BPAA Newsletter

Battle Point Astronomical Association, Bainbridge Island, WA

ISSUE 68 | MARCH-APRIL-MAY CALENDAR | MARCH-APRIL 2005

(Unless otherwise noted, all events are at the Edwin Ritchie Observatory, Battle Point Park)

March

March 2: BPAA Board Meeting 7 p.m.

March 3: Last-quarter Moon; Moon occults Antares.

March 5: Star Party Battle Point Park,
Beginner session 6 p.m.

March 9: Member Meeting 7 p.m.;
Woody Sullivan, Astrobiology—Life in the Universe

March 10: New Moon

March 16: Caroline Herschel's 250th Birthday (1750)

March 17: First-quarter Moon

March 18: 40th Anniversary (1965), First Spacewalk,
Leonov on Voskhod 2

March 20: Vernal Equinox, 4:33 a.m. PST

March 22: Mars Equinox (Beginning of northern Fall)

March 25: Full Moon

March 31: Cassini, Titan Flyby

April

April 1: Last-quarter Moon

April 2: Star Party Battle Point Park,
Beginner session 7 p.m.

April 3: Daylight Saving Time begins

April 6: BPAA Board Meeting 7 p.m.

April 6-8: International Dark Sky Association Annual Meeting, Tuscon, Arizona

April 8: New Moon

April 13: Member Meeting 7 p.m.

April 16: First-quarter moon; Astronomy Day;
Cassini, Titan Flyby

April 22: Lyrids Meteor Shower Peak

April 24: Full Moon

May

May 1: Last-quarter Moon

May 1-8: Texas Star Party, Prude Ranch, Texas

May 4: BPAA Board Meeting 7 p.m.

May 5: Eta Aquarids Meteor Shower Peak

May 7: Star Party Battle Point Park.
Beginner session 7 p.m.

May 8: New Moon

May 11: Member Meeting 7 p.m.

May 16: First-quarter Moon

May 23: Full Moon

May 27-29: Riverside Telescope Makers Conference,
near Big Bear City, California

May 30: Last-quarter Moon

CALENDAR NOTES

Apparently all that whining I did about the weather in the January–February issue of the Newsletter did some good. We've had an amazing string of clear nights in mid-February, overwhelming now sleep-deprived amateur astronomers in the Pacific Northwest previously starved for observing opportunities. What a treat finally getting to see those bright stars that populate the winter sky. Saturn will remain high in the sky through March and Jupiter will shine brightly as well. On the morning of March 3, the Moon will occult Antares. *Sky and Telescope*'s Web site gives 2:11 a.m. PST as the immersion time, 3:11 a.m. as the emersion time for the Seattle area. If the skies are clear, this will be an impressive sight. Antares will hang on the edge of the Moon for a few seconds, suddenly disappear, then reappear in about an hour on the moon's earthlit dark edge.

Meanwhile, back indoors, BPAA is privileged to host in March University of Washington Professor Woody Sullivan. Professor Sullivan's interests are in astrobiology, the search for extraterrestrial intelligence, and the history of astronomy. He has designed many sundials, one of which landed on Mars in January 2004 as part of the Mars Exploration Rover mission. Professor Sullivan started the EarthDial Project, which links sundials with Webcams all around the world. He is also director of Project AstroBio, which sponsors scientists of all sorts in year-long partnerships with grades 3–12 teachers throughout the Puget Sound region. He is also active in the International Dark Sky Association and its local chapter Dark Skies Northwest.

On March 9 at our Member Meeting Professor Sullivan will speak to us about sundials and about Project Astro-Bio, and present a lecture entitled “Astrobiology—Life in the Universe.” Astrobiology investigates the wide range of multidisciplinary factors that may influence the origin and evolution of life on Earth and beyond. Professor Sullivan is one of the leaders of the UW’s interdisciplinary graduate program in Astrobiology. His presentation is sure to be fascinating; join us for an exceptional evening.

And join us for our other regularly scheduled monthly member meetings and star parties. Note that the Beginner Session for the March star party starts at 6:00 p.m.; in April and May the sessions will begin at 7:00 p.m. to reflect the time change to Daylight Saving. Remember that any member who plans to observe on any clear night can invite others to join in by sending an email to bpaa@yahoogroups.com. To join our email group, send an email with your name to bpaa-owner@yahoogroups.com and we can enroll you. If you want to also have web access to the messages and files, you can join the yahoogroups by clicking the register link for new users on http://groups.yahoo.com/, and request to join our group at: http://groups.yahoo.com/group/bpaa/. The system will send us a message, and we’ll approve your request after we verify your membership.

