***Habitable Planet Like Earth***

The curiosity to know the unknown is a unique peculiarity of human nature. One special quality of human nature is our insatiable curiosity for the unknown. Humanity has always been captivated by the idea of exploring the vastness of the cosmos. We have long believed that if we visit another planet in the cosmos without making the necessary preparations, we will instantly perish due to the planet's strong gravity, intense heat, intense pressure, and unfavorable atmosphere. But there are some planets in the universe where visiting can even give a feeling that you have got super power. Recently scientist have discovered a lot of habitable planets which are better than earth in all means. In these planets, life can evolve better than earth. In astronomy, the finding of exoplanets—worlds outside of our solar system—has been a tremendous accomplishment. Among these finds, astronomers have come across planets with possibly more livable circumstances than Earth. This article explores the fascinating field of exoplanets, their discovery, and the exciting possibility of discovering habitable worlds outside of our own.

Astronomers have been trying to discover planets around far-off stars for eras. The finding of the first verified exoplanets revolving a pulsar followed by a sun-like star in the 1990s marks a significant advancement in space exploration. Technological developments in the following decades triggered to the finding of thousands of exoplanets, especially with telescopes and detecting technologies.

The search for planets that are habitable requires finding celestial bodies that have the necessary elements for supporting life as we know it. The area in which a planet can keep liquid water on its surface is referred to as the "habitable zone" surrounding a star. The size, temperature, and other properties of the star affect this zone. But habitability is more than just the existence of water. Examining several elements of a planet's potential livability is necessary to explore worlds that are more livable than Earth. The planet's size, structure, atmosphere, surface conditions, and liquid water level are some of these variables, together with the kind and stability of the parent star. Higher degrees of habitability have been assigned to planetary systems with stable orbits, protective atmospheres, and comfortable temperatures.

we all know earth the only one planet in entire universe where from simple life form to complex life form, all living organism who are capable of living in extreme environment have been evolved and living.so most of the people can think that earth is the only one unique planet where life is possible. but there are a lot of researchers who says that there might be some planets where environment is more favorable for life. but as we are living on earth, many of scientists are wasting their time to find the mirror of Earth, not for finding superior planets than Earth, which is totally wrong. For this reason, on 5th October,2020, the astrobiologist of Washington State University and technical University of Berlin, Dirk Schulze Makuch, has started a new mission with his team. during this mission, they have targeted that planets which are better than earth in every way. even they get succeed. they have got 24 super habitable planets. They followed a different approach for this mission. they made a criteria list for the planets. if a planet does not follow the criteria, it will not be superhabitable planet. we all know, every life need some important factors to survive. suitable temperature, atmosphere, water and land surface area are must for a life to survive. keeping this in mind, they made some criteria where the first one was age of host star. generally when an exoplanet is explored, scientists focus on yellow dwarf star, in other words, star like sun. but in the mission of Dirk Schulze Makuch, they targeted orange dwarf star also, which are cooler, dimmer and less massive. the main reason behind this was the lifespan of that stars. actually, all yellow dwarf stars have a lifespan around 10Billion years, where the orange dwarf stars have 20 to 50billions years' lifespan which is double. that means if any life evolve in that planetary system, it can be evolved two three times more than earth, potentially. older stars are not always better. older planets' interior geothermal energy decreases with time and lose magnetic field. anyways the second criteria is water. when a planetary system is found, the first step should be to measure the distance of the planet from the host star. we can know about the habitable zone and the water percentage of the planet from this. the third one was the size and the mass of the planet. according to researchers, the size and the mass of the planet help to evolve life. their reason was very simple which was the more the surface would be there,the more the habitable area would be. the more the mass, the more the gravity would be and if the gravity is more, atmosphere will be more stable, potential and thicker . but there is another condition.The mass of planet should be at most one and a half or two times that of Earth.So that, planet interior can be heated for a long period of time and this Hot interior help the core to be molted, and for this , protective magnetic field will be active for long time around that planet which will enhance the chance of life araise or evolve. the next important criteria is temperature. if the temperature of a planet is high, indirectly the pressure will be also high and no life can survive in extreme temperature. so scientist generally target that planets, which have temperature five degree more or less than arts average temperature of earth. there is also reason behind it. if we consider the tropical region temperature of Earth, the microbe living there can survive in that highest extreme temperature.

