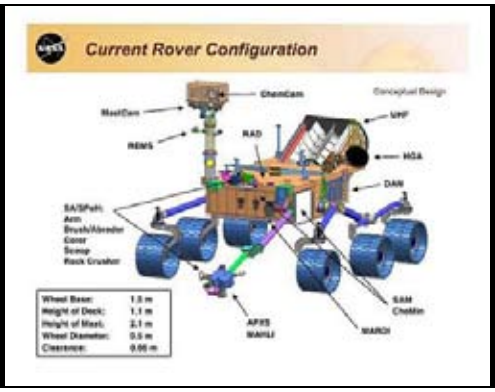
PRIMEFOCUS

Tri-Valley Stargazers



June 2010

Meeting Info

What: Mars Science Laboratory Mission and the Search for Carbonates and Methane on Mars

Who: Dr. Adrian Brown

When:
June 18, 2010
Doors open at 7:00 p.m.
Lecture at 7:30 p.m.

Where:
Unitarian Universalist Church in Livermore
1893 N. Vasco Road

Inside

June Meeting

Mars Science Laboratory Mission and the Search for Carbonates and Methane on Mars

Dr. Adrian Brown

Exposed Light Material in Upland Region in Aureum Chaos. Credit: NASA/JPL/University of Arizona

The Mars Science Laboratory (named 'Curiosity') will launch to Mars next year and is loaded with new instruments and cameras to investigate the geology of a new location on Mars. Dr. Brown will talk about the exciting and scary aspects of the new Rover, and how it might just impact our understanding of the chances for life on The Red Planet. The MSL Rover will have the capability to measure atmospheric methane, which is a possible trace gas for Martian volcanism or perhaps even Martian biota. Dr. Brown will discuss the recent controversy over methane, and how it is linked to the 2008 finding of carbonate on Mars.

Dr. Adrian Brown, an Australian citizen, is currently working as a planetary science researcher at the NASA Ames Research Center and SETI Institute in Mountain View. Adrian completed his PhD in Earth and Planetary Science at Macquarie University, in Sydney, Australia. The topic of his defence was "Hyperspectral Mapping of Ancient Hydrothermal Systems".

Check-out the SETI Institute Seminar Series Online!!!

Have you looked at the Calendar of Events (beginning on p.3) to see the interesting weekly talks that are held at the SETI Institute? As I assemble the calendar for each newsletter I find myself wishing that I could attend the weekly SETI talks, but since they are held on Wednesday's at noon I haven't been able to attend. That is until now; Dr. Brown has informed me that the past seminars are posted on YouTube. Go to the SETI website to see the list of upcoming seminars (http://www.seti.org/csc/lectures) and link to YouTube to see the past lectures (http://www.youtube.com/setiinstitute). Enjoy, I know I will!

News & Notes

2010 TVS Meeting Dates

The following lists the TVS meeting dates for 2010. The lecture meetings are on the third Friday of the month, with the Board meetings on the Monday following the lecture meeting.

Lecture Meeting	Board Meeting	Prime Focus Deadline
June 18	June 21	May 28
July 16	July 19	June 25
Aug. 20	Aug. 23	July 31
Sept. 17	Sept. 20	Aug. 28
Oct. 15	Oct. 18	
Nov. 19	Nov. 22	
Dec. 17	Dec. 20	

Money Matters

Treasurer David Feindel indicates that as of the May 17, 2010 the TVS account balances are:

Checking	$5,130.32	
CD #1	$3,761.41	rolled over 5/17/2010
CD #2	$2,654.36	rolled over 2/27/2010

TVS Volunteers Needed

We still need a volunteer to take on the duties of the club Secretary. We also could use more members on the Board of Directors. If you wish to help with any of these positions, please contact any officer or board member.

TVS Yosemite Dates

TVS' annual public star party weekend at Glacier Point will take place on July 9th - 10th. TVS puts on a star party both nights in exchange for free camping at the Bridalveil Campgrounds. This year we lucked out--we got a New Moon weekend!

H2O Open House

The second TVS Open House for the club observing site, H2O, will be Saturday, July 3rd. Our Open Houses are meant to give members an idea of what our dark sky site is like, and to be able to get a guided tour (of sorts) of the site.