Diane Colvin (dtcolvin@comcast.net)

In Brief

Kiwanis Holds First-Sunday Planetarium Brunches

Sally Metcalf

The Bainbridge Island Kiwanis Club has come up with a delicious idea—a Sunday morning brunch to support the John H. Rudolph Planetarium Project.

On any first Sunday of the month throughout 2005, at Wing Point Golf and Country Club, $5 from each $19 brunch will go to BPAA’s Planetarium Project. Call 842-2688 for reservations. Times are available from 10a.m. to 1:00p.m., every half hour, first Sundays only.

John Rudolph was a founding member of Kiwanis and was a well-loved and valued member for forty-five years. Naturally, when Kiwanis heard about the Planetarium Project, they wanted to help realize John’s dream. The club specializes in raising funds primarily for programs that benefit children. A planetarium dedicated to education—either onsite at the Ed Ritchie Observatory or a portable show taken to schools—is right up Kiwanis’ alley.

In 2004, Kiwanis innaugurated its support of the Planetarium Project by helping to produce an Intensely Vigorous Revolutionary Volunteer Dixieland Band concert to benefit the project. John was the instigator and leader of that band for 36 years, so the musicians were enthusiastic about supporting his dream. The concert brought in $3,340.

While Battle Point Astronomical Association (BPAA) hasn’t yet decided on a planetariumformat—everything from an economical traveling show to an addition onto the present building is being contemplated—it’s certain that more funds will be needed to bring the John H. Rudolph Planetarium into being, and Kiwanis has expressed the desire to continue partnering with BPAA in raising those funds.

Many thanks to all John’s friends at Kiwanis. See you at the Kiwanis’ First-Sunday Planetarium Brunches!

How’s the Big Telescope?

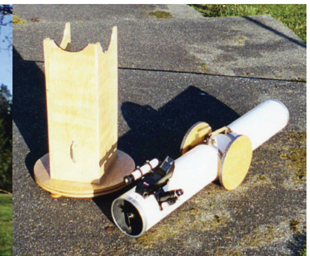
Malcolm Saunders

Dan Caster, Allan Saunders, and I have tested a sample servo motor and found that it has enough torque to drive the telescope. With that settled, we ordered motors, motor control electronics, software and hand paddle, which arrived this week. The *Scope II* system requires an up-to-date computer, which we have purchased, but not yet configured. Some mechanical design work and machine shop work remains. Following that, it’s a matter of installing the components and tinkering with control settings.

Free Telescopes, Binoculars, etc…!!

Russell M. Heglund

BPAA has several telescopes, binoculars, video cameras, and other instruments that members can check out and use, for FREE (OK…for the cost of dues). Three Dobsonian reflector telescopes, at 4”, 6” and 16” mirror diameters, are in our inventory.



6”Dobsonian, set up and broken down.

The 4” (32.5” focal length) Dobsonian has a Telerad finder, and is very light and portable. An excellent starter scope. The 6” (47” focal length) Dobsonian has a Telrad finder and a 6x30 finder scope. It has very clear optics, is portable, and is a good set-up for your first try at clusters and Messier objects.

The 16” (63” focal length) Dobsonian telescope has a Telerad finder. This is a “string” scope, using tensioned poles to support the eyepieces and diagonal. It collapses into a small, but heavy package. Because of the size of the mirror, it is capable of pulling in fainter nebulae and galaxies. It has cooling fans and dew heaters. It is more complex to set up than the previous telescopes. **A**lso available is a 20x80 Bausch & Lomb Binocular, on a camera mount. These binoculars are great for viewing the moon, or open star-clusters and comets.

16”Dobsonian, set up and broken down.

To check out items you must be a member and have been a member for at least two months. You must be trained on the use of the telescope or instrument by a member-trainer, who will then sign off on the check out form. You must fill out a check out form in the check out book (kept in the Observatory Office). Items may be checked out for 30 days. If you are interested in checking out an item, contact me (Russ Heglund (206) 842-8758 or email: rmheglund@yahoo.com) or show up at the monthly Star Party, and try out an instrument under the stars!!

(Note: Several of our other items will be covered in a later article, including video cameras, refractor telescopes, and a CCD Camera).

