

# PrimeFocus



## WHEN:

December 15, 2023  
Set-up at 6:00pm  
Dinner at 6:30pm

## WHERE:

Unitarian Church  
1893 North Vasco Rd.  
Livermore, CA 94551

## TVS QR Code



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## Tri-Valley Stargazers 2023 Winter Solstice Pot Luck Dinner December 15: Set-up at 6:00pm, Dinner at 6:30pm

The winter Solstice Pot Luck Dinner will be held at the Unitarian Church. The main course, provided by the club, will consist of roast chicken and lamb. Attendees are requested to bring a side dish to feed 8. Based on the first letter of your last name, the suggestions are:

A-D: Dessert  
E-J: Macaroni, Potato, Green, or Fruit Salad  
K-O: Vegetable or Beans  
P-Z: Appetizer

Come get reacquainted with your fellow club members!

## TVS Astrophotos



Caption: Mark Hai Du imaged the Horsehead Nebula (B33) and the Flame Nebula (NGC2024) region on November 11 from Lake San Antonio. He used a William Optics Redcat 51 II telescope with a ZWO ASI2600MC Pro camera and an Optolong L-Ultimate 2" filter. The exposures totaled 6hr 5min (73 x 300sec) under clear skies on a very cold night (28°F). If you look closely, the bright stars have unusual diffraction spikes, unexpected from a refractor or your typical Newtonian. Mark used a custom 3-D printed guide to mimic JWST diffraction spikes!

# News and Notes

## 2023-2024 Meeting Dates

Lecture Meeting	Board Meeting	PrimeFocus Deadline
Dec. 15	Dec. 18	
Jan. 19	Jan. 22	Jan. 5
Feb. 16	Feb. 19	Feb. 2
Mar. 15	Mar. 18	Mar. 1
Apr. 19	Apr. 22	Apr. 5
May 17	May 20	May 3
Jun. 21	Jun. 24	Jun. 7
Jul. 19	Jul. 22	Jul. 5
Aug. 16	Aug. 19	Aug. 2
Sep. 20	Sep. 23	Sep. 6
Oct. 18	Oct. 21	Oct. 4
Nov. 15	Nov. 18	Nov. 1
Dec. 20	Dec. 23	Dec. 6

## Money Matters

As of the last Treasurer's Report on 11/20/23, our club's account balance is \$55,152.99. This includes \$26,145.47 in the H2O Rebuild fund.

## TVS Election Final

The club officers elected during the November meeting are:

President: Ron Kane

Vice-President: Eric Dueltgen

Secretary: Dave Lackey

Treasurer: John Forrest

## TVS Welcomes New Members

TVS welcomes new members Sathvik Ananthapadmanabha and Arvind Goel. Please say hello and chat with them during our meetings.

## Time to Renew Club Membership for 2024

Now is a great time to become part of TVS. Membership is open to anyone with an interest in astronomy. Amateurs and professionals are equally welcome; skilled amateurs comprise most of the membership. You do not have to own a telescope to become a member.

Those renewing their club membership are encouraged to do so by using the online application before the end of December. Normally our memberships are only good for the calendar year, but anyone joining after October 1st will be given a membership for the remainder of 2023 and all of 2024.

The regular club membership remains a bargain at \$30. Student membership (full-time High School or College student) is only \$10! To become a key holder to H2O, you must be 18 or older. There is a one-time \$20 Key deposit and a \$10 annual access fee.

You can join TVS or renew your membership online at: <http://www.trivalleystargazers.org/membership.shtml> After

filling out the application form you are connected to the PayPal payment form. You do not need to have a PayPal account to pay online, since PayPal will accept credit cards. Everyone is encouraged to use the online application. Alternatively, you can mail in the Membership Application on the last page of this newsletter along with a check to the Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551-2476. Note that TVS will not share your information with anyone. We only use the e-mail address to notify you when the newsletter becomes available.

All members agree to hold the 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.

## 2024 Club Star Party Schedule

Save the dates for the 2024 Club Star Parties.

Del Valle star parties are also public outreach events. They are jointly hosted with the EBRPD and held at the Arroyo Staging Area. The public is invited for the first 1.5-2 hours, while club members can stay the remainder of the night.