For those members who have yet to check out the site, it is about an hour's drive south of Livermore, along a very windy road. It is a primitive site—no water or electricity, with a couple of outhouses. What it lacks in amenities, it makes up for in dark skies.

Plan to meet at the corner of Mines and Tesla at 6:45 p.m. The caravan will depart at 7:00.

Golden State Star Party Dates

The Golden State Star Party is now taking advance (discounted) reservations for their star party which runs from Saturday July 10th through Wednesday July 14th up at Adin, CA (near Mt. Lassen). For more info, go to http://www.goldenstatestarparty.org/.

Journal Club by Ken Sperber

Dark What?

You've heard of dark matter, you've heard of dark energy; well now there is dark flow! Kashlinsky et al. (2010) have used WMAP data and X-Ray data from ROSAT to analyze the motion of over 1000 galaxy clusters. Redshifts of all of the clusters have been obtained, with the most distant lying 2.5 billion light years away. The redshift data enabled measurements of the (peculiar) velocities of the clusters relative to the large-scale structure of the universe as encoded in the Cosmic Microwave Background Radiation. According to the standard inflationary model of the Big Bang, quantum fluctuations of space-time were enlarged to cosmic scales in a fraction of a second, with areas of higher mass density being the locations where galaxies and clusters of galaxies preferentially formed. The standard model predicts the size of velocity fluctuations that are possible due to these mass inhomgeneities. All of the galaxy clusters showed a peculiar velocity of about 800km/sec (~2 million miles an hour) in the direction of constellations of Centaurus and Hydra. Numerous possibilities exist as to the cause of this uniform motion, including the presence of a large mass beyond the observable universe that is attracting the galaxy clusters. This excess mass could be associated with other bubbles of space-time that experienced inflation at a different rate than the bubble in which our universe lives.

For more information see: http://www.space.com/scienceastronomy/distant-dark-flow-100317.html and Kashlinsky et al. (2010, ApJ. Lett., 712: L81-L85; doi:10.1088/2041-8205/712/1/L81)

Newsletter header image: Artists concept of the Mars Science Laboratory, which is scheduled for launch in November 2011 for a scheduled landing on Mars in August 2012.

For more information see NASA website: http://marsprogram.jpl.nasa.gov/msl/ and for an informational brochure about the mission see: http://marsoweb.nas.nasa.gov/landingsites/msl/memoranda/MSL_overview_LS.pdf

Image Credit: NASA

Calendar of Events

June 16, 12:00 - 1:00 pm

What: Don't Rain on my Planet: The Importance of Clouds and Hazes for Understanding Exoplanets and Brown Dwarfs
Who: Mark Marley
Where: SETI in Mountain View
Cost: Free

Clouds and hazes shape the observed spectra of exoplanets and brown dwarfs. Yet we know from Earth that clouds and hazes are inherently difficult to model and are the leading source of uncertainty in terrestrial GCM forecasts of global warming. Dr. Marley will review what we know about the chemistry and physics of clouds in substellar atmospheres and discuss some pathways to haze formation in exoplanet atmospheres. In the future determining if extrasolar earthlike planets are habitable--or inhabited--will ultimately depend on an understanding of the role clouds play in their atmospheres, so we can expect to be hearing about these issues for some time to come.

This lunchtime talk is part of the SETI Institute Colloquium Series. Location is 515 N. Whisman Road, Mountain View, CA 94043. For more info, visit their web site http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

June 19, 8:30pm

What: WHY WE NEED TO COLONIZE SPACE
Who: Dr. Seth Shostak, Seti Institute
Where: Mt. Tamalpais State Park, Cushing Memorial Amphitheater, more commonly known as the Mountain Theater, Rock Spring parking area
Cost: Free

Everyone talks about colonizing space, but is it just a pipe dream? If at least some of us aren't off this planet within a half-century or so, our lifestyles are going to be less than commodious!

