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# Paleontological Evidences of Pleistocene,Interpret The Coming of Intelligence & Harbor Life of Planet Earth

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**ABSTRACT:**According to solar nebula structured ,our planetary system bear from accretion of the dust particles and planetesimal period ,after that condensation in solar nebula.Thus most of celestial bodies of our planetary system,like planet,natural satellite,comet, meteorite & asteroids exhibit the different kind of planetary habitable. Base on energy source as a sun like star, carbon as a most prominent element of life forms on earth & percentage of liquid water which consist of celestial bodies. Due to study of the origin,evolution, distribution & future of life in universe ,earth is the only place know to harbor life. It is depend on minimal condition for life such as temperature,water,radiation shielding,the stuff of life ,sunlight,oxygen, when planet belongs to G2 type star forming like ours.To revealed evidences for the planetary habitability & harbor life of planet earth, paleontological factors are the one of most prominent way .It's provide a unique view into the history of life by showing the forms and features of life in the past & tell us how species have changed across long periods of the Earth's history. Though the fossil record does not include every planet and animal that ever lived, also compatibility substantial evidence for the common descent of life via evolution & tend to explain about other habitable planets(one upon which living beings not unlike terrestrial organisms) like Gliese 581c & Kepler-452b which consisted in out of our solar system.There are massive possibility of habitable zone around other stars & search for extraterrestrial microbial life,such as found from the examination of the Allan hills 84001 meteorite like microfossil .Also undeniable fossils (meteorite type) which carried out from aranaganwila _sri lanka ,exhibited the ample evidences for extraterrestrial microbial life. Thus our aims to be explore dominate paleontological factors (Macro fossils/ Pleistocene) in sabaragamu basin sri lanka,which tend to explain comparative model of Harbor life of planet earth.

**Keywords**:Harbor life,Sabaragamu basin,Fossils,Pleistocene,Astrogeology,Astroecology,Planetary habitability,Earth

## I.METHOLOGY

If there are habitable planet earth-like then we can assume that we are not alone. Astrobiologists estimate that the milky way has 500 habitable planets, which fit the following criteria:

- They're a comfortable distance away from a star similar to our sun. That is, they're far enough away to be out of the heavy heat and radiation zone, but not so far that they're extremely cold. This just-right distance is called the "habitable zone."
- They're made of rock. Jupiter, Saturn, and Uranus in our solar system are made of gases, so we don't expect life to be able to survive there.
- They're big enough to have a molten core. Earth's core gives us a source of geothermal energy, it allows cycling of raw materials, and it sets up a magnetic field around the planet that protects us from radiation. Mars probably had a hot liquid core at one time, but because it's a smaller planet its heat dissipated more quickly.
- They are good candidates for having a protective atmosphere. The atmosphere holds carbon dioxide and other gases that keep the planet warm and protect its surface from radiation.

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Due to above assumed , consider the habitable zone [In astronomy and astrobiology, the circumstellar habitable zone (CHZ), or simply the habitable zone, is the region around a star within which planetary-mass objects with sufficient atmospheric pressure can support liquid water at their surfaces.]for harbor life which consisted with G2 type sun like star & it's energized earth like plant . Even it 's tend to explain comparative & compatibility data of astrogeology , astroecology of each celestial bodies,due to palantological evidence in pleistocene of Earth .

## II.THE COMING OF INTELLIGENCE

Even today, most Earth life is microbial and microbes have been here for at least 3.5 billion years a very long time when you consider that the first rocks formed about 3.8 billion years ago. Given the number of potentially habitable planets within our home galaxy, chances are good that microbial life exists elsewhere. Whether more-complex life forms like plants and insects exist elsewhere is a bigger question. For 2.9 billion years or so, all life on Earth was microscopic. Multicellular, macroscopic algae and animals came onto the scene about 600 million years ago. That's about 17% of the total time that life has existed on Earth. It's very hard to say how likely we are to find other intelligent life forms. The oldest fossils of our species, Homo sapiens, are less than 200,000 years old. That's a geological microsecond, just 0.000057% of the time microbes have been around. If, like on Earth, intelligent life takes much longer to evolve than microbial life, it might be rare. But some galaxies and solar systems are much older than ours, so maybe other intelligent life has formed; however, it may be long dead. Finding living intelligent beings is a matter of both space and time.