Tesla Vintners star parties are open to only club members and their guests. These star parties end at midnight, but participants can leave earlier, should they wish.

H2O Open House star parties are open to only club members and their guests. The open house ends at midnight, and all participants are encouraged to stay the duration. The drive to H2O takes about 1 hour, and the caravan leaves promptly from the corner of Mines and Tesla Rds. No gas stations are available on the route, so be prepared. Admission is \$3/car-bring exact change. H2O is a primitive site with two porta-potties. Bring water, food, and warm clothing, as needed. Red flashlights are to be used so observers can preserve their night vision.

January 17: School Star Party, [Hart Middle School, 4433 Willow Road, Pleasanton](#). Set-up at 5:15pm, Observing 6pm-8pm.

January 25: School Star Party, [Dublin Elementary School, 7997 Vomak Road, Dublin](#). 5:00-8:00pm, Details TBD.

February 1: School Star Party, [St. Michael School, 345 Church Street, Livermore](#). Set-up at 6:00pm in the central courtyard, Observing 7:00-9:00pm.

# Calendar of Events

**December 16, 22, 23, 29, 30**  
**7:30pm-10:30pm**

What: Free Telescope Viewing

Who: Chabot Staff

Where: Chabot Space and Science Center, 10000 Skyline

# Calendar of Events (con't)

Blvd. Oakland, CA 94619

Cost: Free

Join Chabot astronomers on the Observatory Deck for a free telescope viewing! Weather permitting, this is a chance to explore stars, planets and more through Chabot's historic telescopes. Chabot's three large historic telescopes offer a unique way to experience the awe and wonder of the Universe. Three observatory domes house the Center's 8-inch (Leah, 1883) and 20-inch (Rachel, 1916) refracting telescopes, along with a 36-inch reflecting telescope (Nellie, 2003).

**Are the skies clear for viewing tonight?** Viewing can be impacted by rain, clouds, humidity, and other weather conditions. Before your visit, check out the [Weather Station](#) to see the current conditions at Chabot.

For more information, see:

<https://chabotspace.org/events/events-listing/>

## December 21, 6:00pm-8:00pm

What: Family Astronomy: Winter Solstice

Who: Chabot Staff

Where: Chabot Space and Science Center, 10000 Skyline Blvd. Oakland, CA 94619

Cost: \$25 Adults, \$15 Youth, Family with children 5+

Explore the fascinating history, diverse cultural customs, and ancient rituals associated with the Winter Solstice. You'll learn about the shortest day of the year, the various types and stages of night and twilight and how different cultures around the world celebrate this celestial event, from lighting candles and bonfires to creating handmade decorations and sharing

stories. Guests will receive complimentary hot cider, hot chocolate, and cookies.

For more information, see:

<https://chabotspace.org/events/events-listing/>

## January 5, 6:00pm-10:00pm

What: First Friday: Close Encounters

Who: Researchers, Astrobiologists, and Astronomers

Where: Chabot Space and Science Center, 10000 Skyline Blvd. Oakland, CA 94619

Cost: \$15 Adults, \$5 Kids/Seniors, \$5 Members

Are we alone in the universe? Or could there be other forms of life out there, waiting far away in the vast expanse of space? Hear from researchers, astrobiologists and astronomers on the possibility of extraterrestrial life and distant exoplanets that could sustain it. Show off your best out-of-this-world attire by wearing your best alien-themed costume at the costume parade, engage in hands-on alien crafts then take a trip across the universe in our Planetarium – who knows what could be lurking among the stars?

This First Friday, we're happy to be joined by our high school student volunteers from our Galaxy Explorer program for their end-of-term showcase! Stop by Studio 1, 2, and 3 to see presentations and demonstrations of the innovative work they've been exploring in their Engineering, Astronomy, Environmental Biology, and Science Communications teams.

For more information, see:

<https://chabotspace.org/events/events-listing/>

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### **Officers**

#### **President**

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#### **Refreshment Coordinator**

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info@trivalleystargazers.org

#### **TVS E-Group**

To join the TVS e-group just send an email message to TVS at: info@trivalleystargazers.org asking to join the group. Make sure you specify the e-mail address you want to use to read and post to the group.

