PRIMEFOCUS

Tri-Valley Stargazers

January 2020

Meeting Info
Did Comet Impacts Jump-Start Life on Earth?

Who:
Dr. Matthew Kroonblawd

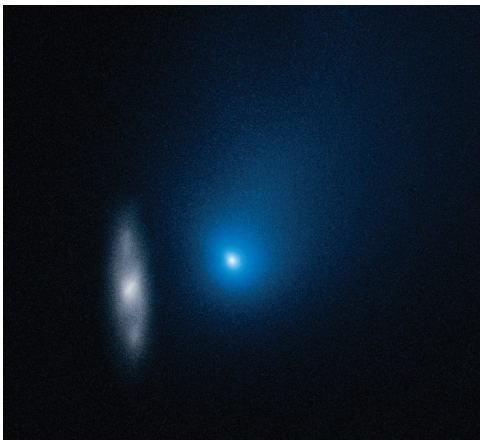
When:
January 17, 2020
Doors open at 7:00 p.m.
Meeting at 7:30 p.m.
Lecture at 8:00 p.m.

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

Inside

January Meeting

Did Comet Impacts Jump-Start Life on Earth?
By Matthew P. Kroonblawd, Lawrence Livermore National Laboratory



Caption: Interstellar Comet Borisov appears in front of a distant background spiral galaxy (2MASX J10500165-0152029). The comet was ~203 million miles from Earth in this exposure taken on November 16, 2019 by the Hubble Space Telescope. Credit:_NASA/ESA/GSFC

Recent observations confirming the presence of the protein-forming amino acid glycine in comets lend support to cometary impact as a possible source for delivering simple amino acids to early Earth. Little is known regarding the survivability or reactivity of glycine during impacts, especially considering that condensed phase chemistry at extreme conditions and can lead to the formation of new products through unusual synthetic routes. Quantum-based molecular dynamics (QMD) simulations are a useful atomistic modeling tool to predict chemistry that is difficult and expensive to isolate through laboratory experiments. With QMD, we explore how glycine reacts under the extreme temperatures, pressures, and shear states reached in shock impacts and other geological processes on early Earth and other planets and moons. Conditions typical of cometary impacts are found to prompt the rapid transformation of glycine into more complicated aromatic molecules. Shearing forces under more moderate compressive loads are predicted to drive formation of polypeptides and large oligomers. Our studies provide a "bottom-up" methodology and prospectus for predicting possible prebiotic chemistry under extreme conditions and help determine feasible chemical pathways towards chemicals needed for the origins of life.

Matthew (Matt) Kroonblawd is a staff scientist in the Reaction Dynamics Group at Lawrence Livermore National Laboratory (LLNL), where he first started as a postdoc under Nir Goldman. He holds a BA in Physics from the University of Minnesota – Morris (2012) and a PhD in Chemistry from the University of Missouri – Columbia (2016), where he studied with Tommy Sewell. His work is focused broadly on developing computational approaches to understand the thermomechanical response and chemistry of molecular materials under dynamic and extreme conditions. He has over twenty publications on topics ranging from prebiotic chemistry to explosives and polymers.

News & Notes

2020 TVS Meeting Dates

Below are the TVS meeting dates for 2020. 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**
Jan. 17	Jan. 20	
Feb. 21	Feb. 24	Feb. 07
Mar. 20	Mar. 23	Mar. 06
Apr. 17	Apr. 20	Apr. 03
May 15	May 18	May 01
Jun. 19	Jun. 22	Jun. 05
Jul. 17	Jul. 20	Jul. 03
Aug. 21	Aug. 24	Aug. 07
Sep. 18	Sep. 21	Sep. 04
Oct. 16	Oct. 19	Oct. 02
Nov. 20	Nov. 23	Nov. 06
Dec. 18	Dec. 21	Dec. 04

Money Matters

As of the last Treasurer's Report on 12/16/19, our club's checking account balance is $11,695.48.

TVS Welcome to New Members

TVS would like to welcome new member Jose Picazo. Please say hello and chat with him at upcoming club meetings.

Outreach Star Party

January 15: Lawrence Elementary School, 2451 Portola Ave., Livermore, set-up at 5:30pm

Time to Renew Club Membership for 2020

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 the majority of the membership. You do not have to own a telescope in order to be 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 2019 and all of 2020. The regular club membership remains a bargain at $30. Student membership (full-time High School or College student) is only $10! Alternatively, Patron Membership, which grants use of the club's 17.5" reflector at H2O, is available at the annual rate of $100.00. 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.