**Sub Harbor life Stations on Earth & Fossil Record of Pleistocene Epoch In Sri Lanka**

Pleistocene commences 2.58 -1.67 million before present about 12,000- 10,000 years(Bp). In that period sri lanka experienced heavy rainfall and covered with rain forest. These heavy showers in the sabaragamu basin providing habitats for a number of marsh loving mammals and other animals such as sub harbor station of earth. However at the end of Pleistocene the climate change resulting in the extinction of a number of animals & fossilized in alluvial. The last ice age ended about 14,000 years ago(temporary), but we cannot be certain that this was related to the Earth's precession.[The Earth's axis rotates (processes) just as a spinning top does, the period of precession is about 26,000 years. Therefore, the North Celestial Pole will not always be point towards the same star field,precession is caused by the gravitational pull of the Sun and the Moon on the Earth.]How ever earth's precession was tend to stimulate the increase of temperature & patterns of extinction, distribution , evolution as a result of changing geomagnetic field.

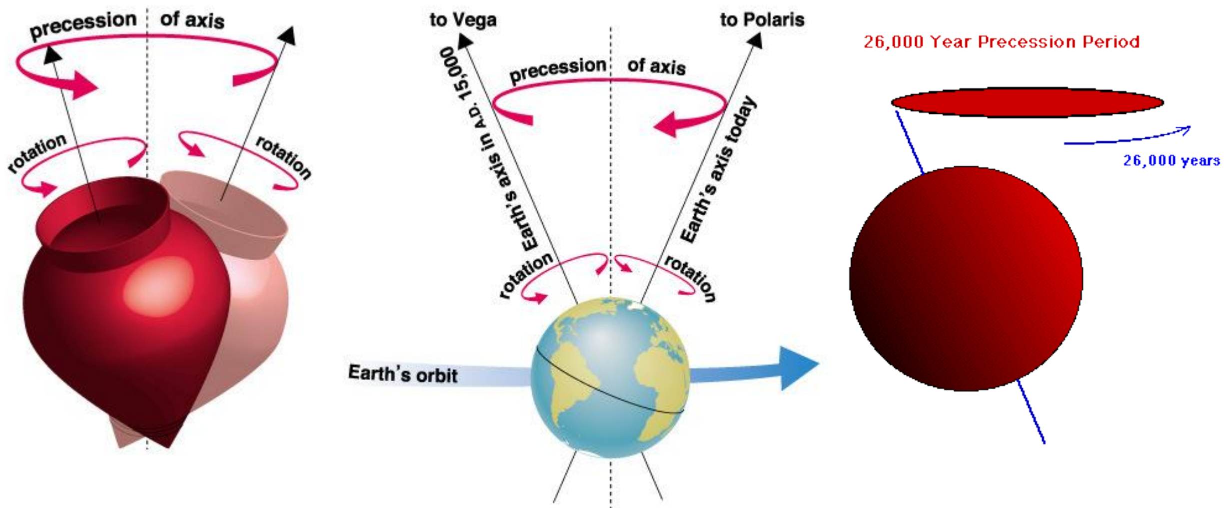


**Fig 01:**Earth rotation axis was focus to vega in Pleistocene,recently this kind planetary motion affected to all fauna & flora species which belongs to Earth.

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***Fig 02:***Recent fossils that have found in sabaragamu basin Sri Lanka which exhibit the palaeo geographical pattern & tolerance of climatic condition of per historic period. Deep analysis of the fossils ,could able to find out the microbial organisms from those sediment. [1. *Panthera tigris or Pantheraleo sinhaleyus,2. Rinoceros sinhaleyus 3.Bibos sinhaleyus,4. Crocodylu ssp,5. Rusa unicolor,6. Maximus sinhaleyus*: Image Via Eco Astronomy Sri Lanka]

The first near-Earth-size planet is called Kepler-452b. It's the smallest planet to date discovered orbiting in the habitable zone of its star. Considered a ***super-Earth-size planet***, it's 60 percent larger in diameter than our world. Its orbit around the sun last 385 days, only 5 percent longer than Earth's orbit.It's star is a G2-type, like our sun. Kepler-452b is 5 percent farther from its parent star than Earth is from our sun.It's 6 billion years old, 1.5 billion years older than our sun. Also has the same temperature as Earth, and appears 20 percent brighter. If extraterrestrial plant was more than 90% close to planet earth, it's possible of habitable zone like earth & sub harbor life such as Sabaragamuwa basin. However still we are unable to find out such a macro fossils from extraterrestrial plant.