# Dr. George Ellery Hale: An Unknown Enigma

By Saanika Kulkarni

In my past three articles, I discussed three observatories—Yerkes in Wisconsin, Wilson in Los Angeles, and Palomar in San Diego—but I've yet to write about the driving factor behind them: Dr. George Ellery Hale. In a nation focused on steel and oil innovations, Hale single-handedly furthered astronomical innovation, starting right at home in Chicago.

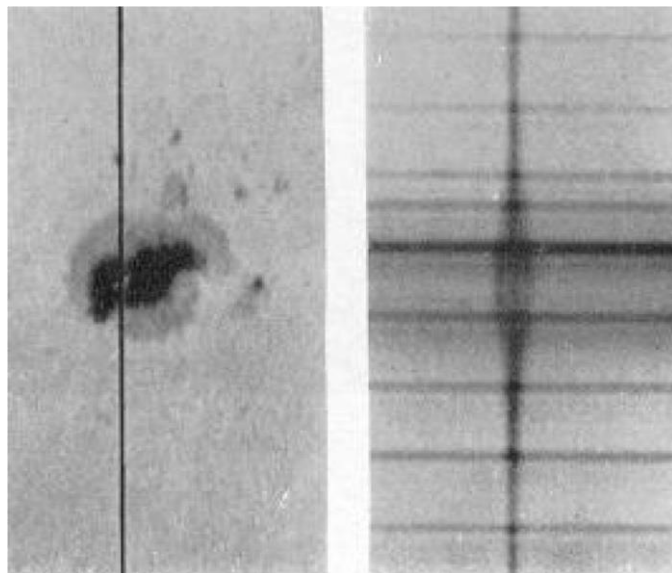
Born into an affluent family in 1868 post-Civil War Chicago, Hale saw innovation unfolding right in front of his eyes. His father, William Ellery Hale, made his fortune by selling and installing elevators in Chicago skyscrapers, which were becoming increasingly popular due to their being fire-resistant and space-efficient. It's safe to say that the Hale family had a cushioned lifestyle, which was reflected in George's childhood.



Caption: Although this isn't Hale's first Clark telescope, it is one of the telescopes he built himself and used for solar observations at Kenwood. This telescope was used at Caltech for optical courses in the 1950's. Image Credit: Calisphere.org

Despite not being scientists themselves, George's parents encouraged his interest in the sciences from an early age; his first piece of equipment was a small microscope, which would lead to his later interest in optics. Fueling his fascination further, George secured his father's financial support to establish a small laboratory on the expansive Hale estate. Here, surrounded by the sprawling grounds of privilege, he immersed himself in experiments with lenses and mirrors, laying the groundwork for what would evolve into a profound journey into the realms of optics and astronomy. It was within this private sanctuary that George Hale, driven by an insatiable curiosity, crafted his amateur telescope—a humble yet pivotal instrument that foreshadowed the astronomical heights he would later reach. Driven by an insatiable desire for a professional instrument to observe the sky, Hale was able to obtain a second-hand Clark telescope. Ironically, referencing my previous article on Mt. Wilson becomes pertinent. I touched upon the University of Southern California's (USC) aspiration for a telescope, a plan that fell victim to financial

setbacks. Notably, the Clark telescope that eventually found its way into Hale's possession was initially earmarked for USC. Thus, right from the outset, Hale strategically positioned himself for significant achievements, securing access to instruments of the utmost caliber.



Caption: The Zeeman Effect, which Hale worked to prove, is the splitting of solar spectral lines due to the presence of a strong magnetic field. Credit: NCAR High Altitude Observatory

George Ellery Hale's contributions to astrophysics were marked by methodical exploration and pioneering work that significantly advanced our comprehension of the cosmos. Hale's early focus centered on the Sun, where he employed solar spectroscopy to dissect its radiant spectrum. This analytical approach allowed him to scrutinize the Sun's emitted light, providing insights into its composition and behavior. One of Hale's notable discoveries through solar spectroscopy was the identification of magnetic fields on the Sun. By meticulously examining the patterns within the solar spectrum, he discerned the subtle signatures indicative of magnetic influences, the Zeeman Effect. This revelation marked a significant milestone in solar physics, as it added a valuable layer to our understanding of solar dynamics. The newfound awareness of magnetic fields on the sun proved instrumental in explaining various solar phenomena, such as sunspots and solar flares. Hale's work not only demystified these enigmatic solar features but also laid the groundwork for ongoing research into the Sun's magnetic activity and its impact on space weather.

