PRIMEFOCUS

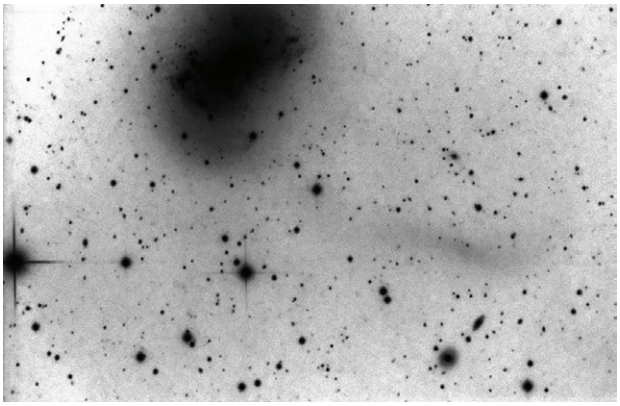
Tri-Valley Stargazers

April 2013

April Meeting

How I do Remote Astrophotography from the Comfort of my Home

Dr. Hilary Jones



Caption: NGC4449, a starburst irregular galaxy, as imaged by Hilary Jones from his backyard in Danville. This extremely long exposure, over 23 hours in duration, brings out the tidal tail of the galaxy. Hilary used his 12.5" CDK telescope and a ST-10XME camera.

With the Internet becoming ever more intertwined in our lives, it is now practical to do astronomy remotely. We can access equipment that we would not normally be able or willing to afford; this equipment can be located at a dark sky site that's far away from our home; and for those of us who are not mechanically inclined or interested, we can work with well-maintained equipment. One example of this is the iTelescope system (nee Global Rent A Scope), which lets people pay to access top quality equipment in Australia on an hourly basis. But while remote astronomy is becoming a big business, it is also useful for the amateur who just wants to do astronomy more easily. Hilary will talk about how he does remote astrophotography in his home observatory. He will start with a discussion of some of the general aspects of astrophotography for those who are not familiar with it, then describe how he runs his observatory remotely from his home, which lets him keep warm and undertake projects that would otherwise be impossible.

Hilary has been interested in astronomy since 1966, when he ground the mirror for his first telescope and built a mount out of pipe fittings. While working at Cornell on his Physics PhD, he wrote a program for one of the first Control Data Corporation supercomputers. He received his PhD in 1967 and has been doing programming ever since. After retiring from Sandia National Labs in 2002, he bought his first "real" telescope (a Meade LX200 8") in 2003, then his first CCD camera (a Meade DSI) in 2004. He entered some of his photos in Meade's Messier Challenge contest in 2005 and won the grand prize, a Meade RCX400 10". When he found that it was too big to handle, he built an observatory in his back yard. He now works with a PlaneWave CDK 12.5" scope and a Software Bisque Paramount MX mount. When he's not taking astrophotos, he writes astronomy programs, maintains the TVS web page, sings with the Valley Concert Chorale, and works in the garden.

Meeting Info

What:
How I do Remote Astrophotography from the Comfort of my Home

Who:
Dr. Hilary Jones

When:
April 19, 2013
Doors open at 7:00 p.m.
Show & Tell at 7:30 p.m.

Featured Speaker at 8:00 p.m.

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

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News & Notes

2013 TVS Meeting Dates

The following lists the TVS meeting dates for 2013. 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**
Apr. 19	Apr. 22	
May 17	May 20	Apr. 26
Jun. 21	Jun. 24	May 24
Jul. 19	Jul. 22	Jun. 28
Aug. 16	Aug. 19	Jul. 26
Sep. 20	Sep. 23	Aug. 30
Oct. 18	Oct. 21	Sep. 27
Nov. 15	Nov. 18	Oct. 25
Dec. 20	Dec. 23	Nov. 29

Money Matters

Treasurer David Feindel indicates that as of November 16, 2012 the TVS account balance is:

Checking $11,857.26

TVS Needs YOU!!!

TVS needs your help. Please consider taking on the role of Vice-President or Program Director. Anyone interested in either (or both) of these positions is encouraged to contact any of the club officers via email or at the monthly meeting.

Journal Club by Ken Sperber

You Can Get a Lot for $10.25!

The last time I went to a movie at the local theater, the price of admission was $12.50 per ticket. For less than that, you can visit the California Science Center in Los Angeles to see the Space Shuttle Endeavour and the IMAX movie "Hubble 3D." Karen and I did just that on our way back from Joshua Tree National Park over the Easter weekend.