**Fig 03**:Artist's concept of Earth cousin kepler 452b.This world might have water & activate volcanoes. Image via SETI


**Fig 04:** Geological view & Pleistocene fossil site [Kuruwita&Rathnapura ]of Sabaragamauwa basin Sri Lanka :Map image via:Google & Monitoring the Climet from Space European Space Agency 2015

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## III.DISCUSSIONS AND RESULTS

As we have seen, the stellar population includes all sorts of strange and exotic objects. Which of them are possible homes for living beings? In order for a planet to develop any sort of higher life forms, its central star must have a more or less constant luminosity over periods as long as billions of years. Sudden changes in stellar luminosity, the abrupt appearance of massive flaring, or the emission of strong x-ray or gamma-ray radiation will spell instant death for star .This excludes as possible havens of life such stars as red giants, planetary nebulae, white dwarfs, or neutron stars. In order to support life, it must be a stable member of the main sequence.It has taken about 4.5billion years for intelligent life to appear on Earth, beginning with the time that the Sun first entered the main sequence. The sun appears to have been shining at about the same rate ever since Biological evolution on other inhabited worlds should take about the same amount of time. The life time of star decreases as one moves from right or left along the main sequence. Stars of classes earlier than F5 have life time shorter than 5 billion years. They will leave the main giants before their planets have a chance to develop any intelligent life forms.A star such as Altair (class A7) is planets (if there are any)cannot have complex than the simplest one-called organisms. Alter will drift off the main sequence before biological can advance very far

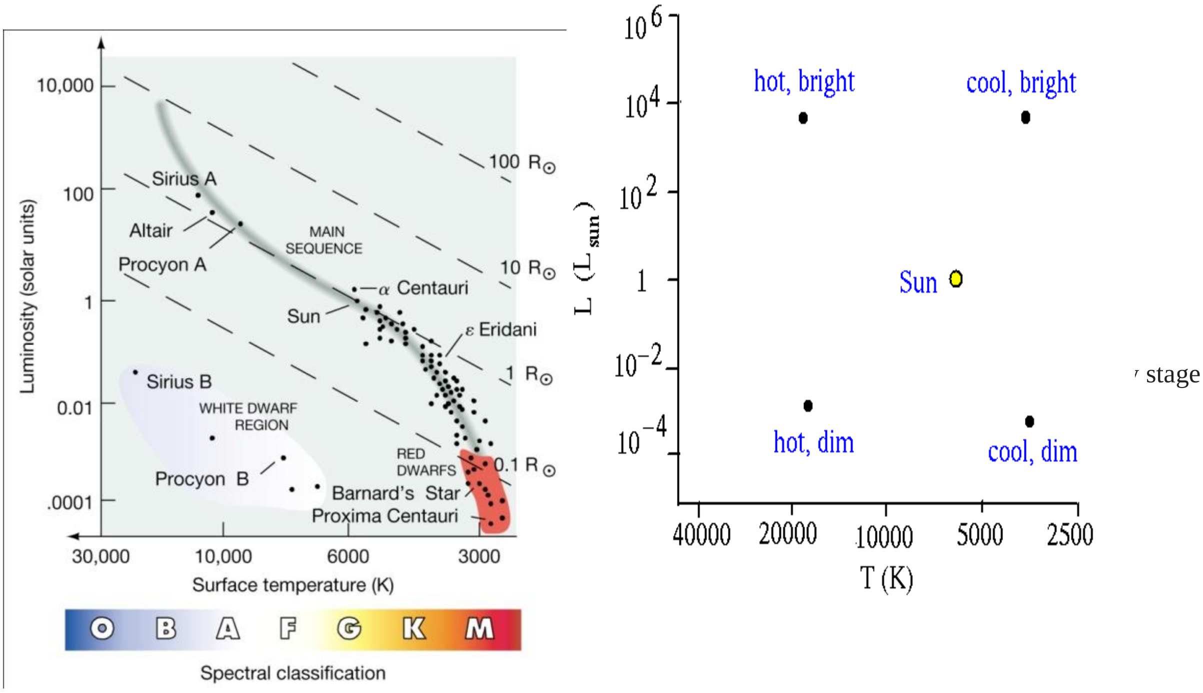


**Fig 05:**HRD:Classify stars according to their luminosity, spectral type, color, temperature ,evolutionary stage & describe life cycle of star