June 23, 12:00 - 1:00 pm

What: Cosmic Microwave Background Measurements with the QUaD Experiment
Who: Sarah Church, Deputy Director of KIPAC, Stanford University
Where: SETI in Mountain View
Cost: Free

The Cosmic Microwave Background (CMB) radiation has enabled us to probe conditions in the early universe with incredible precision. The QUaD experiment is one of the first to report detailed measurements of the polarization of the CMB, which provides extra information that complements temperature measurements. Dr. Church will discuss the implications of the QUaD data and set the stage for what we can expect from future, more sensitive experiments.

This lunchtime talk is part of the SETI Institute Colloquium Series. Location is 515 N. Whisman Road, Mountain View, CA 94043. For more info, visit their web site http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

June 30, 12:00 - 1:00 pm

What: NASA's Flexible Path Architecture Study for Human Missions
Who: David Korsmeyer, NASA Ames Research Center
Where: SETI in Mountain View

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Officers

President:
Chuck Grant
cg@fx4m.com
925-422-7278

Vice-President:
unfilled

Treasurer:
David Feindel
feindel1@comcast.net

Secretary:
unfilled

Volunteer Positions

Librarian:
Jim Alves
ajaengr@yahoo.com
209-833-9623

Newsletter Editor:
Ken Sperber
sperbs13@yahoo.com
925-361-7435

Program Director:
Jim Alves
ajaengr@yahoo.com

Loaner Scope Manager:
John Swenson
johnswenson1@comcast.net

Webmaster:
Wayne Miller

Observatory Director/ Key Master:
Chuck Grant

Public Star Party Chair:
Wayne Miller
starpartytvs@gmail.com

Historian:
unfilled

Mentor:
Mike Rushford
rushford@eyes-on-the-skies.org

Refreshment Coordinator:
Laurie Grefsheim

Web & E-mail

www.trivalleystargazers.org

tvs@trivalleystargazers.org

Eyes on the Skies

Eyes on the Skies is a robotic solar telescope run by Mike Rushford (rushford@eyes-on-the-skies.org). You may access it by visiting www.eyes-on-the-skies.org.

TVS E-Group

So how do you join the TVS e-group, you ask? Just send an e-mail message to the TVS e-mail address (trivalleystargazers@gmail.com) asking to join the group. Make sure you specify the e-mail address you want to use to read and post to the group.

Cost: Free

NASA supported the "Review of U.S. Human Spaceflight Plans" (HSF) Committee during the Summer of 2009 by performing a study and analysis of a novel Flexible Path concept. The Flexible Path architecture for human spaceflight calls for incrementally more aggressive human missions out into the inner solar system. Exploration of the Moon, Lagrange points, Near Earth Objects, leading to the exploration of the Martian moons. All of these missions would have broad technical and scientific merit as precursors to the future exploration of the Mars surface. Dr. Korsmeyer lead the Flexible Path Architecture Study for NASA in support of the HSF Committee.

This lunchtime talk is part of the SETI Institute Colloquium Series. Location is 515 N. Whisman Road, Mountain View, CA 94043. For more info, visit their web site http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

July 7, 12:00 - 1:00 pm

What: Did the Late Heavy Bombardment end with a whimper? Evidence from 3.5-3.2 Ga rocks in Archean Barberton region of South Africa
Who: Don Lowe, School of Earth Sciences, Stanford University
Where: SETI in Mountain View
Cost: Free

Lunar evidence of Late Heavy Bombardment has been interpreted to suggest that large-body impacting declined rapidly after about 3.8 Ga and that by 3.5 Ga the terrestrial bombardment rate was not much greater than the impact rates of today. In 1986 and 1989 Dr. Lowe and colleagues described four major layers of spherical particles in the 3.22-3.55 Ga Barberton greenstone belt (BGB), South Africa, ranging from 3,472 to 3,243 Ma, and interpreted them to represent the products of large terrestrial impacts of bolides 20-50 km in diameter. Since describing and interpreting these early impact layers, they have identified at least three additional thick layers of spherules in the Barberton belt that likely represent deposits of large impacts, and two new layers that display some geological features associated with impacts. Large impact layers have been identified to date in most of the major sedimentary units in the BGB. Intervening sections are composed largely of volcanic rocks where the record of impact events is unlikely to be preserved: it seems likely that other large impacts occurred during this period without leaving a record. These layers suggest that Earth continued to be bombarded by large extraterrestrial objects late into the Archean, at least until 3.2 Ga. The large sizes possible for these objects means that, while none was probably a sterilizing impact, many may have severely heated the oceans and atmosphere, boiled off the upper layer of seawater. The 3.8-3.2 Ga development of the Earth's surface environment and life may have been constrained largely by the continuing flux of large impactors. Only as that flux declined in the Late Archean were stable surface systems established within which non-thermophilic organisms and a stable geodynamic system could develop and evolve.