For crowd control, admission to the shuttle exhibit is staggered, with tickets available for preset times. We selected 2pm admission, and after a 10-minute wait in the queue we gained access to "Endeavour: The California Story" which is an exhibit that celebrates California's role in the construction of the shuttles. This exhibit includes the display terminals and big-board of the Rocketdyne Operations Support Center that were used to monitor every shuttle launch. On these are shown data and video of a shuttle from launch through tank separation, including that from the solid boosters as they fall back to Earth and land in the Atlantic Ocean. You can touch the tires on which STS-134 Endeavour landed, see the space potty, and many other artifacts from the shuttle program.

Caption: The Space Shuttle Endeavour in the Samuel Oschin Pavilion at the California Science Center in Los Angeles. Credit: K. Sperber

After spending about 45 minutes at the afore-mentioned exhibit we made our way to the Samuel Oschin Pavilion. As you enter the hall, the Endeavour greets you nearly head-on. She is a massive beast that almost fills the hall. After 25 missions, 4,671 Earth orbits, and nearly 122 million miles travelled during 296+ days in space, she looks ready for another mission. It is humbling to think of the thousands of people that dedicated their careers to its development, and the astronauts who risked their lives for a larger cause.

Endeavour first flew in May 1992 (STS-49), during which 3 spacewalkers hand-captured Intelsat VI, a communication satellite that failed to reach orbit in 1990. After attaching a new motor, the satellite was released, and sent into its planned geosynchronous orbit. Other notable Endeavour missions included the launch into space of the first female African-American astronaut, Mae Jemison, the first service mission to repair the Hubble Space Telescope, the launch of astronaut Barbara Morgan (who was Christa McAuliffe's back-up on the Challenger mission), one docking with the Russian Mir Space Station, and twelve dockings with the International Space Station.

We're looking forward to seeing Endeavour again. The Samuel Oschin Pavilion is the temporary home of Endeavour, while the Samuel Oschin Air and Space Center is being built onsite. At its permanent home, planned to open in 2017, Endeavour will be displayed vertically while mated to an external tank and a pair of solid rocket boosters. One payload bay door will be open to view the cargo payload bay.

After viewing the Endeavour, and buying souvenirs, we saw Hubble 3D in the adjacent IMAX theater. The 3D experience was amazing. You'll feel as though you are witnessing the launch firsthand, spacewalking with the astronauts (people in the audience were actually reaching out "touch" the

Header Image: Astronauts R. Hieb, T. Akers, and P. Thuot .hand-capture Intelsat VI during the maiden voyage of Endeavour in 1992: Credit: NASA

Journal Club (continued)

Hubble), and flying through the Orion Nebula and universe at-large during the sequence generated using Hubble's improved capabilities and the new science results gleaned by the astronomers and astrophysicists who have had the privilege the make use of her results. If you only see one 3D movie in your life, this is the one to see!

For ticket information, see: http://www.californiasciencecenter.org/GenInfo/PlanningYourVisit/Hours/endeavour/endeavour.php. Also see: http://www.imax.com/hubble/ for more information on the movie. Additional information from: http://en.wikipedia.org/wiki/Space_Shuttle_Endeavour

Calendar of Events

April 8, 7:30pm

What: Small Worlds in Collision: Recent Meteorite Falls in California
Who: Peter Jenniskens, SETI Institute
Where: California Academy of Science, 55 Music Concourse Dr., Golden Gate Park, San Francisco, CA
Cost: Adults $12, Seniors $10, Academy members $8. Reserve a Space Online or call 1-877-227-1831

On April 22, 2012, a small asteroid impacted close to home in California—at Sutter's Mill, the site where gold was first discovered in 1848, leading to the California Gold Rush. Meteor astronomer Dr. Peter Jenniskens kept a tally of finds and mobilized NASA Ames Research Center into leading the recovery effort from the air and the ground. 77 meteorites were found. He will summarize research results reported in a recent 70-author Science article, and also discuss a second meteorite fall that happened in Novato and Sonoma on October 17 and was recovered thanks to an ongoing all-sky video surveillance of meteor showers in the Bay Area. If you are interested in having your potential Sutter's Mill or Novato meteorite validated, please bring it to the meeting.

See http://www.calacademy.org/events/lectures/ for lecture and reservation information.