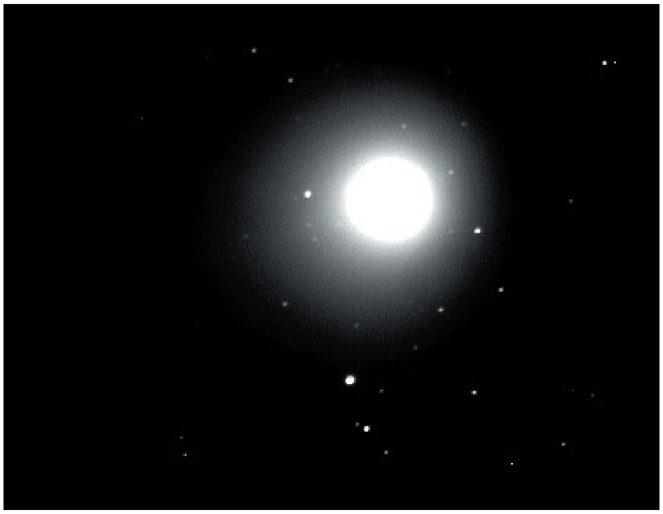
(photos by Russell Hegland)

Comets, Asteroids, and Supernova

Harry Colvin

Finding astronomical objects can present both novice and experienced observers with real challenges. On one end of the scale are the Messier objects. Relatively easy to find, they are bright and their locations are well documented on printed charts and reference texts. What is really nice is that they stay in one place, relative to the outline of the proximate constellations and reference stars. More difficult are the Herschel objects. They are harder to locate because of their magnitudes, many in the range of 11 to 13. But even these objects stay put, and knowing where and how to locate them is simply a matter of learning your equipment, having dark sky conditions, and practicing the art of star-hopping with printed or computer generated charts.

Of course one can always “cheat” by using a GO TO



Comet Machholz on January 10, 2005. Image stack of twenty 10 second images taken with LX200 at f6.3 with MX916 camera. Image enhanced to bring out the short tail corona detail with DDP filtering. Image taken by Harry Colvin from a private observatory on Bainbridge Island, WA.

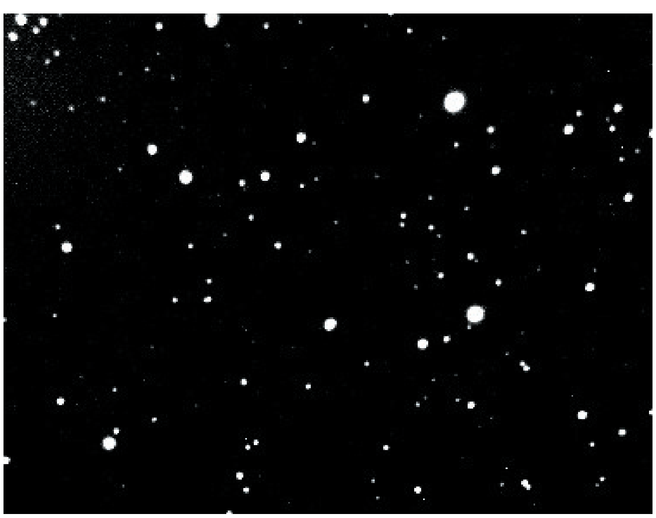
mount. I have found that for some objects, cheating is almost a necessary evil. Dim comets and almost all asteroids are extremely difficult to locate and confirm, even when one uses GO TO methods. I am not referring to bright comets like Machholz, which was naked-eye visible by some for over a month in late December and January. But try to find, as I did one night about a year ago, a small magnitude 11 comet using charts. No way does this work for me.

I recently started an asteroid observing program with the eventual goal of some day making a discovery. But first, as I found out, I had to learn how to find documented asteroids in the range of Magnitude 10 to 12. Even this was not easy, because asteroids look like stars and many, unlike man-made satellites, do not move across the sky very fast. But by using telescope control software such as that in *Starry Night* or *Cartes du Ciel*, I am able to place my LX200 10" within five arc minutes of the asteroid's location and "on" my CCD chip. I can then obtain images with my MX 916 CCD camera, and using the Internet, download DSS images to determine which "star" is in fact the asteroid. Isn't technology great!

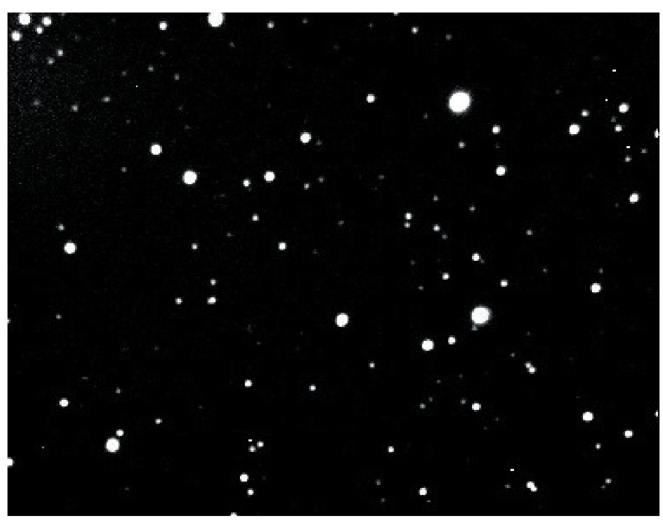
Another method of detecting asteroids is the use of "blinking" software to find objects that are moving relative to background stars. Clyde W. Tombaugh used the blinking method at Lowell Observatory in 1930 to find the asteroid (some would say planet) Pluto, without the assistance of computer software, of course. By using a series of three asteroid images taken over a period of time and performing plate reductions one can also calculate the asteroid's orbit and predict where the asteroid will be in the future.

