

MAUI STARGAZING MAY OBSERVING LIST

DEEP SPACE OBJECTS OBSERVED with the 12 INCH DOBSONIAN TELESCOPE

PLANETS

Mars
Jupiter

4 GALILEAN MOONS

Io
Calisto
Europa
Ganymede

NEBULA

M 1 Crab (Cancer)
M 42 - The Great Nebula (Orion)

PLANETARY NEBULA

Owl (Ursa Major)

8 GALAXIES

M 51 Whirlpool (2 galaxies in Canes Venatici)
M 81 Bode's (Ursa Major)
M 82 Bode's AKA Cigar (Ursa Major)
M 65, M66, NGC 3628 Triplet of Galaxies (Leo)
M 104 Sombrero (Corvus)

3 GLOBULAR STAR CLUSTERS

M 5 (Serpens)
M 13 (Hercules)
Omega Centauri (Centaurus)

5 OPEN STAR CLUSTERS

M 38 Starfish (Auriga)
M 41 (Heart of the Dog)
M 44 Beehive (Cancer)
Caldwell 41 Hyades (Taurus) (Bare Eye)
NGC 1976 Trapezium (Orion)

LASER POINTER OBJECTS

13 FIRST MAGNITUDE STARS

Aldebaran (Taurus the Bull)
Antares (Scorpius)
Arcturus (Bootes the Kite)
Bellatrix (Orion)
Betelgeuse (Orion the Hunter)
Capella (Auriga the Charioteer)
Pollux (Gemini)
Procyon (Canis Minor the Little Dog)
Regulus (Leo)
Rigel (Orion)
Sirius (Canis Major the Big Dog)
Spica (Virgo)
Vega (Lyra)

14 ASTERISMS

Belt (Orion)
Big Dipper (Ursa Major)
Butterfly (Hercules)
Diamond (Virgo)
Guardians of The Pole (Ursa Minor)
Keystone (Hercules)
Kids (Auriga)
Kite or Ice Cream Cone (Bootes)
Little Dipper (Ursa Minor)
Milk Dipper (Orion)
Sickle (Leo)
Sword (Orion)
Winter Circle (clockwise: Capella, Aldebaran, Rigel, Sirius, Procyon, Pollux)
Winter Triangle (Betelgeuse, Procyon, Sirius)

21 CONSTELLATIONS

Auriga (Charioteer)
Bootes (Herdsman)
Canis Major (Big Dog)
Canis Minor (Little Dog)
Canes Vanetici (Hunting Dogs)
Centaurus (Centaur)
Coma Berenices (Berenice's Hair)
Corona Borealis (Northern Crown)

Corvus (Crow)
Hercules (Hero)
Hydra (Water Snake)
Leo (Lion)
Libra (Scales)
Orion (Hunter)
Perseus (Hero)
Scorpius rising (Scorpion)
Southern Cross rising (Centaurus)
Taurus (The Bull)
Ursa Major (Big Bear)
Ursa Minor (Little Bear)
Virgo (Maiden)

FIRST MAGNITUDE STARS - First magnitude stars are the 20 brightest stars visible in the night [sky](#) from Planet Earth. [Hipparchos](#), introduced the magnitude scale in the 1st century B.C..

ASTERISMS - An asterism is an informal pattern of [stars](#) recognized in the Earth's night sky. It may be part of an official [constellation](#) or it may be composed of stars from more than one constellation.

CONSTELLATIONS - A constellation is a specific area of the [celestial sphere](#) as defined by the [International Astronomical Union](#) (IAU). There are [88 officially recognized constellations](#), covering the entire sky.

GALAXIES

A galaxy is a [gravitationally](#) bound system of [stars](#), [stellar remnants](#), [interstellar gas](#), [dust](#), and [dark matter](#). The word galaxy is derived from the [Greek](#) *galaxias* (γαλαξίας), literally "milky," a reference to The Milky Way. Galaxies range in size from dwarfs with just a few thousand stars to giants with one hundred trillion stars, each orbiting their galaxy's own center of mass.

