find what the world needs; then I go ahead and try to invent it." He was sure that genius was "two per cent inspiration and ninety eight per cent perspiration".

Check your comprehension.

1. Where was Thomas Edison born?

2. What was his first work?

3. What was Edison's greatest invention?

**Alexander Graham Bell (1847-1922)**

Alexander Graham Bell’s family were no strangers to the communicative arts. His grandfather was a well-known elocutionist and actor in Edinburgh, where the younger Alexander was born on March 3, 1847. Bell’s father gained a worldwide reputation as a teacher of correct speech and lecturer on education. Alec’s mother was a musician and a portrait painter, and her son was born with such a talent for music that from infancy he could play by ear and improvise by piano.

In 1870 the family moved to North America and settled in Canada. Later Alexander went to Boston, where he opened a School of Vocal Physiology for teachers of the deaf and became professor at Boston University. His job brought him into contact with the scientific minds of the city. Furthermore he began the electrical experiments which resulted in his invention of the telephone.

In his laboratory notebook Alexander recorded the description of the most important experiment in his life. He leaned over transmitter connected to a reed receiver that his assistant, Thomas Watson (in another room at the far end of an entry hall with two intervening doors), pressed against his ear. Alexander shouted into the mouthpiece: "Mr. Watson, come here, I want to see you". To his delight his assistant came and declared that he had heard and understood what Bell said. Bell asked him to repeat the words. He answered, "You said: Mr. Watson, come here, I want to see you". They then changed places and Bell listened at the reed receiver while Mr. Watson read a few passages from a book into the mouthpiece. The words came clearly and intelligibly.

On April 4, 1877, the first true telephone line was established between Somerville, Massachusetts and Boston, the distance of about three miles. Bell got many prizes for his invention, among which was the James Watt silver medal in England and the Volta Prize by the French Government. His fellow inventor Thomas Edison spoke of him as "the friend whose world-famed invention annihilated time and space, and brought the human family in closer touch".

Check your comprehension.

1. When and where was Alexander Bell born?

2. Why did Alexander go to Boston?

3. How did he record his experiment in the laboratory note book?

**2. Nobel Prize winners.**

The Nobel Prize in Physics was awarded in 1956 to John Bardeen, Walter H. Brattain and William Shockley, talented American scientists, for investigations on semiconductors and the discovery of the transistor effect, carried on at the Bell Telephone Laboratories.

John Bardeen was born in Madison, Wisconsin, in 1908. He attended the University High School in Madison for several years, and graduated from Madison Central High School in 1923. This was followed by a course in electrical engineering at the University of Wisconsin, where he took extra work in mathematics and physics. Dr. Bardeen worked on the development of methods for the interpretation of magnetic and gravitational surveys physics at Princeton University. Here Dr. Bardeen became interested in solid state physics. He was offered a position as Junior Fellow of the Society of Fellows at Harvard University. He spent the next three years there working on problems in cohesion and electrical conduction in metals. John Bardeen was awarded the Ph. D. degree at Princeton in 1936.

During the war years Dr. Bardeen worked on the influence fields of ships for application to underwater ordnance and minesweeping. After the war, he joined the solid-state research group at the Bell Telephone Laboratories.

Dr. Bardeen's main fields of research since 1945 have been electrical conduction in semiconductors and metals, surface properties of semiconductors, theory of superconductivity, and diffusion of atoms in solids. In 1956 the Nobel Prize was awarded to Dr. Bardeen and his two colleagues for their talented work in the sphere of semi conductivity.

In 1957, Bardeen and two colleagues, L. N. Cooper and J. R. Schrieffer, proposed the first successful explanation of superconductivity, which has been a puzzle since its discovery in 1908. Much of his research effort since that time has been devoted to further extensions and applications of the theory. Dr.Bardeen died in 1991.

Check your comprehension.

1. What American scientists were awarded the Nobel Prize?
2. When was John Bardeen born?
3. What problems did he work out during World War II?

**3. The father of space age- Robert Goddard.**

Born in 1882 in Worcester, Massachusetts. Robert Goddard had been interested in space exploration and rocketry from childhood. Due to various illnesses, that often kept him out of school, he did much reading at home. Among his books on mathematics and the physical and chemical sciences were such science fiction works as H. G. Wells' War of the Worlds and Jules Verne's Journey from the Earth to the Moon. His diary and early notebooks show that he was fascinated with the idea of space travel.

Being a teenager Robert fell ill with tuberculosis. Although the disease remained inactive for many years, it kept him in a physically weak condition. He once wrote to a friend, “ It’s shocking how short life is and how much there is to do. We have to take chances and do what we can”. Robert Goddard worked far beyond the Limits of his poor Health. Receiving his Ph. D. in physics in 1913, he chose a career in university teaching and research. Most of his moderate income from teaching he added to the small amount he received from the Smithsonian Institution to finance his rocket experiments. Goddard worked to make his dream of conquering space come true.

In the dry and sunny southwest in Mexico, during ten years of brilliant work, he developed and experimented with guided and stabilized rocked flights. Goddard was the first to use a gyroscope; the first to use deflector vanes in the rocket motor blast to guide the missile; and in 1935, he was the first to launch a rocket which flew faster than the speed of sound.

Goddard contributed many advanced ideas to help the war effort, among which was the basic plan for the bazooka, the rocket launcher which was eventually used as an antitank weapon.

If Goddard had lived only 17 years longer, he would have seen his life’s work crowned with success. In 1962 John Glenn piloted America’s first spacecraft in orbit around the earth; and seven years later, Neil Armstrong became the first man to set foot upon the moon. Such achievements were possible only by the amazing power of liquid-fuel rockets which Goddard’s research had made possible.

Check your comprehension.

1. What was Robert Goddard interested in from his childhood?

2. What books was he fond of?

3. What inventions did Goddard make?