To discover and report newly discovered asteroids that you can name, you must pass a test to determine if you and your equipment can perform asteroid imaging and plate reductions with precision. The Minor Planet Committee will then issue your observatory a number and you can officially play the asteroid discovery, orbit prediction, and naming game. All this is in fact serious business, because as we know asteroids have impacted earth in the past and will again in the future. Once you have an observatory number, you are in effect competing in the asteroid discovery game with well-funded and large robotic telescopes that scan the sky looking for NEO's (Near Earth Objects). This means if an amateur wants to discover an asteroid, he or she should image in places in the sky where the robots don't scan, and should seek dim small rocks with magnitudes in the range of 18 to 20.

This is a test. Can you spot the asteroid 58 Elpis using the two images below? I took these image stacks on



Star field image stack including asteroid 58 Elpis. Images taken at ca 9:30 p.m. Image by Harry Colvin.

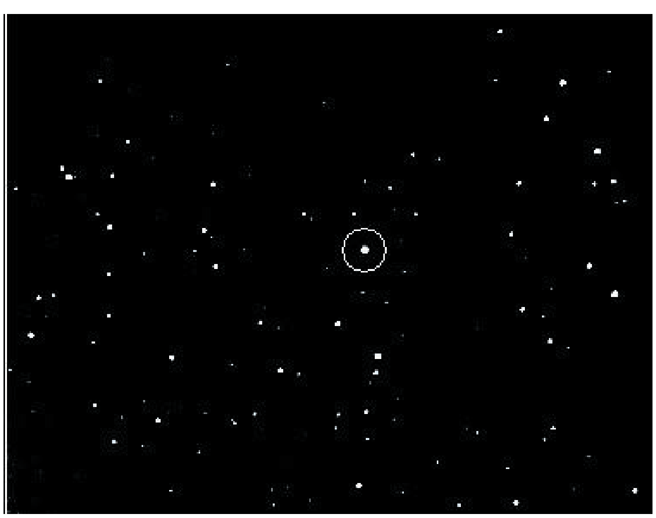


Star field image stack including asteroid 58 Elpis. Images taken one hour later at ca 10:30 p.m. Image by Harry Colvin.

the night of January 17 about one hour apart. It's not easy without blinking software so, if you can't spot the asteroid, see the illustration at the end of the article for the answer.

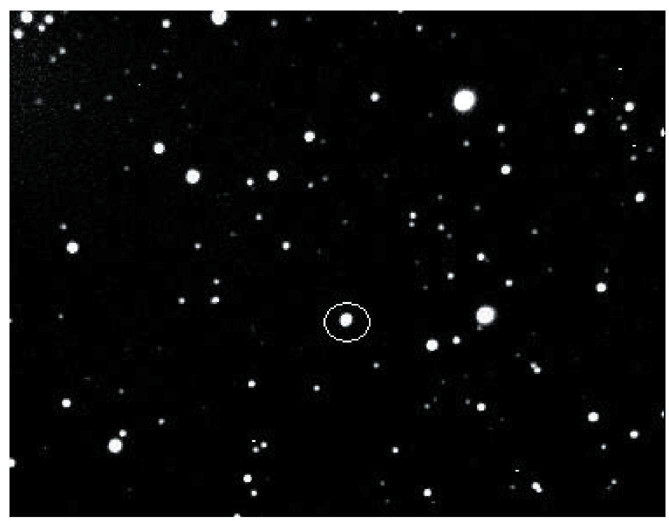
I should point out that you really don't need a CCD camera to find and confirm an asteroid observation. You need only average observational skills and patience. Once you are fairly certain that you are looking in the correct part of the sky, simply sketch the star field through your eyepiece, then return several hours later and re-sketch the same star field. Then compare the two sketches to determine what has moved.

Another fun thing one can do with asteroids is observe an occultation; i.e., the eclipsing of a star by an asteroid. The effect of an occultation is that the eclipsed star blinks off for one–three seconds. It is a strange phenomenon to behold. By noting the duration of the blink and the exact time and location of your observation in combination with other astronomers' observations, the asteroid's size, shape, and other information can be determined. The International Occultation Timing Association forecasts these events. In the Pacific Northwest, we had an opportunity to observe just such an event on February eighth. The asteroid 709 Fringilla was going to occult a 10.9 star. I was all set up with the clock on the PC synced with Internet time signals. I had located and confirmed the star that was going to blink. By comparing DSS images with those I had imaged I was certain I was looking at TYC 2911-01538-1. My plan was to remove my camera around 11:00 p.m. and replace it with a 12 mm eyepiece to observe the event. And to get the correct timing of the event I was going to start a sound file at exactly 11:06 p.m. and record my observations by voice. The occultation was to occur around 11:08 p.m. But it was not to be and yes, you guessed it, clouds moved in around 10 p.m. preventing the observation.