April 9, Noon-1:00pm

What: Engineering the emergence of life through convection, serpentinization and the first metabolic pathway
Who: Michael J. Russell, Jet Propulsion Laboratory
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA
Cost: Free

The alkaline hydrothermal theory for the emergence of life holds that the endergonic (thermodynamically uphill) reactions vital for life's origin and continued existence require free energy converters (nano-engines) fueled by various disequilibria. The first two primary engines were i) a carbon fixation engine to generate the organic building blocks of life by reaction between hydrothermal CH4 and H2 with the CO2 and NO in atmosphere and ocean, ii) a proton pyrophosphatase engine exploiting the natural pH gradient between alkaline hydrothermal solution and acidulous ocean to drive biosynthesis by condensations of these same building blocks.

To this end there occurred on the early Earth, and other such rocky bodies, inorganic prebiotic molecules that would have been precipitated at the interface between a submarine alkaline hydrothermal solution and the metal-bearing acidulous ocean.

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Calendar of Events (continued)

Dr. Russell will show how these metals, especially iron, occurred as ready-made nanoscale sulfides and oxides with the same structures and valences as the active centers of those biotic metalloenzymes shown to be present in the Last Universal Common Ancestor of all life.

For more information see: http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

April 12, 7:00pm-8:00pm

What: Venus on Mars
Who: Mars Exploration Discussion Panel
Where: Chabot Space and Science Center, 10000 Skyline Blvd. Oakland, CA 94619
Cost: $20 members, $23 guests, $25 at the door. Tickets available by calling (510) 336-7373.

Inspire a female in your life, inspire yourself! Take a trip to the red planet with an all-female panel of experts who will share their perspectives on what it will take to get humans to Mars based on their respective experience and expertise. Join us for a spirited discussion by these accomplished women, who are finding new ways to explore Mars, to overcome the physical demands of long-distance space travel, and to take imaginative planetary leaps from Earth to our next-door neighbor in space.

See http://www.chabotspace.org/events.htm for more information.

April 13, 11:00am-5:00pm

What: Earth Day
Who: Chabot Staff
Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619
Cost: Included with General Admission, Tickets available online or call (510) 336-7373

It all comes down to Earth. Learn about renewable energy sources and hidden power from the Galaxy Explorers.

See http://www.chabotspace.org/events.htm for more information.

April 13, 8:30pm

What: Understanding the Climate Change of the Last 250 Years
Who: Dr. Robert A. Rohde, Berkeley Earth Surface Temperature
Where: Mt. Tamalpais State Park, Cushing Memorial Amphitheater, more commonly known as the Mountain Theater, Rock Spring parking area
Cost: Free

The Earth is getting warmer. Come review the evidence that Earth's climate has been changing, and understand the likely connection to the greenhouse gases generated by mankind's industrial activities.

For more information see: http://www.mttam.net/astronomy/schedule.html

April 16, 7:00pm

What: Clicks, whistles and pulses: what can SETI learn from the parallel challenges of dolphin communication research?
Who: Denise Herzing, Research Director, Wild Dolphin Project
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA
Cost: Free

The search for signals out of noise is a problem not only with radio signals from the sky but in the study of animal communication on Earth. Like SETI radio signal searches, dolphin sound analysis includes the detection, recognition, analysis, and interpretation of signals. Dolphins use three main types of acoustic signals and many of these sounds have been a challenge to measure and categorize due to their graded and overlapping nature. The goal of this talk is to provide perspective from dolphin communication studies and lessons learned about signal detection and recognition.

For more information see: http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

April 20, 9:30am-5:00pm

What: Astronomy Day at the Cal Academy of Sciences!
Who: San Francisco Amateur Astronomers and San Francisco Sidewalk Astronomers
Where: California Academy of Science, 55 Music Concourse Dr., Golden Gate Park, San Francisco, CA
Cost: Adults $29.95, Seniors, Students, and Youth (ages 12-17) $24.95, Child (ages 4-11) $19.95, Ages 3 and under Free. Reserve a space online or call 1-877-227-1831

The California Academy of Sciences invites visitors of all ages to join us Saturday, April 20 for Astronomy Day 2013! Planetarium shows, telescope activities, displays about amateur astronomy and space science, views into our meteorite collections, and guest speakers will be presented throughout the day at various locations, including the Forum Theater, the Naturalist Center, and Science in Action.

See http://www.calacademy.org/events/?nid=481 for more information.