This lunchtime talk is part of the SETI Institute Colloquium Series. Location is 515 N. Whisman Road, Mountain View, CA 94043. For more info, visit their web site http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

July 12, 7:30 pm

What: Space Telescopes and The California Connection
Who: Dr. Gordon K. Squires, NASA's Spitzer Space Telescope Science Center, California Institute of Technology
Where: California Academy of Science, 55 Music Concourse Dr., Golden Gate Park, San Francisco, CA 94118
Cost: Adults $12, Seniors $10, Academy members $6. Seating is limited.

A planet with a 6,000 mile-per-hour jetstream, a planet with an atmospheric temperature of 4,000 degrees Fahrenheit, a star with five Earth-oceans worth of water raining down into its planet forming disk, generations of stars living and dying inside a single natal cocoon, and galaxies lurking at the edge of the visible universe. These results, and more, will be highlighted in this exploration of the "hidden universe" revealed by space telescopes currently in-flight.

July 14, 12:00 - 1:00 pm

What: Understanding the Star Formation Rate
Who: Mark Krumholz, Department of Astronomy and Astrophysics, UC Santa Cruz
Where: SETI in Mountain View
Cost: Free

Stars are the engines of the Universe: nuclear reactions within them are the only significant source of non-gravitational power in the cosmos, the source of all heavy elements, and the cradles of life. However, the process by which stars form remains poorly understood, and one mystery in particular stands out: what sets the star formation rate? In this talk Dr. Krumholz will review our understanding of the rate at which stars form, both observationally and theoretically.

This lunchtime talk is part of the SETI Institute Colloquium Series. Location is 515 N. Whisman Road, Mountain View, CA 94043. For more info, visit their web site http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

Mission Update by Ken Sperber

Voyager 2

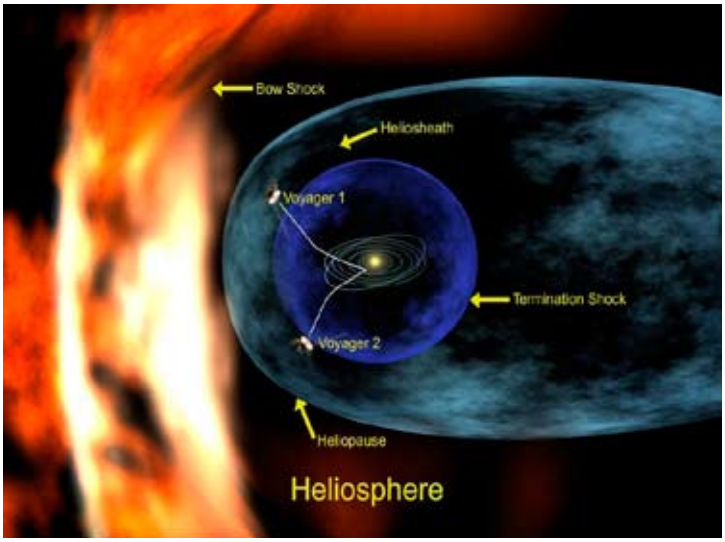
Launched in 1977, the Voyager 2 spacecraft has been in space for 33 years, during which time it provided an initial survey of the outer planets, including Jupiter (1979), Saturn (1981), Uranus (1986), and Neptune (1989). The "grand tour" was made possible by a planetary alignment that occurs once every 175 years. The planetary alignment enabled the spacecraft to be gravitationally slingshot from one planet to the next (one heck of a bank-shot for you pool players).

Voyager 2 made remarkable discoveries during its journey through the outer solar system, including finding active volcanoes on Jupiter's moon Io, and rings around Jupiter. It's flyby's of the planets led to more accurate estimate of their masses, with the improved estimate of Neptune's mass accounting for orbital discrepancies that had puzzled previous generations astronomers.