Stars more massive than F5 can therefore be ruled out in any search for intelligent beings. An entirely different argument has been to rule out certain low-mass stars, in particular those of class M. These stars are very dim in comparison to the sun,And in order to sustain any life their planets would have to be quite close. The dimmer the star, the closes the planet must before some of the later M-class stars. Plants would have to be as close as 0.02 AU in order to be life supporting. This is probably not impossible, and such miniature solar systems may indeed exist, much like Jupiter and its Moons. There is nevertheless a limit. The closer a planet is to its sun, the stranger the tidal force acting on it. These tidal forces will tend to brae the rotation of such a plant until it eventually locks in to synchronization with its revolution ,keeping the same face forever turned toward its star. Such a planet would roast on one side and freeze on the other. The oceans on the sunward side of the planet would all boil away . On the far side they would all freeze solid. The prospects for life on such plants are exceedingly dim. It is estimated by various workers that stars less

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massive about 0.5 solar masses are so faint that any planets close enough to sustain life are locked in to synchronous rotation. This restriction rules out all class M stars as sites for life

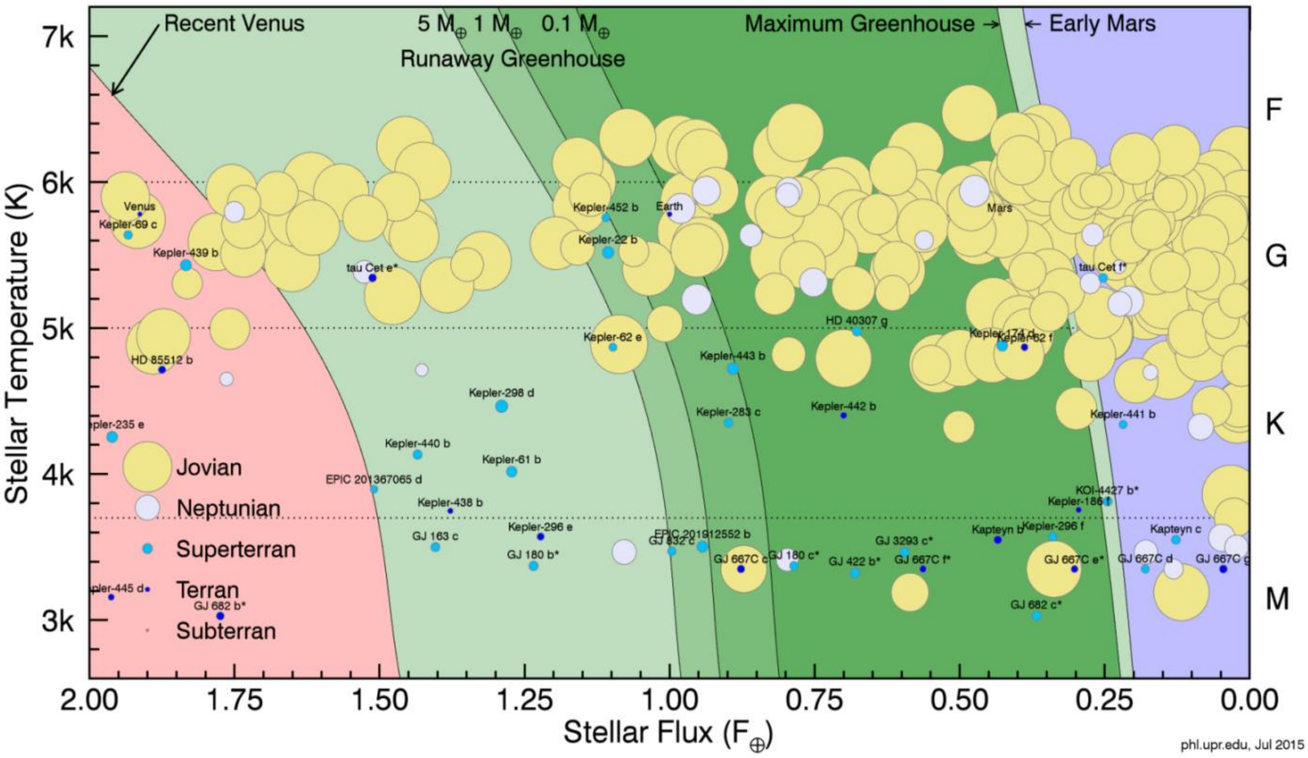


**Fig 06:** The figure above shows all planets near the habitable zone (green shades). Only those less than 10 Earth masses or 2.5 Earth radii are labeled. Some are still unconfirmed (* = unconfirmed). The different limits of the habitable zone are described in Kopparapu et al. (2014). Size of the circles corresponds to the radius of the planets