April 23, Noon-1:00pm

What: A New Book on Mathematical SETI
Who: Claudio Maccone, IAA; Stephane Dumas, SETI League, Eastern Canada Coordinator

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Calendar of Events (continued)

Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA
Cost: Free

Claudio Maccone and Stephane Dumas have developed new techniques that could be used in the task of analyzing possible SETI signals in a mathematical fashion. Claudio and Stephane will talk about the new ideas in the book 'Mathematical SETI' published in 2012. This book is intended for University-level courses on SETI and related fields for graduates, post-graduates and researchers, and so a preliminary background is assumed in college mathematics (like basic calculus, probability and stochastic processes), and also a basic background in astronomy and astronautics. Claudio and Stephane will give an introduction to the topics covered in the book, including: 1) The Statistical Drake Equation and its extension to the Evolution of Life, Human History and "Entropy Progress", 2) The FOCAL spacecraft mission to the Sun's radio gravitational lensing location, and 3) The use of the Karhunen-Loeve Transform (KLT) which can be used to analyze radio signals and extract potential SETI communications.

For more information see: http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

April 30, Noon - 1:00pm

What: Probing Supermassive Black Hole Growth with Next Generation Telescopes
Who: Steve Croft, UC Berkeley/University of Wisconsin-Milwaukee
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA
Cost: Free

A new generation of telescopes is coming online. Operating at wavelengths from radio, through optical, to gamma ray, they are particularly well-suited to time-domain survey science -- essentially, making large-format movies of the sky. These telescopes will have the capability to tell us about how black holes grow: through stupendous mergers that shake the very fabric of space-time, through swallowing huge volumes of ten million degree gas, and through shredding stars that happen to pass too close.

Dr. Croft's talk will particularly focus on the capabilities of the next generation of radio telescopes, including the Square Kilometer Array, due to come online during the next decade, and its precursor facilities, including the Allen Telescope Array (which also continues to undertake SETI surveys). These instruments are due to transform our understanding of the growth of the enormous black holes that lurk at the heart of almost all galaxies.

For more information see: http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

May 7, Noon-1:00pm

What: The Next Generation of Radio Telescopes
Who: Geoffrey Bower, UC Berkeley
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA
Cost: Free

The past decade has seen an explosion of creativity and progress in radio astronomy telescopes and techniques. In the coming decade, we will harvest the fruit of these innovations with a powerful new generation of radio telescopes that are coming online. These will open avenues for new science, in areas such as the epoch of reionization, synoptic surveys for radio transients, and exquisitely sensitive observations of the most distant objects in the Universe.

Dramatic improvements in digital instrumentation have been and will continue to be central to the advancement of the field. But there has also been a resurgence of interest in many other areas including receiver technologies, antennas, optimized array configurations, remote site management, software, commensal observing modes, and algorithms. Considerable attention has been paid to manufacturability and array costs in order to address the prospects of optimizing array performance at costs exceeding $1B. Telescope projects have also bifurcated into general facility instruments and targeted experiments, with significance consequences for their design and operation.

I will review the current state of the art for meter and centimeter wavelength telescopes. Among the projects of note, I will discuss the SKA Technology Development Project, the Allen Telescope Array, MeerKAT, the Australian SKA Pathfinder (ASKAP), the Precision Array for Probing the Epoch of Reionization (PAPER), the Mileura Widefield Array (MWA), the Long Wavelength Array (LWA), the Low Frequency Array (LOFAR), and SKA Phase 1. I will also explore what telescope parameter space remains unexplored and where new technical developments are required to make scientific progress.

For more information see: http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

May 14, Noon-1:00pm

What: Life Before Genetics: Autogenesis, Information, and the Outer Solar System
Who: Terrence W. Deacon, Anthropology Department, UC Berkeley
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA
Cost: Free

The investigation of the origins of life has been hindered by what we think we know about current living organisms. This includes three assumptions about necessary conditions: 1)

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What's Up by Ken Sperber (adapted from The Year in Space and S&T)

Pacific Daylight Time

April

10	Wed	New Moon (2:35am)
13	Sat	Jupiter close to crescent Moon, Aldebaran, the Hyades, and the Pleiades (Evening and Night; see p.40, April S&T)
14	Sun	Jupiter 2 degrees north of the Moon
18	Thu	First Quarter Moon (5:31am)
22	Mon	Lyrid Meteor shower peaks before dawn (see p.50, April S&T)
25	Thu	Full Moon (12:57pm)
27-28	Sat	Saturn at opposition, visible all night, and closest to Earth for 2013.
28	Sun	Antares in conjunction with the Moon

May

2	Thu	Last Quarter Moon (4:14am)
5	Sun	Eta Aquarid Meteor Shower (see p.52, May S&T)
9	Thu	New Moon (5:28pm)
11-12	Sat-	Thin crescent Moon in conjunction with Jupiter
17	Fri	First Quarter Moon (9:35pm)

Calendar of Events (continued)

that it emerged entirely on Earth, 2) that it is dependent on the availability of liquid water, and 3) that it is coextensive with the emergence of molecules able to replicate themselves.

