TODAY we cannot even imagine our lives without science. Science and all its tools have become an immensely important part of our existence. But it is scientists whom we owe a debt of gratitude for implementing scientific knowledge for the benefit of humankind.

Over the years, scientists have had to repeatedly fight against many heavy odds in their quest for unraveling the forces of nature and revealing the scientific truth behind many confounding phenomena. They always tried to overcome those adverse situations with their intelligence. Some of the greatest discoverers had to face injuries, and sadly, some even died due to the hazards inherent in their experiments. Let us take a look at some of these great scientific pioneers whose discoveries have revolutionized the world but had to face personal injuries in their pursuit of knowledge.

Galileo Galilei

Galileo Galilei was the pioneer of the interesting branch of telescopic astronomy and modern physics. He was born on 15 February 1564 near Pisa in Italy. Besides being a well known physicist, he was indeed a good mathematician, astronomer, philosopher and played a major role in the Scientific Revolution. He worked on the improvement of the telescope that aided in subsequent astronomical observations and discovery of huge unexplored realms of space. Some of his greatest discoveries include observation of sunspots, lunar valleys and mountains, and satellites of Jupiter.

A heartbreaking fact is that though Galileo’s endeavour to refine the telescope opened up a new era to resolve the dark age of universe for the forthcoming generations, it severely devastated his eyesight. He spent hours staring at the sun, which caused acute damage to his retina. He felt uncompromising eye pain later on in his life, lost sight in his right eye first, followed by the left. He was nearly blind during the last four years of his life.

Jean Francois De Rozier

Jean Francois De Rozier was a chemistry and physics teacher. Born on 30 March 1754, this Frenchman was one of the pioneers of aviation. He observed the Montgolfier brothers’ demonstration of the flying balloon in June 1783 for the first time and developed a passion for flight. Then, he tested with various untethered flights of a cockerel, a sheep and a duck and decided to take the first manned free flight in hot air balloons. He flew in a Montgolfier hot air balloon along with Marquis d’Arlandes on 21 November 1783 for 25 minutes and safely landed in the Bois de Boulogne. This success helped him gain confidence and he next planned to cross the English Channel starting from France to England.

But this task demanded a very large stock of fuel in the balloon for which the Montgolfier balloon was not up to the mark. So, he used a Rozière balloon which was a combination of hydrogen and hot air balloon. With the plan set, De Rozier along with his companion, Pierre Romain, started off from Boulogne-sur-Mer.

After making a few miles of progress, the direction of the wind changed and pushed them back about five kilometres from the place where they started. Suddenly the balloon deflated and crashed near Pas-de-Calais from an approximate height of 1500 feet. Both De Rozier and his companion died in that incident. The king of that time announced decoration of honour and a pension for De Rozier’s family.

Carl Scheele

Born in 1742, Carl Wilhelm Scheele was a pharmaceutical chemist of German-Swedish origin. He made a number of chemical discoveries like oxygen, manganese, molybdenum, chlorine and tungsten and identified barium, hydrogen...
etc. Scheele also discovered a method quite similar to pasteurization. However, the credit for the discovery of oxygen went to Joseph Priestley who published his findings first. Similarly, credence for the identification of molybdenum, chlorine, tungsten, barium and hydrogen went to Humphrey Davy. That is why an American biochemist Isaac Asimov called him “hard-luck Scheele”.

Many of the elements and compounds with which Scheele used to conduct his experiments were hazardous heavy metals. He had a habit of tasting and sniffing the new substances he discovered. He survived the taste test of many hazardous chemicals but his run of luck faded out by the cumulative accumulation of mercury and its compounds. Mercury poisoning took a toll on his life and he died on 21 May 1786.

Sir David Brewster

Kaleidoscope – a wonder toy that brings a smile to every child’s face – was first invented by Sir David Brewster, a Scottish scientist in 1816. This 1781 born was a genius mathematician, physicist, astronomer, inventor, and a writer too.