estimated from a mass-radius relationship when not available

Class M stars present an additional problem in that most ,if not all of them are *flare stars*. Such stars can suddenly and unpredictably become up to 4 magnitudes brighter for short periods of time. Such an unfortunate star, Even if life could actually evolve on planets around class M stars, it would quickly be snuffed out by a massive star.Star more massive than F5 and less massive than M0 can therefore be eliminated in any search for extraterrestrial civilizations. Only for 2 percent of all stars are more massive than F5, so this restriction does not reduce the number of possible life-supporting stars very much. However,73 percent of all stars. in these does restrict the number of potential sites very severely . This leaves only 25 percent of all stars capable of ever giving rise to intelligent life forms. Stars of spectral types between F5 and M0 are said to *sunlike* . The fraction (designated by $f_{sun}$) of stars that are Sun like is therefore equal.What are the chances that life actually does appear on a planet where the condition are favorable? Perhaps the appearance of life on earth wasthe result of extraordinarily importable coincidences, event so rare that they are repeated now here else in the galaxy. The galaxy may be filled with earth like planets that are entirely sterile & barren.

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**Current Number of Potentially Habitable Exoplanets**

| **Subterran** (Mars-size) | **Terran** (Earth-size) | **Superterran** (Super-Earth) | **Total** |
|---|---|---|---|
| 0 | 10 | 21 | 31 |

**subterran** = 0.1 — 0.5 $M_E$ or 0.4 — 0.8 $R_E$, **terran** = 0.5 — 5 $M_E$ or 0.8 — 1.5 $R_E$, **superterran** = 5 — 10 $M_E$ or 1.5 — 2.5 $R_E$. $M_E$ = Earth masses, and $R_E$ = Earth radii.