Beyond solar studies, Hale played a key role in identifying and categorizing galaxies. He developed the Mount Wilson classification system, a practical taxonomy that organized

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## Dr. George Ellery Hale (con't)

galaxies based on their shapes and structures. This system laid a foundation for future research in extragalactic astronomy. Hale's meticulous categorization not only facilitated a systematic understanding of galaxies but also fostered a framework that later astronomers would build upon to explore the diverse populations and characteristics of galaxies beyond our Milky Way. For instance, Hale's classification system paved the way for Edwin Hubble's groundbreaking work, leading to the realization that the Andromeda Nebula, previously considered part of our galaxy, was, in fact, a separate galaxy.

In essence, George Ellery Hale's legacy is a tapestry woven with threads of innovation, curiosity, and strategic vision. From his privileged beginnings in Chicago to the far-reaching realms of astrophysics, Hale's contributions resonate as a testament to the indomitable spirit of exploration that continues to shape our understanding of the universe.

## TVS Astrophotos (con't)



Caption: Swaroop Shere imaged the Flying Bat and Squid Nebulae (SH2-129) from his remote Stellar Skies Observatory. He used an Astro-Physics Starfire EDF "Gran Turismo" 130mm f/6.3 telescope with a QHY268M camera. 15 hours of H-alpha (180 x 300sec) and 20h 40min (248 x 300sec) of OIII were combined using the HOO color palette. Swaroop noted "This was a difficult object to capture and process. The Squid was so faint, even with 20 hours of OIII. In retrospect, I could have spent less time on H-alpha and more on OIII."

## TVS Astrophotos (con't)



Caption: Top: John Barclay imaged M33 from Lake San Antonio under clear and cold conditions (28°F). He used a GSO 150mm f/4 astrograph with a ZWO ASI294MC Pro camera. The exposures totaled 16hr (387 x 150sec). Bottom: Michael Clive imaged the Orion Nebula region using a TeleVue TV85 refractor with a reducer and a QHY268m camera. John stated “The thing that I like about this image is that it naturally came out with a really nice flat black background. I hope to learn how to process it so the Trapezium stars are not blown out. You can see them in the unstretched image, so I know I can figure a way to get them back in there.”

# What's Up

By Ken Sperber (adapted from S&T)

All times are Pacific Standard Time

## December

### 12 Tue New Moon (3:32pm)

- 13- Wed- The Geminid meteor shower peaks the night of Dec. 13-14 (All Night)
- 14 Thu Algol shines at minimum brightness for ~2 hours centered on 6:27pm PST (Evening)
- 17 Sun In the SW, the crescent Moon is ~2.5° to the lower left of Saturn (Evening)

### 19 Tue First-Quarter Moon (10:39am)

- 21 Thu In the SW, the Moon is ~6° to the lower right of Jupiter (Evening)
- 21 Thu The longest night of the year in the Northern Hemisphere; Winter Solstice (7:27pm)

### 26 Tue Full Moon (4:33pm)

- 28 Thu In the West, the Moon is ~2° from Pollux, the brighter of the Gemini Twins (Dawn)
- 29 Fri The Moon is ~3.5° to the right of M44, the Beehive Cluster (Dawn)
- 31 Sun In the WSW, the Moon is ~2.5° to the upper right of Regulus (Dawn)
- 31 Sun Algol shines at minimum brightness for ~2 hours centered on 11:23pm PST (Evening)

## January

- 2 Tue Earth at perihelion, 91.4 million miles from the Sun (3% closer than July aphelion)

### 3 Wed Last-Quarter Moon (7:30pm)

- 3 Wed Algol shines at minimum brightness for ~2 hours centered on 8:12pm PST (Evening)
- 4 Thu The brief Quadrantid meteor shower peaks in wee hours of the morning (See p.50 January S&T)
- 5 Fri In the ESE, the Moon trails Spica by ~4° (Morning)
- 8 Mon In the SE, the crescent Moon is near Antares with Venus to their upper left (Dawn; see p.48 January S&T)
- 9 Tue In the SE, the crescent Moon, Venus, and Mercury form a triangle (Dawn)