His specific field of interest in science included optics, laws of polarization of light by reflection and refraction and experiments on absorption of light. The field of polarization study requires an exquisite vision capability. But unfortunately Sir David got nearly blind due to a chemical experiment performed by him in 1831. He was plagued with annoying eye troubles until his death.

Louis Slotin

Louis Alexander Slotin, a Canadian born chemist and physicist, took part in a project named the Manhattan Project during World War II. At Los Alamos National Laboratory, Slotin was performing experiments with plutonium and uranium cores to calculate values of their critical mass.

Slotin carried out an experiment on 21 May 1946, in front of seven colleagues, which involved creation of a step of fission reaction by positioning two half spheres of beryllium, which is a neutron reflector, around a core of plutonium.

He grappled the uppermost nine-inch beryllium hemisphere with his left hand and managed to maintain another half sphere of beryllium below, separating both using a screwdriver with his right hand. Use of the screwdriver was beyond the normal protocol of the experiment. Suddenly, the screwdriver slipped, the top beryllium hemisphere fell causing an immediate “prompt critical” reaction and a blowout of hard radiation. His colleagues nearby observed a bluish glow of air ionization and felt a shock of heat wave. Slotin felt a sour flavour in his mouth and an acute blazing sensation in his left hand. He then intuitively jerked his hand and dropped the beryllium hemisphere to the floor, but by that time he was exposed to a potentially lethal dose of ionizing radiation, equivalent to standing approximately 4800 feet away from a huge atomic bomb explosion.

He started vomiting, a common after-effect of intense ionizing radiation exposure. His colleagues took him to the hospital promptly, but it was in vain; irreversible damage had already been done by the radiation. Slotin’s colleagues and many
other volunteers donated ample amount of blood for transfusion, but all their efforts went futile. On May 30, nine days after the accident, Slotin breathed his last. He was buried on 2 June 1946 in Winnipeg.

Slotin was greeted as a ‘Hero’ by the US government for quickly stopping the reaction with his presence of mind by dropping down the beryllium hemisphere to the floor and preventing a bigger accident and saving the lives of his fellow workers.

**Sir Humphry Davy**

Sir Humphry Davy, a 1778 born British chemist, was renowned for his great discoveries of alkali and alkaline earth metals, elementary nature of iodine and chlorine. His invention of the Davy lamp in 1851 aided mine workers immensely when working inside mines filled with flammable gases.

Though Davy got eye-popping success in his scientific career, he had a difficult start. He began as a dispenser at a pharmacy, but was fired from his job for causing too many explosions when dealing with chemicals. Eventually, he got involved in research in the field of chemistry and developed praxis of inhaling various gases he dealt with. This habit led to the discovery of anesthetic properties of nitrous oxide.

However, this habit also led him to near death on many occasions. He permanently damaged his eyes in an enormous nitrogen trichloride explosion. His body showed the symptoms of frequent poisonings during the last decades of his life. In 1829, Davy died in Switzerland out of heart failure. He spent his last few days writing a book named Consolations In Travel, a popular creation rich in great thoughts of science and philosophy.

**Marie Curie**

Marie Skłodowska-Curie was a legendary chemist of Polish origin, who was famous for laying the groundwork for the research on radioactivity. Indeed, the term ‘radioactivity’ was first introduced by her. Her scientific accomplishments include theory of radioactivity, techniques for isolation of radioactive isotopes, discovery of the element Polonium (which she named after her native country Poland). In the year 1998, Marie along with her husband Pierre Curie discovered Radium.

Marie Curie was the first and only woman ever to win the prestigious Nobel Prize twice in both the fields of chemistry and physics. She is also credited with being the first female professor of the University of Paris. Under her direction and supervision, radioactive isotopes were first used in the treatment of neoplasms. Curie Institutes both in Paris and in Warsaw were founded by this genius scientist. Today, both these institutes are doing excellent work in medical research.