Voyager 2 is currrently about 8.2 billion miles from Earth, and getting further from us at the rate of about 290 million miles per year. At its present distance, one-way communication time between the spacecraft and Earth takes about 13 hours. Even at this distance its radio plasma experiment is returning valuable information about the region of space that the Sun influences, the heliosphere. Voyager's 1 and 2 passed the termination shock in the last few years (see the diagram at the lower right). The termination shock is the location where the solar wind becomes subsonic. The location of the termination shock flutuates with solar activity, and because of these flutuations the spacecraft passed through the termination shock five times. Eventually the Voyagers wil pass into interstellar space when they pass the heliopause.

Recently, Voyager 2 experienced commuincation problems, in that the data it sent home was unreadable. Stalwart engineers and scientists determined that one bit in its computer memory had been flipped due to a cosmic ray hit. After sending up instructions to correct the flipped memory bit, the returned data were once again properly fomatted. The hope is that the spacecraft will return valuable data for years to come. It is estimated that Voiyager 2 will become silent in about 2025, when its radioisotope electricity generator will not longer supply sufficient energy to power its instruments.

For more details see: http://voyager.jpl.nasa.gov/ and http://www.universetoday.com/2010/06/02/voyager-2-update-from-dr-ed-stone/#more-65683. See the "NASA Space Place" article on p. 7 for additional discoveries by the Voyager spacecraft.



Left: Artist impression of the Voyager spacecraft. Right: Schematic showing the locations of Voyagers 1 and 2 with respect to the Solar System. Image credits: NASA/JPL.

What's Up by Ken Sperber

All times Pacific Daylight unless otherwise noted.

June

10-	Thur	Comet McNaught visible in the morning sky throughout the month; For more details and maps see: http://www.skyandtelescope.com/observing/highlights/94277259.html
18	Fri	First Quarter Moon (9:29pm)
18	Fri	Ceres at opposition, visible all night
21	Mon	Summer Solstice (First day of summer)
26	Sat	Full Moon

July

4	Sun	Last-Quarter Moon (7:35am)
11	Sun	New Moon (12:40pm)
14	Wed	Crescent Moon is about 7 degrees to the lower-left of Venus (Dusk)
15	Thur	Crescent Moon is about 7 degrees to the lower-left of Mars (Dusk)
18	Sun	First-Quarter Moon (3:11am)
21	Wed	Moon is about 5 degrees east of Antares
25	Sun	Full Moon (6:37pm)
27	Tue	Regulus and Mercury are within 1 degree of each other in the lower west (Dusk)
29-30	Thur-	Saturn and Mars are within 2 degrees of each other

Sibylle Frohlich (Gert's wife) took this fantastic photo of a waxing gibbous Moon on April 23, 2010 at 08:15UT from Berlin, Germany. It was obtained with her 8" f5 Newtonian (with a Zambuto mirror) and a 1280 x 960 USB2 video camera. The final shot is a composite of 5 overlapping exposures.

Ancient Supernova Riddle, Solved

by Dr. Tony Phillips

Australopithecus squinted at the blue African sky. He had never seen a star in broad daylight before, but he could see one today. Was it dangerous? He stared for a long time, puzzled, but nothing happened, and after a while he strode across the savanna unconcerned.

Millions of years later, we know better.

That star was a supernova, one of many that exploded in our corner of the Milky Way around the Pliocene era of pre-humans. Australopithecus left no records; we know the explosions happened because their debris is still around. The Solar System and everything else within about 300 light-years is surrounded by supernova exhaust—a haze of million-degree gas that permeates all of local space.

Supernovas are dangerous things, and when one appears in the daytime sky, it is cause for alarm. How did Earth survive? Modern astronomers believe the blasts were too far away (albeit not by much) to zap our planet with lethal amounts of radiation. Also, the sun's magnetic field has done a good job holding the hot gas at bay. In other words, we lucked out.

The debris from those old explosions has the compelling power of a train wreck; astronomers have trouble tearing their eyes away. Over the years, they've thoroughly surveyed the wreckage and therein found a mystery--clouds of hydrogen and helium apparently too fragile to have survived the blasts. One of them, whimsically called "the Local Fluff," is on the doorstep of the Solar System.