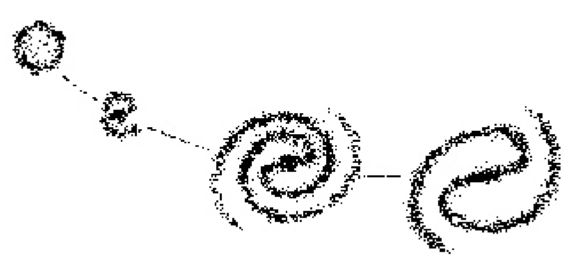


Star field with the Mag. 10.9 star TYC 2911-01538-1 circled. Auto-guided image stack of ten 120 second images taken with an LX200 at f 6.3 with a MX916 CCD camera. Image taken at ca 8:30 p.m. on February 8, 2005 from a private observatory on Bainbridge Island WA. Images were stacked and preprocessed with flat fields, dark frames and filtered using DDP. Image by Harry Colvin.

There is one class of object more difficult to observe than asteroids and dim comets. That's a supernova event, the result of an exploding star in a galaxy far away. Supernova discoveries take on average about 5,000 hours of search time per discovery. Most of these discoveries are made with robotic telescopes that mine the sky while their owners are sleeping. I don't have one of these so I will not be playing this game. Once a supernova event is discovered and reported, the big telescopes all over the world study the event. Then the object fades away over several days and all one is left with is a number and a location recorded in a computer database somewhere. Sorry, but I don't have any images of supernova objects, at least none that I have taken.



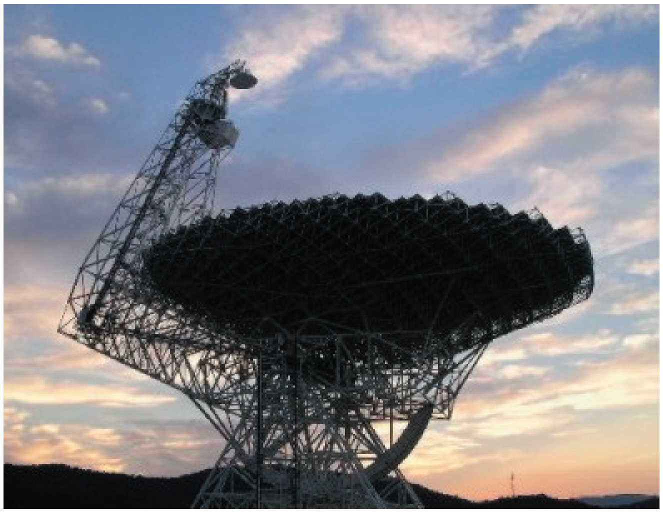
Star field image stack taken at ca 10:30 p.m. showing asteroid 58 Elpis circled. Image by Harry Colvin.



Intelligent Life

Ted S. Frost

"Intelligent life means being able to make a radio telescope."—Woody Sullivan



Green Bank Radio Telescope. photo courtesy Andy Clegg, NSF

A daily highlight sixty-five years ago was arrival of the evening newspaper—Buck Rogers and rocket ships, ray guns, robots, and aliens galore. Flash Gordon on the planet Mongo heroically facing Ming the Merciless. Flights of fancy transporting this young boy from the humdrummery of a plebian lifestyle.

Other worlds seemed not so fanciful in view of UFO sightings, SETI, and the Copernican principle[1]: the assumption that Earth, the Sun, our solar system, and the Milky Way are average. If nothing is unique about our place in the universe, why should anything be special about life here on it, including complex life, intelligent life, and human technology. With gazillions of stars, isn't it reasonable to assume others are out there? Many a starry night I've looked at the heavens and wondered if strange humanoids could be staring back at me.

Alas, comes now old age and disillusionment: after attending astrobiology classes at the University of Washington the past two years, and reading prominent scientists, advanced civilizations seem problematical. Buck Rogers and Flash Gordon might find it pretty lonely. Microbial life can thrive in hostile environments. But complex multicellular organisms with complicated information processing systems require more benign environments. There are many constraints on intelligent life in the universe.