After the discovery of Radium in 1898, she dedicated herself fully to the study of radioactive elements, radiation research and radiation therapy. She carried out much of her work in a shed, without proper safety measures that are popularly in use in today’s radiation research. She is also known to have carried test-tubes with radioactive isotope in her coat pocket and stored them in the drawer of her desk, thereby getting exposed to radiation repeatedly.

Curie was also frequently exposed to X-rays in hospitals while helping fellow radiologists during wars. Eventually, she became afflicted with aplastic anemia, a kind of leukemia and died on 4 July 1934.

She was entombed alongside her husband in Sceaux; but sixty years later in 1995, to honour their great contributions to science, their dead remains were relocated to Panthéon, in Paris.
Some scholars surmised that Bogdanov’s death very shortly after the transfusion was due to incompatibility of the blood type, a concept that was less known at that time.

**Alexander Bogdanov**

Alexander Aleksandrovich Bogdanov was a Russian physician, science fiction writer, economist and philosopher. He was born on 22 August 1873 and his scientific pursuit ranged from rejuvenation of the human body through blood transfusion to the universal system theory.

Bogdanov started his experiments with blood transfusion in the year 1924 with the goal of having eternal youth. He did almost eleven transfusion experiments on himself, and found a satisfactory improvement in his eyesight, suspended baldness, and other affirmative effects, which he concluded were due to the miraculous effect of those blood transfusions. At that time his friend Leonid Krasin wrote to Bogdanov’s wife, “Bogdanov seems to have become seven, no, ten years younger after the operation.”

Bogdanov was the founder of the “Institute for Hematology and Blood Transfusions” in 1925-1926, which was later renamed in his honour. After many successful blood transfusions, Bogdanov once in 1928 made the serious mistake of not testing the health fitness of the blood donor he had chosen. The donor was a student of his who was infected with tubercular and malarial germs. The consequence was Bogdanov’s death very shortly after the transfusion. Some scholars surmised that Bogdanov’s death was due to incompatibility of the blood type, a concept that was less known at that time.

**Michael Faraday**

Michael Faraday is a renowned name in both chemical and physical sciences for his contribution in the fields of electrochemistry and electromagnetism. His chief contribution was the discovery of the processes of electrolysis, electromagnetic induction and diamagnetism.

In 1812, when Faraday was in his twenties, he attended many lectures of Humphry Davy at the Royal Society and Royal Institution. Faraday became very much impressed with Davy’s work and sent him a three-hundred page book based only on the notes that Faraday took during Davy’s lectures. Davy appreciated this hugely and when Davy lost his eyesight due to nitrogen trichloride explosion accident, he decided to employ Faraday as an apprentice.

Faraday was appointed to the post of Chemical Assistant at the Royal Institution in 1813. As a chemical scientist, Faraday discovered benzene, invented the system of counting oxidation numbers, studied clathrate hydrate of chlorine, modified Davy’s method of electrolysis and also universalized the technology involving anode, cathode and ions. Lamentably, Faraday too got his eyes damaged like Davy in a nitrogen chloride explosion. Chronic chemical poisoning also caused much trouble in his later life.

**Elizabeth Fleischmann Ascheim**

Earlier in her life Elizabeth worked as an accountant for the Friedland and Mitau firm, a manufacturer of underwear for ladies and children. In the winter of 1895, when Wilhelm Conrad Röntgen announced the discovery of ‘X-rays’ (as their nature was unknown), Elizabeth became enthusiastic hearing about these magical rays that could penetrate the woven apparels, even more, pierce the flesh like gaseous vapour, pass easily through muscles, bones and take clear pictures of the body.

It was then that she thought of using X-rays in the field of medicine. She was inspired and supported by Dr. Michael J.H. Woolf who was her elder sister’s husband.

Within a year, Elizabeth learnt all the techniques of radiophotography and opened her own laboratory, which was California’s first X-ray laboratory. Very soon, this laboratory became the best-equipped lab of west America.
arsonic and till today this antidote is used as a potion against arsenic poisoning. Shortly after his horrible experiences with arsenic poisoning, he faced an explosion of cacodyl cyanide at his workstation, which lost him his right eyesight.