In addition, the three most widely explored alternative general models for a molecular process that could serve as a precursor to life also reflect reductionistically-envisioned fragments of current living systems: e.g., container-first, metabolism-first, or information-first scenarios. Finally, we are hindered by a technical concept of information that is fundamentally incomplete in precise ways that are critical to characterizing living processes.

These all reflect reductionistic "top-down" approaches to the extent that they begin with a reverse-engineering view of what constitutes a living Earth-organism and explore possible re-compositional scenarios. This is a Frankensteinian enterprise that also begins with assumptions that are highly Earth-life specific and therefore unlikely to lead to a general exo-biology.

The approach Dr. Deacon will outline instead begins from an unstated conundrum about the origins of life. The initial transition to a life-like process necessarily exemplified two almost inconceivably incompatible properties: 1) it must have involved exceedingly simple molecular interactions, and 2) it must have embodied a thermodynamic organization with the unprecedented capacity to locally compensate for spontaneous thermodynamic degradation as well as to stabilize one or more intrinsically self-destroying self-organizing processes.

This talk will explore the origins of life problem by attempting to identify the necessary and sufficient molecular relationships able to embody these two properties. From this perspective Dr. Deacon will develop a model system - autogenesis - that redefines biological information and opens the search for life's origin to cosmic and planetary contexts seldom considered.

For more information see: http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

Your Daily Dose of Astonishment

By Diane K. Fisher

As a person vitally interested in astronomy, you probably have the Astronomy Picture of the Day website at apod.nasa.gov set as favorite link. APOD has been around since practically the beginning of the web. The first APOD appeared unannounced on June 16, 1995. It got 15 hits. The next picture appeared June 20, 1995, and the site has not taken a day off since. Now daily traffic is more like one million hits.

Obviously, someone is responsible for picking, posting, and writing the detailed descriptions for these images. Is it a whole team of people? No. Surprisingly, it is only two men, the same ones who started it and have been doing it ever since.

Robert Nemiroff and Jerry Bonnell shared an office at NASA's Goddard Space Flight Center in the early-90s, when the term "World Wide Web" was unknown, but a software program called Mosaic could connect to and display specially coded content on other computers. The office mates thought "we should do something with this."

Thus was conceived the Astronomy Picture of the Day. Now, in addition to the wildly popular English version, over 25 mirror websites in other languages are maintained independently by volunteers. (See http://apod.nasa.gov/apod/lib/about_apod.html for links). An archive of every APOD ever published is at http://apod.nasa.gov/apod/archivepix.html. Dr. Nemiroff also maintains a discussion website at http://asterisk.apod.com/.

But how does it get done? Do these guys even have day jobs?

Dr. Nemiroff has since moved to Michigan Technological University in Houghton, Michigan, where he is professor of astrophysics, both teaching and doing research. Dr. Bonnell is still with NASA, an astrophysicist with the Compton Gamma Ray Observatory Science Support Center at Goddard. APOD is only a very small part of their responsibilities. They do not collaborate, but rather divide up the calendar, and each picks the image, writes the description, and includes the links for the days on his own list. The files are queued up for posting by a "robot" each day.

They use the same tools they used at the beginning: Raw HTML code written using the vi text editor in Linux. This simple format has now become such a part of the brand that they would upset all the people and websites and mobile apps that link to their feed if they were to change anything at this point.

Where do they find the images? Candidates are volunteered from large and small observatories, space telescopes (like the Hubble and Spitzer), and independent astronomers and astro-photographers. The good doctors receive ten images for every one they publish on APOD. But, as Dr. Nemiroff emphasizes, being picked or not picked is no reflection on the value of the image. Some of the selections are picked for their quirkiness. Some are videos instead of images. Some have nothing to do with astronomy at all, like the astonishing August 21, 2012, video of a replicating DNA molecule.

Among the many mobile apps taking advantage of the APOD feed is Space Place Prime, a NASA magazine that updates daily with the best of NASA. It's available free (in iOS only at this time) at the Apple Store.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Caption: The January 20, 2013, Astronomy Picture of the Day is one that might fall into the "quirky" category. The object was found at the bottom of the sea aboard a Greek ship that sank in 80 BCE. It is an Antikythera mechanism, a mechanical computer of an accuracy thought impossible for that era. Its wheels and gears create a portable orrery of the sky that predicts star and planet locations as well as lunar and solar eclipses.

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

PRIMEFOCUS

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.