NEBULAE

A nebula is a cloud formed of gas and dust from an exploded star. New star clusters form from the clouds of gas and dust, and these illuminate the cloud to form the visible nebula.

PLANETARY NEBULAE

A planetary nebula is an emission nebula consisting of an expanding glowing shell of ionized gas ejected from old red giant stars late in their lives. The shells of gas are illuminated by a white dwarf carbon star that collapsed in less than millionth of a second.

GLOBULAR STAR CLUSTERS

A globular cluster is a spherical collection of stars that orbits a galactic core as a satellite of a parent galaxy. Globular clusters are very tightly bound by gravity, which gives them their spherical shapes and relatively high stellar densities toward their centers.

ZODIACAL LIGHT

A faint column of diffuse white glow seen in the night sky that appears to extend up from the vicinity of the Sun along the path of the ecliptic or zodiac. It is best seen just after sunset in spring, and just before sunrise in autumn, when the zodiac is at a steep angle to the horizon. Caused by sunlight scattered by space dust.

OPEN STAR CLUSTERS

An open cluster is a group of up to a few thousand stars that were formed from the same giant molecular cloud and have roughly the same age.

BINARY or DOUBLE STAR SYSTEMS

A binary star is a star system consisting of two stars orbiting around their common center.

CASINI DIVISION

A 3000-mile (4800-km) wide dark region that separates the middle and outermost rings of the planet Saturn named after Italian astronomer Giovanni Domenico Cassini (1625-1712), who discovered it in 1675. It formed as a result of particles being removed from the area by the gravitational pull of Mimas, one of the smaller of Saturn's moons.

THE UNIVERSE

The Universe is comprised of one trillion Galaxies. Each galaxy contains up to hundreds of billion stars.

THE MILKY WAY

Our own galaxy, the Milky Way, formed 12.5 billion years ago, is estimated to contain 100 to 400 billion stars and be 100,000-180,000 light years across.

GALAXIES

Galaxies are the place where stars are born and die.

Stars are born in clouds of dust and gas called nebulae.

1924 Edwin Hubble using a 100-inch telescope at Mount Wilson categorized nebulous objects discovered in the 1700s as galaxies beyond the Milky Way. Hubble is credited with realizing that the Milky Way was just one of many galaxies. It was considered the greatest discovery that shocked the science community.

THE MOTION OF THINGS

Earth travels at 1,000 miles per hour on its axis toward the east.

Earth travels 67,000 mph around the sun

Our Sun travels at 515,000 mph in its orbit around the Milky Way

It takes the Sun 225 to 250 million years to complete a galactic year.

225 million years ago the Earth crust had one landmass called Pangea, 25 million years before plate tectonics began breaking apart the continents.

The Milky Way travels at 1.3 million miles per hour toward the star Vega. In 3.5-4 billion years from now, the Milky Way will merge with its closet neighbor, the Andromeda Galaxy.

SPEED OF LIGHT

Light travels 6 trillion miles in a year

SIZE OF THINGS

The Milky Way is 100,000 to 180,000 light years across

Andromeda galaxy 200,000 light years across

The largest galaxy is IC 1011 at 6 million light years across

HOW LONG WOULD IT TAKE TO REACH THE CLOSEST STAR TO OUR OWN SOLAR SYSTEM?

NASA's New Horizons spacecraft is the first spacecraft ever to visit Pluto and its moons. New Horizons spacecraft travels at 36,373 miles per hour (58,536 km/h). Launched from Earth in mid-January, 2006, it reached Pluto in mid-July, 2015 ... nine-and-a-half years later. If New Horizons were aimed toward the Alpha Centauri system, which it isn't, it would take this spacecraft about 78,000 years to get there.

THE ODDS THAT WE'RE THE ONLY ADVANCED SPECIES IN THE GALAXY ARE ONE IN 60 BILLION

<http://www.airspacemag.com/daily-planet/odds-were-only-technologically-advanced-species-universe-are-extremely-low-180958975/>

LIFE IN OUR SOLAR SYSTEM

Does Our Solar System Harbor Life beyond Earth?