After that he moved to the field of inorganic chemistry and concentrated on spectroscopic studies. He then started investigating emission spectra of heated elements along with Gustav Kirchhoff and consequently discovered cesium and rubidium. He was also a pioneer in photochemistry.

Rosalind Franklin

Perhaps no other woman scientist faced as much opposition as Rosalind. Rosalind Elsie Franklin was born on 25 July 1920. At the age of 15 years, this British genius decided to become a scientist. Rosalind proved herself right against the wish of her father who wanted her to become a social worker. She was a biophysicist and X-ray crystallographer. Also a pioneer molecular biologist, Rosalind made great contributions in the understanding of the molecular structure of DNA. She also clarified the structure of graphite, coal etc. by crystallographic modeling.

Franklin is universally known for taking the X-ray diffraction images of DNA, which provided conclusive evidence for the discovery of the double helical model of DNA. She did her research on DNA X-ray crystallography in John Randall’s laboratory at King’s College, London, where Maurice Wilkins and Franklin were peers. At that time, two other scientists, J.D. Watson and Francis Crick, were working to resolve the structure of DNA separately.

Once, Maurice Wilkins invited and showed Watson one of the portraits of Franklin’s crystallographic data of DNA that provided very valuable insight into its double helical model. From this Watson got a clear picture of DNA, which he had been searching for a long time. Franklin was unaware of all this. Watson immediately published a hypothesis regarding the structure of DNA in the journal Nature and the valuable role of Franklin’s work was never mentioned. Later Franklin published her work in the same journal but she did not get the recognition that she deserved.

After finishing the work on DNA, she became engrossed in her work on the tobacco mosaic virus and polio virus. By that time, she was unknowingly invaded with a dreadful ovarian cancer. A probable cause might have been her continuous exposure to X-rays due to her X-ray crystallographic equipments.

In 1958, after two years of suffering, she died at the age of 37 years. An American author Brenda Maddox wrote a book on Franklin named Rosalind Franklin: The Dark Lady of DNA, which described her intelligence, achievements and the generosity she showed in not making any complaint even after being deprived of the recognition she deserved.

The “Death Diary” of Edwin Katskee

Edwin Katskee, the Nebraska proctologist did exhilarating daring research by self-experiment with a large dose of cocaine. The first local anesthetic used in the field of medicine was cocaine. Application of local anesthesia with cocaine had many advantages over the other general anesthetics to avoid complications relating to maintenance of constant blood pressure of the patient. But patients often showed reactions to this drug.

Edwin Katskee wanted to find out why such reactions occur and in this quest he injected himself a jumbo dose of cocaine on the night of 25 November 1936. He wrote about the after-effect of cocaine on the wall of his office. But the amount of cocaine that he injected himself was an overdose and proved fatal for him. After his death that night, his recorded symptoms were recovered and the media called Katskee’s note written on the wall as a “Death Diary”.

There was no ostensible order of the notes, which Katskee wrote erratically on the wall, but his notes could be arranged in a chronological order of decreasing limpidity of his handwriting. His first recorded symptoms were: “Eyes mildly dilated. Vision excellent.” Then the cocaine dose caused sessions of convulsions and paralysis haltingly. During one of these sessions he again wrote: “Partial recovery. Smoked cigarette.” After that he somehow doodled: “Now able to stand up” on the upper parts of the wall and in another place he wrote again: “After depression is terrible. Advise all inquisitive M.D.’s to lay off this stuff.”

In another spot, he scribbled with his trembling hand, “Clinical course over about twelve minutes”. Followed by the word “paralysis,” which ended with a wavy scratch descending towards the floor of the room, which meant he might have fallen on the ground and couldn’t write anything after that. This was apparently the last word he wrote before eternal darkness.

Ms Arpita Das Choudhury has a Masters in Biotechnology and postgraduate diploma in Bioinformatics from the Assam University. Address: Main Road, Opposite D.S.A. Complex, PO & District Karimganj, Assam-788710. E-mail: arpitadaschoudhury@gmail.com