| **Name** | **Type** | **Mass ($M_E$)** | **Radius ($R_E$)** | **Flux ($F_E$)** | **$T_{eq}$ (K)** | **Period (days)** | **Distance (ly)** | **ESI** |
|---|---|---|---|---|---|---|---|---|
| 001. Kepler-438 b | K-Warm Terran | 4.0 - 1.3 0.6 | -1.1 | 1.38 | 276 | 35.2 | 473 | 0.88 |
| 002. Kepler-296 e | M-Warm Terran | 12.5 - 3.3 - 1.4 | 1.5 | 1.22 | 267 | 34.1 | 1692 | 0.85 |
| 003. GJ 667C c | M-Warm Terran | 3.8 | 1.1 - 1.5 2.0 | -0.88 | 247 | 28.1 | 24 | 0.84 |
| 004. Kepler-442 b | K-Warm Terran | 8.2 - 2.3 1.0 | -1.3 | 0.70 | 233 | 112.3 | 1115 | 0.84 |
| 005. Kepler-62 e | K-Warm Superterran | 18.7 - 4.5 - 1.9 | 1.6 | 1.10 | 261 | 122.4 | 1200 | 0.83 |
| 006. Kepler-452 b (N) | G-Warm Superterran | 19.8 - 4.7 - 1.9 | 1.6 | 1.11 | 261 | 384.8 | 1402 | 0.83 |
| 007. GJ 832 c | M-Warm Superterran | 5.4 | 1.2 - 1.7 2.2 | -1.00 | 253 | 35.7 | 16 | 0.81 |
| 008. EPIC 201367065 d | M-Warm Superterran | 14.1 - 3.7 - 1.5 | 1.5 | 1.51 | 282 | 44.6 | 147 | 0.80 |
| 009. Kepler-283 c | K-Warm Superterran | 35.3 - 7.0 - 2.8 | 1.8 | 0.90 | 248 | 92.7 | 1741 | 0.79 |
| 010. tau Cet e* | G-Warm Terran | 4.3 | 1.1 - 1.6 2.0 | -1.51 | 282 | 168.1 | 12 | 0.78 |
| 011. GJ 180 c* | M-Warm Superterran | 6.4 | 1.3 - 1.8 2.3 | -0.79 | 239 | 24.3 | 38 | 0.77 |
| 012. GJ 667C f* | M-Warm Terran | 2.7 | 1.0 - 1.4 1.8 | -0.56 | 221 | 39.0 | 24 | 0.77 |
| 013. Kepler-440 b | K-Warm Superterran | 41.2 - 7.7 - 3.1 | 1.9 | 1.43 | 273 | 101.1 | 851 | 0.75 |
| 014. GJ 180 b* | M-Warm Superterran | 8.3 | 1.3 - 1.9 2.4 | -1.23 | 268 | 17.4 | 38 | 0.75 |
| 015. GJ 163 c | M-Warm Superterran | 7.3 | 1.3 - 1.8 2.4 | -1.40 | 277 | 25.6 | 49 | 0.75 |
| 016. HD 40307 g | K-Warm Superterran | 7.1 | 1.3 - 1.8 2.3 | -0.68 | 227 | 197.8 | 42 | 0.74 |
| 017. EPIC 201912552 b | M-Warm Superterran | N/A 16.5 - 6.0 | -2.2 | 0.94 | 251 | 32.9 | 111 | 0.73 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 018. Kepler-61 b | K-Warm Superterran | N/A - 13.8 - 5.2 | 2.2 | 1.27 | 267 | 59.9 | 1063 | 0.73 |
| 019. Kepler-443 b | K-Warm Superterran | N/A - 19.5 - 7.0 | 2.3 | 0.89 | 247 | 177.7 | 2540 | 0.71 |
| 020. Kepler-22 b | G-Warm Superterran | N/A - 20.4 - 7.2 | 2.4 | 1.11 | 261 | 289.9 | 619 | 0.71 |
| 021. GJ 422 b* | M-Warm Superterran | 9.9 | 1.4 - 2.0 - 2.6 | 0.68 | 231 | 26.2 | 41 | 0.71 |
| 022. GJ 3293 c* | M-Warm Superterran | 8.6 | 1.4 - 1.9 - 2.5 | 0.60 | 223 | 48.1 | 59 | 0.70 |
| 023. Kepler-298 d | K-Warm Superterran | N/A - 26.8 - 9.1 | 2.5 | 1.29 | 271 | 77.5 | 1545 | 0.68 |
| 024. Kapteyn b | M-Warm Terran | 4.8 | 1.2 - 1.6 - 2.1 | 0.43 | 205 | 48.6 | 13 | 0.67 |
| 025. Kepler-62 f | K-Warm Terran | 10.2 - 2.8 - 1.2 | 1.4 | 0.39 | 201 | 267.3 | 1200 | 0.67 |
| 026. Kepler-174 d | K-Warm Superterran | N/A - 14.8 - 5.5 | 2.2 | 0.43 | 206 | 247.4 | 1174 | 0.61 |
| 027. Kepler-186 f | M-Warm Terran | 4.7 - 1.5 - 0.6 | 1.2 | 0.29 | 188 | 129.9 | 561 | 0.61 |
| 028. GJ 667C e* | M-Warm Terran | 2.7 | 1.0 - 1.4 - 1.8 | 0.30 | 189 | 62.2 | 24 | 0.60 |
| 029. Kepler-296 f | M-Warm Superterran | 28.7 - 6.1 - 2.5 | 1.8 | 0.34 | 194 | 63.3 | 1692 | 0.60 |
| 030. GJ 682 c* | M-Warm Superterran | 8.7 | 1.4 - 1.9 - 2.5 | 0.37 | 198 | 57.3 | 17 | 0.59 |
| 031. KOI-4427 b* | K-Warm Superterran | 38.5 - 7.4 - 3.0 | 1.8 | 0.24 | 179 | 147.7 | 782 | 0.52 |