Cosmological Constraints: When considering extraterrestrial life in the cosmos, astrobiologists are concerned with metallicity, the measure of elements heavier than hydrogen and helium. (Astronomers consider anything heavier than H and He to be a metal.) Since the Big Bang produced only hydrogen and helium in large quantities, metallicity, the raw materials for life, had to accumulate from subsequent supernovae. This could have taken several billion years[2]. But if metallicity gets too high, it may be detrimental to earth-like planets due to formation of giant gas planets close to the host star[3]. Recent discoveries of large gas planets show many orbiting so close to their stars that there's no room for earth-like planets[4].

There appears to be a "Goldilocks" selection effect for metallicity: a limited period of time where the appropriate levels exist.

Galaxy Constraints: Scientists also have concluded that galactic regions are limited as to their suitability for life[5]. It appears that only spiral galaxies, such as the Milky Way, have stable and collision-free regions.

But even spiral galaxies have extensive regions that are unsuitable for life. According to recent analysis, our Milky Way galaxy has a habitable zone: a very restricted region of the Milky Way's thin disk. The thick disk, bulge, and halo regions have too much radiation, too many cosmic collisions, and too little metallicity for development of intelligent life. And on the thin disk, only the middle portion is suitable. The inner regions are too dangerous because of collisions while outer regions are too poor in metallicity. Finally, the fact our Milky Way even has a habitable zone may be unusual. Eighty percent of the galaxies in our local universe appear to have less metallicity than the Milky Way[5].

Messier 81 Spiral Galaxy

Planetary System Constraints: Once we have picked a habitable site within a spiral galaxy with suitable metallicity, certain attributes are critical. First, it should be a single star system. Planetary orbits in the more common binary or multiple star systems are undoubtedly too erratic for long term evolution of intelligent life. Even if stable, differences in luminosities of the multiple stars would probably make living there very difficult. And this is assuming planets are able to form around the multiple stars in the first place[6].

The star should be close to the size of our sun. The Sun's life span is estimated to be 10^{10} years, time enough for the $4.5x10^9$ years it took our planet to form and for intelligent life to evolve. A star's life and luminosity is dependent on mass, with the life of a main sequence star varying roughly as the inverse third power of its mass. Thus a star two times the Sun's mass would have a life $\approx 10^{10}x(1/2^3) = 1.25$ billion years, not nearly enough time.

A star one half the Sun's mass would live approximately 80 billion years. That sounds attractive, except its luminosity would only be about 6% that of the Sun making it pretty dim. So dim an earth-like planet would have to orbit extremely close in order receive enough rays for liquid water. So close it would get zapped by solar flare radiation, and so close one side of the planet would perpetually face the star. It sounds like we'd better stick to a host star close to the size of our Sun, which eliminates 93% of all stars[7].

Another important attribute is existence of Jupiter-sized planets outside the system's habitable zone. These intercept incoming comets and asteroids, reducing the chances of inner planets getting clobbered with extinction-causing missiles[8]. Finally, to maintain peace and tranquility, planetary orbits should be stable and not too elliptical.

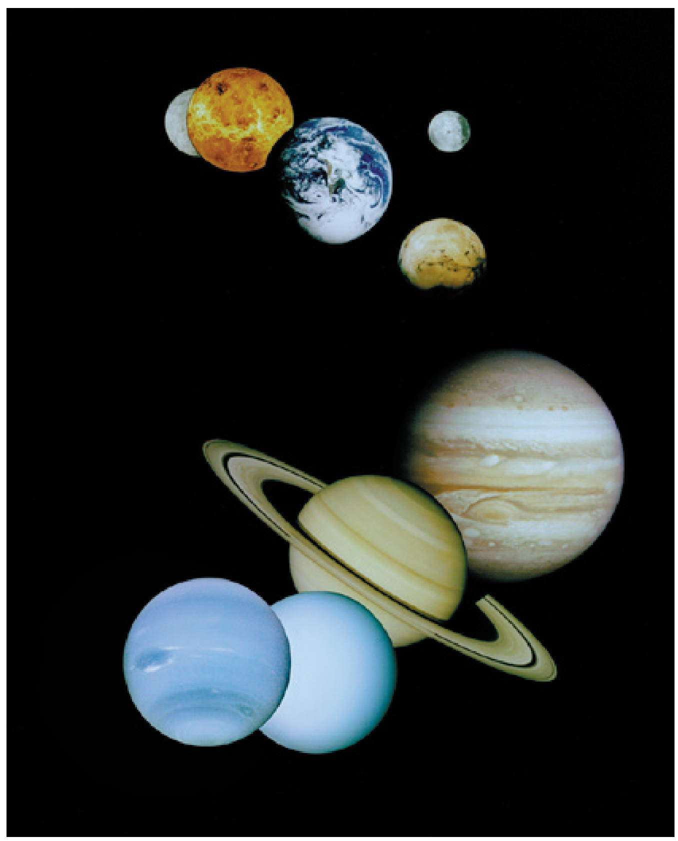
How are we doing so far? Multiplying the foregoing constraints Drake Equation-wise gives us approximately one one-thousandth of one percent of all stars having the potential of harboring planet Mongo and Ming the Merciless. A very small percentage but, in view of the humongous number of stars out there, still a large number.