<http://www.space.com/15716-alien-life-search-solar-system.html>

We still don't have hard evidence for any life that's not of this Earth, but across our solar system there are some tantalizing possibilities for primitive life to find a haven. Some moons of Jupiter and Saturn are intriguing, and there's also the chance for some surprises somewhere on Mars.

Here are my top six candidates for the best spots to search for primitive alien life in our solar system.

Enceladus

In 2005, NASA's Cassini spacecraft photographed geysers of frozen water spewing from cracks in Enceladus' southern hemisphere. Scientists think reservoirs of liquid water lie beneath the frozen surface and are warmed by gravitational interactions between Enceladus and other moons around Saturn. The necessities for life are there, and maybe Enceladans are as well. The moon has a mean radius of 156.6 miles (252.1 km).

Mars

[Mars](#) remains perennially popular for those hunting for otherworldly protoplasm. Particularly intriguing are the dark stripes that appear in the Martian summertime at Horowitz crater. These are likely to be salty meltwater only inches beneath Mars' dusty epidermis. A relatively simple probe could sample this muddy environment. Mars has a diameter of about 4,212 miles (6,779 km).

Titan

Titan is Saturn's largest moon and the only world in the solar system (besides Earth) known to sport liquid lakes. These are lakes of ethane and methane — liquid natural gas — endlessly topped up by hydrocarbon rain. Despite the odd ingredients and Titan's gelid temperatures (minus 290 Fahrenheit, or minus 179 Celsius), it is a world where chemistry's a happening enterprise. Titan possesses diameter of 3,200 miles (5,150 km).

Europa

Many would grant [Europa](#) a higher potential-life rating than I have, since there's probably more liquid water here than in all of Earth's oceans. The downside is that Europa's vast, salty seas lie beneath roughly 10 miles of ice. Not only is it difficult get a probe beneath this icy armor, but Europa's oceans are darker than a cave — which means photosynthesis won't work. However, something down there may subsist on geothermal heat or complex molecules from the surface. Europa possesses a mean radius of 970 miles (1,560.8 km).

Venus

A surprise entry in the exobiology sweepstakes is our sister planet, [Venus](#), with its scorching surface temperatures (850 F, or 454 C). The planet is generally assumed to be as sterile as a boiled mule.

But planetary scientist David Grinspoon, astrobiology curator at the Denver Museum of Nature and Science, points out that high in the Venusian atmosphere temperatures are refreshingly tolerable. Atmospheric sulfur dioxide and carbon monoxide might serve as food for floating microbes. Venus is 7,521 miles wide (12,104 km).

Callisto and Ganymede

Like their more celebrated neighbor Europa, Ganymede and Callisto may have buried, liquid oceans. However, in the case of these two satellite siblings, briny deeps would underlie at least 60 miles (100 km) of rock. Finding inhabitants here is a shovel-ready project for our grandkids. Callisto has a diameter of more than 2,985 miles (4,800 km); Ganymede's diameter is 3,270 miles (5,262.4 km).

There's a small chance that Pluto's subsurface ocean might harbor primitive life, and that could expand the search for habitable worlds out into the rest of the Kuiper Belt.

Pluto

Recent studies, drawing on a combination of computer modelling and data from the New Horizons mission, suggest that there could be a small subsurface ocean hidden beneath the ice of Sputnik Planitia, the round icy basin in the western lobe of Pluto's famed heart-shaped feature. If that ocean exists, claims William McKinnon, professor of Earth and planetary sciences at Washington University and coauthor on two of the recent studies, it raises the question of whether there could be life under the nitrogen ice of Pluto's frozen heart. It's a very, very long shot, but it raises intriguing questions about the potential for life in wholly unexpected places on the outskirts of our solar system. <http://www.astronomy.com/news/2016/12/life-on-pluto>