* planetcanditate/unconfirmed, (N) = new addition to the catalog

**Table Legend:**

- **Name** - Name of the planet. This links to the data of the planet at the Extrasolar Planets Encyclopaedia or NASA Exoplanet Archive.
- **Type** - PHL's classification of planets that includes host star spectral type (F, G, K, M), habitable zone location (hot, warm, cold) and size (miniterran, subterran, terran, superterran, jovian, neptunian) (e.g. Earth = G-Warm Terran, Venus = G-Hot Terran, Mars = G-Warm Subterran).
- **Mass** - Minimum mass of the planet in Earth masses (Earth = 1.0 $M_E$). Estimated for a pure iron, rocky, and water composition, respectively, when not available.
- **Radius** - Radius of planet in Earth radii (Earth = 1.0 $R_E$). Estimated for a pure iron, rocky, and water composition, respectively, when not available.
- **Flux** - Average stellar flux of the planet in Earth fluxes (Earth = 1.0 $F_E$).
- $\boldsymbol{T_{eq}}$ - Equilibrium temperature in kelvins (K) assuming a 0.3 bond albedo (Earth = 255 K). Actual surface temperatures are expected to be larger than the equilibrium temperature depending on the atmosphere of the planets, which are currently unknown (e.g. Earth mean global surface temperature is about 288 K or 15°C).
- **Period** - Orbital period in days (Earth = 365 days).

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- **Distance** - Distance from Earth in light years (ly).
- **ESI** - Earth Similarity Index, a measure of similarity to Earth that compares how similar are these planets to the stellar flux, mass, and radius of Earth (Earth = 1.0). Results are sorted by this number.

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## REFERENCES


- DeraniyagalaP.E.P ,*The Pleistoncene of Ceylon,Ceylon National Museum*, ,36pg, 1958
- Monitoring the Climet from Space_European Space Agency 2015.
- N. Chandra WickramasingheVol,22, No.4,*Journal of Cosmology* ,Discovery of uranium in outer coat of Sri lankan Red Rain Cell ,April 2013
- Deraniyagala P.E.P , VOL24 Part 1 *SpoliaZeylanica* ,Director of Museums Ceylon, ,pp22-56 , 1944
- DeraniyagalaP.e.p ,VOL.28,Part2 *Spolia Zeylanica*,Director of Museus Ceylon,pp223, 1958
- Joseph F.Baugher,*ON CIVILIZED STARS*,"The search for Intellingent Life outer space", 21-23pp & 65-68pp. 1985
- PHL mapping the Habitabal life: Planetary habitability Laboratory,University of Puerto rico,July 2015:http://phl.upr.edu/projects/habitable-exoplanets-catalog
- Project visible Paleo Earth : Planetary habitability Laboratory,University of Puerto rico,July 2015:http://phl.upr.edu/projects/visual-paleo-earth
- Christoph Reitschuler, Philipp Lins, Thomas Schwarzenauer, Christoph Spötl, Andreas O. Wagner, Paul Illmer,:*New undescribed lineages of non-extremophilic archaea form a homogeneous and dominant element within alpine moonmilk microbiomes*, Geomicrobiology Journal. Nov, Vol. 32:pp 890-902, 2015
- The *National Aeronautics and Space Administration* (*NASA*) 'Institute of astrobiology ,NIA https://astrobiology.nasa.gov/nai/
- E. S. Karaevskaya, L. S. Demchenko, N. E. Demidov, E. M. Rivkina, S. A. Bulat, D. A. Gilichinsky:*Archaeal diversity in permafrost deposits of Bunger Hills Oasis and King George Island*
- (Antarctica) according to the 16S rRNA gene sequencing**:** Microbiology,Vol. 83:pp 398-406, 2014
- EL Shock **,** *Astrobiology: Seeds of life?* Natuer : 416, pp 380-381 2002. http://www.nature.com/nature/journal/v416/n6879/full/416380a.html
- International journal of astrobiology,Volume 03:Issue04:octomber2004.pp335-336,copyright©2005 cambridge university press.