Planetary Constraints: Contrary to the Copernican principle's expectations, there's nothing ordinary about Earth. As pointed out a few years ago by Peter Ward and Donald Brownlee[9], Earth has a number of unusual features making it conducive to life and, in particular, the evolution of complex life forms.

First, Earth resides within our solar system's continuously habitable zone—the circular region around the sun where liquid H_2O can exist—far enough out to avoid being boiled away like Venus, but near enough in to avoid freezing like Mars. This is a rather narrow band, estimated to be between .95 and 1.25 A.U's[10]. Fortunately, Earth's orbit is nearly circular, keeping it well within this zone.

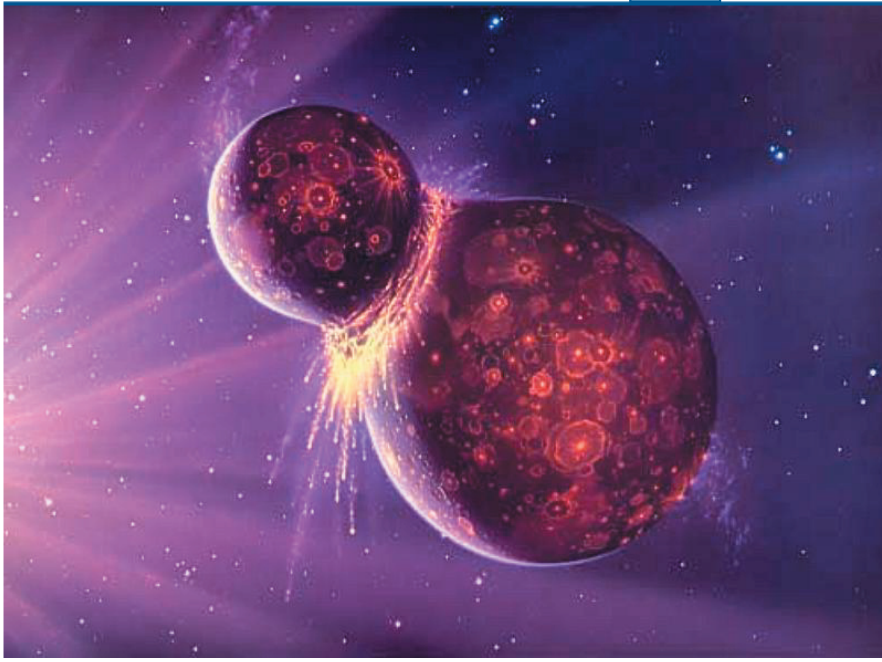
Earth is big enough to retain its internal heat, atmosphere, and water, but not so large that its gravity retains a runaway greenhouse atmosphere, or is excessively attractive to asteroids and comets.

Earth was born early enough to have a generous inventory of radioactive elements to keep its interior hot and liquid during the course of life's evolution on its surface. Yet, Earth was born late enough to have the metallicity needed.



Solar System Planets. Image credit NASA

Earth has a giant moon, thought to be the result of an early collision with a Mars-sized planet[11]. This chance occurrence had many fortuitous consequences. It carried off a big chunk of Earth's light upper crust, thereby allowing continents to rise above ocean basins rather than being covered by oceans. It has given Earth



Formation of the Moon/Giant Impactor Theory. Image Credit: NASA

an enrichment of heavy metals, strong fractionalization of materials, a hot semi-liquid interior that created plate tectonics vital for climatic stability, cycling of chemicals essential to life, and the creation of mountainous continents[12]. It gave us a strong protective magnetic shield, life-stimulating tides, a non-wobbly 23° tilt, as well as a romantic night-light for lovers.

Finally, there is one other factor. Habitable zones don't stay habitable forever. Our sun keeps getting brighter. When Earth first formed, it was only 70% as bright as it is today. Cosmologists estimate that in another billion years the sun will be so bright Earth's animal life will be extinguished[13]. Which means there is only a finite window of time for intelligent life to evolve and exist on a planet.

Origin of Life Constraints: Now that we have suitable chemicals and a suitable habitat for life, how does it begin? How do prebiotic molecules become life? Many origin-of-life scenarios have been proposed: prebiotic soup coalescing into heterotrophic polymers in warm ponds of seawater,[1] two dimensional autotrophic film growing on pyrite crystals associated with volcanic vents,[15] an RNA world of primitive self-replicating strands of RNA,[16] networks of autocatalytic self-replicating proteins emerging from yet-to-be proven complexity laws associated with Chaos theory[17].