Though scientist have got success in exploring 24 exoplanets, Many new researches are being organised everyday. among that planets scientist have got two superhabitable planets where surface,temperature and atmosphere are much better than earth. those two planets are KOI 5715.01 and KOI 5554.01. according to the scientists, this two planets have every possible factors which are required for life evolving. in short both of the planets are perfect for the evolution of life. First planet is KOI5715.01, a planet where temperature is 2.4 degree celsius lesser than earth. The mass of this planet is 7 times more than earth and size is 8 times more than earth. that shows the surface area of land is more than earth . gravity is alsomore than earth, because of mass. for these reasons , the atmosphere of this planet is very much stable. if we think about water sources, considering the distance between host star and that planet, scientists have assumed that it has huge water sources which is again a great news.

After that, we can see about KOI 5554.01 which has surface temperature around 27 degree Celsius which is perfect for human body to survive. in fact for the tectonic plate movement of this planet, nitrogen cycle is going on continuously. we know nitrogen cycle is very essential for earth, because, by biochemical process, nitrogen converts into multiple chemical forms such as amino acids, proteins and even DNA which indirectly help us to clean up the environment also. The more nitrogen will be, the more rapidly ecosystem will be evolved, and also atmosphere will be clean. but as these planets are invented recently, scientists do not have that much detail information . scientists have started researches about that planets with the help of James webb space telescope.

Apart from these two planets, there are also some planets which are more habitable than earth. first we can give a look to LHS 1140 b, a very self contradicting planet. this planet was discovered on 20th April, 2017,by transit method of MEarth Project. basically MEarth Project is a robotic laboratory, which observes the brightness of Red Dwarf stars. the main goal is to find transitioning planet, means that planets who pass in front of Red Dwarf stars.As Red Dwarf stars are small, if any planet pass in front of Red Dwarf stars, they cover the larger portion of that planet. by this method, this planet was discovered. after discovery, when scientists study the surface of this planet, they have found that, the iron nickel core of this planet occupies 75% of landmass in the form of lava. it is a matter of shock that, though the landmass is of lava, scientists have got 4% water under the core. according to them, there are heavy quantity of water under the complete land mass. from this a lot of astronomers have assumed that there could even be an underground water world. Not just that, for the massiveness of this planet, the atmosphere of the planet has maintained a good balance with greenhouse effect.

the next planet seems so much habitable that scientist have already sent a lot of messages to investigate the extraterrestrial life of that planet. that planet is Luyten b. on 17th March 2017 this planet was discovered with the help of radial velocity method.Basically what happens in radial velocity method is that the position of one star relative to other star is observed. if the position of the star is continuously moving back or forth, that means that there exits any massive planet on that system, which is exerting gravitational influences on that star.So when the planet was observed, while studying the position of this planet, it was noticed that water content is present in very large quantities on this planet. in fact, essential materials for any life like amino acids and hydrocarbons are also present in large quantities there.so the planets seem to be perfect. some scientists have also assumed that, the reason behind the perfection can be an advance civilization. this is why, in October 2017 and 2018, messaging extraterrestrial intelligence and METI organization have sent different messages to this planet. among them one message was short musical composition and another one was scientific tutorial about our location in the universe.

One of the most amazing finds is the approximately 40 light-year-distance TRAPPIST-1 system. This ultra-cool dwarf star is orbited by seven Earth-sized planets, three of which are in the habitable zone. This system generated enthusiasm since it offered a fascinating chance to investigate possibly habitable exoplanets in more detail.

Proxima Centauri b, an exoplanet around Proxima Centauri, the star closest to the Sun, is another noteworthy finding. Because of its closeness to Earth, this rocky planet in the habitable zone has drawn interest and created opportunities for further expeditions and investigations.

When looking for exoplanets, scientists also utilize gravitational microlensing. Exoplanet identification and characterization are formed by the advantages and disadvantages of each approach. Technological developments promise to entirely change our understanding of exoplanets, particularly with the development of advanced observatories like the James Webb Space Telescope. The goal of upcoming missions like the European Space Agency's PLATO (Planetary Transits and Oscillations of stars) mission is to find and study exoplanets that seem similar to Earth.

There are several obstacles in the way of finding habitable exoplanets, ranging from technological limitations to ethical issues. Deep social and philosophical issues are raised by concerns about planetary preservation, contamination dangers, and the moral consequences of perhaps discovering extraterrestrial life.

The finding of planets that may be more livable than Earth represents a critical turning point in humanity's exploration of the universe. These findings not only increase our understanding of science but also spark our curiosity regarding the potential possibility of life outside of our solar system. The hunt for habitable exoplanets is an example of how scientific discovery, technological advancement, and human curiosity are working together. This quest has captured our imagination and continues to inspire us to explore the universe.