EVEN two months before her death, she used to roam like a vagabond on the streets of Moscow. She didn’t have any permanent address as she was a street dweller. Nobody even knew about her parents or when and where she took birth. And no one could have imagined that in the last two months of her life she would bring a revolution in space science for which the entire human civilization would be grateful to her.

Laika – the space dog – would always be remembered for her short adventure in space that made it possible for humans to take a giant leap in the field of space science.

There is no distinct boundary between the atmosphere and space, only an imaginary line approximately 68 mile or 110 Kilometer above from the earth’s surface, called the Karman line. Scientists believe that the Earth’s atmosphere meets outer space from here.

Karman was a Hungarian-American engineer-cum-physicist. He was the first scientist who calculated that around 100 km above the Earth’s surface, the atmosphere becomes so thin that it cannot support aeronautical flight. Above this Karman line, there is an abrupt increase in atmospheric temperature and interaction with solar radiation.

The key concerns for a living species beyond this Karman line are ebullism, hypoxia, hypocapnia, decompression sickness, extreme temperature variations, cellular mutation, destruction from high energy photons and sub-atomic particles and many other problems.

• Ebullism is the formation of bubbles in body fluids due to the reduction of atmospheric pressure. It is considered as the most severe experience of space.

• Embolism may start at an elevation of around 19 km above the Earth’s surface or
when atmospheric pressure becomes less than 47 mm of Hg. This limit is known as the Armstrong Limit.

- Rapid de-oxygenation of the blood due to lower atmospheric pressure is called hypoxia, which causes gradual loss of cognitive functions. It starts at about 3 km or 10,000 ft altitude.
- The formation of nitrogen gas bubbles which usually interfere with organ function is known as decompression sickness.
- Reduction of blood carbon dioxide levels is known as hypocapnia. Hypocapnia can alter the blood pH and indirectly contribute to nervous system malfunctions. If the person tries to hold breath in space the lungs may rupture internally.

Scientists, therefore, had to develop a special type of protective cloth to avoid these effects – the space suit. Astronauts still have to contend with weightlessness and micro-gravity. For long periods of time, exposure to weightlessness has several deleterious effects on human health. Short-term exposure to microgravity causes space adaptation syndrome that may cause a self-limiting nausea, derangement of the vestibular system, etc. But long-term exposure could cause loss of bone and muscle mass, increase risk of injury, reduce aerobic capacity, and slow down the cardiovascular system.

In the early days of space science, no one knew what would be the effects of weightlessness on a living body. So, space scientists used animals to understand the impact of microgravity on many biological functions. They have studied these impacts on animals like wasps, beetles, tortoises, flies, worms, fish, spiders, rabbits, bees, ants, frogs, mice, crickets, rats, newts, snails, urchins, moths, brine shrimp, jellyfish, guinea pigs, butterflies, scorpions and cockroaches. Animals like dogs, monkeys and chimps were mainly used to test the safety and feasibility of launching a human being into space and bringing it back to the earth safely.

Russian space scientists preferred dogs because they felt that dogs could endure long periods of inactivity better than any other animal. The dogs could easily be confined in small boxes for 15-20 days at a time. Soviet scientists further assumed that a stray dog would be better as they had already learned to endure harsh conditions of hunger and cold temperatures. So, strays from the Moscow streets were chosen for the first mission to send a living being into space. Further, female dogs were chosen because they did not have to stand and lie a leg to urinate.

Among dozens of other stray dogs which were kept at the space research centre in Moscow, Laika had been rounded up after a variety of tests and training. These tests included weeks of confinement in small cages so that the dogs could be accustomed to the limited space available within the capsule. She also had to pass other tests like noise, vibration and G-forces that would be experienced during the launch period and

On either side of the compartment there were plates of potassium superoxide. This chemical while reacting with carbon dioxide and water vapor emitted oxygen.
the flight. The same general assessment system devised for Laika was later used for cosmonauts who were to be sent into space.