All these ideas have weaknesses [18]: still, biologists retain optimism that life will spontaneously arise if suitable conditions are available. Given the unimaginable size of the universe, it is assumed that life in some form or other likely exists other than here on Earth[19]. Let us accept this premise, even as an article of faith if we have to, and assume that life does arise somewhere, somehow.

Evolutionary Constraints: Now that we have started life, how do we proceed to intelligent life? Most biologists consider evolution to be non-teleological, a random process that tracks opportunistic pathways but is blind to any goal or destination other than survival of one's progeny[20]. You cannot look at evolution as aiming towards the the human species[21]. Stephen Jay Gould speculated that if you rewound and replayed evolution's tape, the chances of humans showing up again would be vanishingly small[22]. Having all the necessary geological, environmental and cosmological events repeat themselves is too unlikely.

To be sure, there does seem to be a long-term trend towards increasing levels of complexity, but many biologists hold that complexity does not inevitably lead to intelligence. Of the millions of lineages evolving and existing over millions of years, intelligence has arisen only once—on one obscure twig of one obscure branch of one particular phylum. And that took 3.8 billion years. Obviously, high intellect isn't necessary for making a living on Earth, as countless micro-organisms would testify (if they could).

It is true some biologists think otherwise—that evolution proceeds along convergent pathways to ever increasing levels of complexity and that emergence of sentience is inevitable[23]. However, from an extraterrestrial point of view, you have to keep in mind that intelligent life (i.e. Homo sapiens) has been around for only about 100,000 years[24]. And high-tech intelligence for a hundred years, or so. Not even an eye blink of time in Earth's history. Granted, it is dangerous to generalize from a sample of one, but since that is all we have to go on, astrobiology must keep Earth's experience in mind when considering prospects for encountering extraterrestrial intelligent life. But let us take the more optimistic view that evolution eventually does lead to neurological complexity resulting in intelligence, whether of humanoid form or not.

Technological Constraints: Being smart does not necessarily mean you can make a radio telescope. Homo Sapiens has been 'smart' for some time, but only recently has been able to satisfy Professor Sullivan's radio telescope criterion. High tech applications depend on intelligence, knowledge, energy sources, and available raw materials, such as accessible mineral deposits, as well as a stable land platform such as Earth's continents. This precludes water worlds or cloud worlds where intelligent life would have a hard time forging metallic instruments, as well as acquiring the necessary knowledge of chemistry and physics. As Guillermo Gonzalez points out[25], Earth is a rare classroom for acquiring knowledge of physics, astronomy, and chemistry, due to its position in the solar system, its moon, and its favorable geological and atmospheric attributes. Intelligent beings on planets not so favored might remain in the scientific and technological dark a long time, despite bulging brains and high I.Q.'s.

Civilization Constraints: High-tech applications also require stable, cooperative, and highly organized societies. But being able to make a radio telescope also means being able to make hydrogen bombs, a variety of pollutants, and a great many surviving babies. So far (knock on wood), we've avoided blowing ourselves up. But we are in dire need of restraints on population. And global warming is real and accelerating. How much longer can our techonological civilization exist without doing itself in? (factor fL of the Drake Equation)? Astrobiologists consider these constraints as placing practical limitations on the lives of high tech civilizations[26]. The flames of high tech civilizations may flicker only briefly before burning themselves out.

Constraint after constraint after constraint. Will we ever be visited by strange little men in space ships? It looks bleak. But keep in mind we yet have much to learn about physics and reality. Some scientists suggest concepts like string and M-brane theory, parallel universes, and traversable wormhole possibilities of general relativity mean the idea of advanced civilizations shouldn't be dismissed, and that some UFO sightings could be credible[27]. I remain optimistic. E. T. lives, I tell you!

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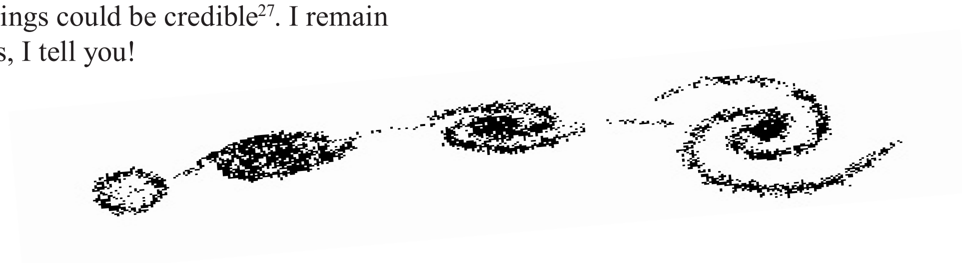

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