### 11 Thu New Moon (3:57am)

- 14 Sun In the SW, the crescent Moon is ~7° to the upper left of Saturn (Dusk)

### 17 Wed First-Quarter Moon (7:52pm)

- 18 Thu In the South, the Moon is ~3° to the upper left of Jupiter (Dusk)
- 20 Sat In the SE, the Moon is ~5° to the lower left of the Pleiades (M45) (Dusk)
- 23 Tue Algol shines at minimum brightness for ~2 hours centered on 9:57pm PST (Evening)
- 24 Wed In the East, the Moon is ~3.5° below Pollux, the brighter of the Gemini Twins (Dusk)

### 25 Thu Full Moon (9:54am)

- 26 Fri Algol shines at minimum brightness for ~2 hours centered on 6:46pm PST (Evening)
- 27 Sat In the SE, Mars and Mercury are ~0.25° apart (use binoculars) with Venus to their upper right (Evening)
- 27 Sat In the ENE, the Moon trails Regulus by ~4.5° (Evening)
- 31 Wed In the ESE, the Moon is ~1.5° to the upper left of Spica (Morning)

## Calendar of Events (con't)

### February 5, 7:30pm

What: The Remarkable Death of a Massive Star  
Who: Dr. Marcia Rieke (University of Arizona)  
Where: Golden Gate Park, 55 Music Concourse Drive,  
San Francisco  
Cost: Members and Seniors \$12, Public \$15

With its increased sensitivity in infrared light, JWST has discovered hundreds of galaxies more distant than HST could possibly detect, and the first galaxies are forming stars earlier and more rapidly than expected.

For more information, see: [Benjamin Dean Astronomy Lecture](#)

Seeking the first galaxies to form after the Big Bang is the primary rationale for building the James Webb Space Telescope (JWST). These first galaxies have eluded the Hubble Space Telescope (HST) because the expansion of the Universe has stretched their light to wavelengths undetectable by HST.



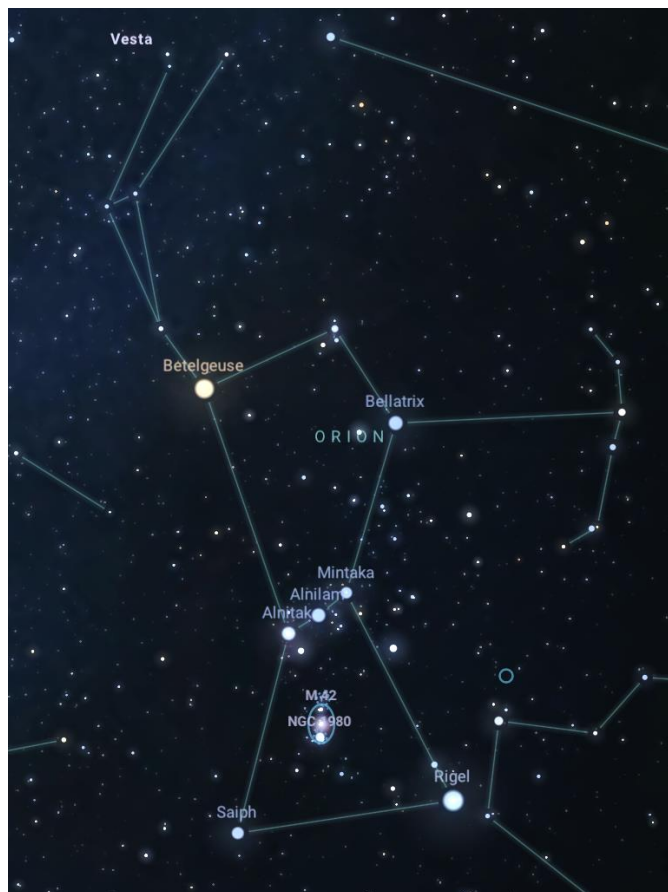
# NASA Night Sky Notes



## A Flame in the Sky – the Orion Nebula

By Kat Troche

It's that time of year again: winter! Here in the Northern Hemisphere, the cold, crisp sky offers spectacular views of various objects, the most famous of all being [Orion the Hunter](#).