The original name of Laika was Kudryavka, or Li Ėle Curly, but she became known internationally as Laika. American reporters dubbed her Muttnik as a pun on Sputnik, the spacecraft on board which she travelled.

During training for the flight, Laika was trained to sit in the cabin and get used to the noises and acceleration of launch and to the harness and waste-collection apparatus. Silver electrocardiogram electrodes were implanted in the chest to measure the heart rate, and a piezoelectric blood-pressure sleeve was surgically placed around the carotid artery in the neck so that the biometric readings could be radioed to Earth. To avoid any infection these were kept carefully bandaged and cleaned with alcohol every day. Respiration rate was measured by strain gauges in a belt around her chest. The dog was chained in place, with limited freedom to lie down or stand, and motion sensors reported activity.

On the 3 November 1957, Sputnik-2 was launched from the Baikonur Cosmodrome in Kazakhstan along with Laika. She became the first cosmonaut of our planet Earth. The flight of Laika became headline news in almost all newspapers across the world. From the capsule of Sputnik-2, reports about her condition were transmitted back to Earth, including her blood pressure, heart rate and breathing. The capsule’s environmental conditions including temperature and internal pressure were also closely monitored from Russia.

Sputnik-2 satellite had three units mounted in a conical frame, with a total mass of 508.3 kg. At the top there was an instrument, which was used to measure solar X-ray and far ultraviolet radiation. Below that, there was a cabin to carry the dog. It was 80 cm long and 64 cm in diameter.
A ventilator fan was mounted at the top. It was designed in such a way that it would turn on if the temperature rose above 15°C.

On either side of the compartment there were plates of potassium superoxide. This chemical while reacting with carbon dioxide and water vapor emitted oxygen. However, since excess oxygen is also harmful and may cause oxygen poisoning, a control system was there to stop the regeneration of oxygen if the pressure went above 765 mm of Hg.

The cabin was equipped with a television camera, along with sensors to measure ambient pressure and temperature. To measure the canine’s blood pressure, breath frequency and heartbeat sensors were fitted to her body. The cabin walls were covered with soft padded material and there were intricate life support instruments positioned everywhere.

Besides, there was access to both water and food. As food material, a special high-nutrition gel was supplied. This gelatinous nutrient was made from water, agar agar, dried-bread powder, powdered meat and beef tallow. This was delivered by a cartridge belt arrangement that doled out portions for the dog to eat at regular intervals. It was estimated that the dog might survive maximum for seven days, according to which provision for the quantity of food and oxygen was made. Urine and feces were collected by a tight fitting rubber cup, and sent to a sanitation reservoir filled with activated charcoal and dried moss.

Heart-rate telemetry indicated that Laika’s heart rate increased almost three times than her normal rate probably due to the stress during the launching period. Five to ten minutes after the achievement of orbit, heart-rate telemetry indicated that her readings and activity had returned to normal. She had become calm.

Moscow scientists were concerned from the very beginning about the heat problem, both from the Sun and from the dog’s body. It was found that during the flight the cabin became steadily warmer. Sometime after nearly five to seven hours the biometric telemetry system failed. Although Laika’s exact fate is unknown, from ground simulations many space scientists predict that she died from overheating soon after the third or fourth orbit.

Though Russian official news reported the results of the experiment from the early hours, no details were announced about Laika, who had become an instant celebrity at that time. The only news they broadcast about her that she was fine. When on November 10, the radio transmitter also stopped, officials began to acknowledge that Laika would die.

In 1969, Romania published a postal stamp to commemorate the event with the caption: “Laika, first travelled into Cosmos”. In November 1997, a statue of Laika was unveiled at the Institute for Aviation and Space Medicine at Star City, Moscow.

But the question is: Do human beings have the right to make scapegoats of innocent animals for their own progress?

Oleg Gazenko, the scientist and trainer of Laika, expressed through a poem in 1998 during the Space Day Programme:

“The more time passes, the more I’m sorry....
We shouldn’t have done it....
We did not learn enough from the mission to justify the death of the dog.”

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