"The observed temperature and density of the Fluff do not provide enough pressure to resist the crushing action of the hot supernova gas around it," says astronomer Merav Opher of George Mason University. "It makes us wonder, how can such a cloud exist?

NASA's Voyager spacecraft may have found the answer.

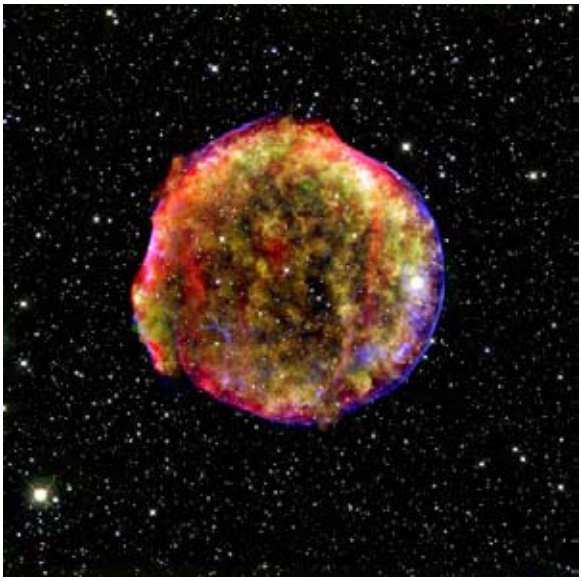
NASA's two Voyager probes have been racing out of the solar system for more than 30 years. They are now beyond the orbit of Pluto and on the verge of entering interstellar space. "The Voyagers are not actually inside the Local Fluff," explains Opher. "But they are getting close and can sense what the cloud is like as they approach it."

And the answer is…. "Magnetism," says Opher. "Voyager data show that the Fluff is strongly magnetized with a field strength between 4 and 5 microgauss. This magnetic field can provide the pressure required to resist destruction."

If fluffy clouds of hydrogen can survive a supernova blast, maybe it's not so surprising that we did, too. "Indeed, this is helping us understand how supernovas interact with their environment—and how destructive the blasts actually are," says Opher.

Maybe Australopithecus was on to something after all.

Opher's original research describing Voyager's discovery of the magnetic field in the Local Fluff may be found in Nature, 462, 1036-1038 (24 December 2009). The Space Place has a new Amazing Fact page about the Voyagers' Golden Record, with sample images and sounds of Earth. After all, just in case one of the Voyager's ever meets up with ET, we will want to introduce ourselves. Visit http://spaceplace.nasa.gov/en/kids/voyager.



Left-over cloud from the Tycho supernova, witnessed by Tycho Brahe and other astronomers over 400 years ago. This image combines infrared light captured by the Spitzer Space Telescope with x-rays captured by the Chandra X-ray Observatory, plus visible light from the Calar Also Observatory in Spain.

Tri-Valley Stargazers
P.O. Box 2476
Livermore, CA 94551

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Tri-Valley Stargazers Membership Application

Member agrees to hold Tri-Valley Stargazers, and any cooperating organizations or landowners, harmless from all claims of liability for any injury or loss sustained at a TVS function.

Name _____ Phone _____ e-mail _____

Address _____

Do not release my: _____ address, _____ phone, or _____ e-mail information to other TVS members.

Membership category:
_____ $5 Student.
_____ $30 Basic. You will receive e-mail notification when the PDF version of Prime Focus is available for download off the TVS web site.
_____ $10 Hidden Hill Observatory (H2O) yearly access fee. You need to be a key holder to access the site.
_____ $20 H2O key holder fee. (A refundable key deposit—key property of TVS).
_____ $40 Patron Membership. Must be a member for at least a year and a key holder.
_____ $34 One year subscription to Astronomy magazine.
_____ $60 Two year subscription to Astronomy magazine.
_____ $32.95 One year subscription to Sky & Telescope magazine. Note: Subscription to S&T is for new subscribers only. Existing subscribers please renew directly through S&T.
$ _____ Tax deductible contribution to Tri-Valley Stargazers.

$ _____ TOTAL – Return to: Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551

Membership information: Term is one calendar year, January through December. Student members must be less than 18 years old or still in high school.