Caption: Orion is a great way to [test your sky darkness](#). With your naked eye, you can easily spot this hourglass-shaped constellation. Known as an epic hunter in Greco-Roman, Orion and all its parts have had many names and meanings across many cultures. In Egyptian mythology, this constellation represented the god *Sah*. The Babylonians referred to it as *The Heavenly Shepard*. In most cultures, it is Orion's Belt that has many stories: [Shen](#) in Chinese folklore, or [Tayamnicankhu](#) in Lakota storytelling. But the Maya of Mesoamerica believed that part of Orion contained [The Cosmic Hearth](#) – the fire of creation. Credit: Stellarium Web

1,500 light years away from Earth sits the star-forming region and crown jewel of Orion – Messier 42 (M42), the Orion Nebula. Part of the “sword” of Orion, this cloud of dust and gas sits below the first star in Orion's Belt, Alnitak, and can easily be spotted with the naked eye under moderate dark skies. You may also use binoculars or a telescope to resolve even more details, like the Trapezium: four stars in the shape of a baseball diamond. These young stars make up the core of this magnificent object.

Of course, it's not just for looking at! M42 is easily one of the most photographed nebulae around, by astrophotographers here on the ground, large ground-based observatories, and space telescopes alike. It has long been a place of interest for the Hubble, Spitzer, and Chandra X-ray Space Telescopes, with James Webb Space Telescope (JWST) joining the list in February 2023. Earlier this year, NASA and the European Space Agency released [a new photo](#) of the Orion Nebula taken from JWST's NIRCам (Near-Infrared Camera), allowing scientists to image this early star forming region in both short and long wavelengths.



Caption: Stars aren't the only items photographed here. In June 2023, JWST's NIRCам and MIRI (mid-infrared instrument) imaged a developing star system with a planetary disk forming around it. That's right – a solar system happening in real time – located within the edges of a section called the [Orion Bar](#). Scientists have named this planet-forming disk **d203-506**, and you can learn more about the chemistry found [here](#). By capturing these objects in multiple wavelengths of light, we now have even greater insight into what other objects may be hiding within these hazy hydrogen regions of our night sky. Credit: ESA/Webb, NASA, CSA, M. Zamani (ESA/Webb), PDRs4ALL ERS Team

In addition to our Dark Sky Wheel, a fun presentation you can share with your astronomy club would be our [Universe Discovery Guide: Orion Nebula, Nursery of Newborn Stars](#) activity. This will allow you to explain to audiences how infrared astronomy, like JWST, helps to reveal the secrets of nebulae. Or, you can use public projects like the NASA-funded [MicroObservatory](#) to capture M42 and other objects.

Learn more about what to spy in the winter sky with our upcoming mid-month article on the [Night Sky Network page](#) through NASA's website.

**This article is distributed by NASA's Night Sky Network (NSN).** The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.gov](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!





Tri-Valley Stargazers  
P.O. Box 2476  
Livermore, CA 94551  
[www.trivalleystargazers.org](http://www.trivalleystargazers.org)

## Tri-Valley Stargazers Membership Application

### Contact information:

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Street Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

Email Address: \_\_\_\_\_

Status (select one): \_\_\_\_\_ New member \_\_\_\_\_ Renewing or returning member

**Membership category** (select one): Membership term is for one calendar year, January through December.

\_\_\_\_\_ Student member (\$10). Must be a full-time high-school or college student.

\_\_\_\_\_ Regular member (\$30).

**Hidden Hill Observatory Access** (optional): Must be 18 or older.

\_\_\_\_\_ One-time key deposit (\$20). This is a refundable deposit for a key to H2O. New key holders must first hear an orientation lecture and sign a usage agreement form before using the observing site.

\_\_\_\_\_ Annual access fee (\$10). You must also be a key holder to access the site.

**Donation** (optional):

\_\_\_\_\_ Tax-deductible contribution to Tri-Valley Stargazers

**Total enclosed:** \$ \_\_\_\_\_

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. TVS will not share information with anyone except as detailed in our Privacy Policy (<http://www.trivalleystargazers.org/privacy.shtml>).

Mail this completed form along with a check to: Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551.