Calendar of Events

January 13, 7:30pm

What: Baby Planets and Their Nurseries
Who: Dr. Catherine Espaillat, Boston University
Where: California Academy of Sciences, 55 Music Concourse Dr., Golden Gate Park, San Francisco, CA
Cost: Advanced ticketing required. Academy members $12, Seniors $12, General $15. Reserve a space online or call 1-877-227-1831.

Planets are born in the protoplanetary disks that surround stars when they are young. How these disks evolve into planetary systems is a fundamental question in astronomy. Observations have revealed remarkable structures in disks that may indicate the presence of newly born planets. This talk will review these key observations and compare them to current theoretical predictions of planet formation. Possibilities for future progress in the field will be discussed.

For lecture and reservation information see: https://www.calacademy.org/events/benjamin-dean-astronomy-lectures/baby-planets-and-their-nurseries

January 21, 7:30pm-10:00pm

What: Imaging Meeting
Who: Bruce B.
Where: Houge Park, 3972 Twilight Drive, San Jose, CA
Cost: Free

The Imaging SIG meets roughly every month at Houge Park to discuss topics about imaging. The SIG is open to people with absolutely no experience but want to learn what it's all about, but experienced imagers are also more than welcome, indeed, encouraged to participate.

For more information, see: https://www.meetup.com/SJ-Astronomy/events/lkxnnmyzpbzb/

Header Image: Native American Guide giving a tour of Meteor Crater in 2007. Credit: Ken Sperber

Calendar of Events (continued)

January 22, 7:00pm

What: What Does a Black Hole Look Like: How We Got our First Picture
Who: Prof. Eliot Quataert, UC Berkeley
Where: Foothill College, Smithwick Theatre, 12345 El Monte Road, Los Altos Hills, CA 94022
Cost: Free, $3 parking (Credit Cards or $1 dollar bills)

Black holes are one of the most remarkable predictions of Einstein's theory of gravity: so much material is compressed into such a small volume that nothing, not even light, can escape. Black holes have also captured the public imagination, and are commonly featured in popular culture, from Star Trek to Hollywood movies. In Spring 2019, the world-wide Event Horizon Telescope released the first real (non-Hollywood!) picture of gas around a black hole and the "shadow" it makes as the gas swirls into the black hole. Dr. Quataert will describe how these observations were made and what they have taught us about black holes.

For more information see: https://foothill.edu/astronomy/ or phone 650-949-7888.

January 28, 7:15pm

What: Directly Imaging Exoplanets
Who: Dr. Gaspard Duchene, UCB
Where: Mt. Diablo Astronomical Society, Lindsay Wildlife Experience, Community Room, 1931 First St., Walnut Creek, CA 94597
Cost: Free.

Details not available.

For more information see: https://nightsky.jpl.nasa.gov/event-view.cfm?Event_ID=97160

February 16-17, 6:00pm - 9:00am

What: Slumber With the Stars: A Night of Celestial Romance
Who: You
Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619
Cost: Adults 21+ Only; Members $90, General $95

A night at the museum is the stellar date night you'll never forget. The perfect Valentine's Day gift – this romantic evening is just for adults and designed for couples. Start the evening off with a delicious, candlelit dinner in a private museum exhibit. Indulge in a lesson on the history of chocolate, also known as "the food of the gods", paired with an exclusive show in our 360-degree Planetarium dome.

At the end of the night, curl up on the deck with your date on our stunning Observatory Deck for some dreamy stargazing. Your guide to the cosmos will share stories on the epic and tragic love stories behind the constellations. Then, stay the night with after-hours museum access as you camp out under Chabot's stars – the exhibits.

Dinner and breakfast are included with dairy free and vegetarian options. Wine and beer included with dinner.

Bring your own sleeping bags, mats, toiletries, jacket, medications, water bottle, snacks, tents (optional for outdoor sleeping).

For more information see: https://chabotspace.org/calendar/slumber-with-the-stars-written-in-the-stars-a-night-of-celestial-romance/.

The President's Corner: Looking Back and Looking Forward By Roland Albers

Happy New Year to all my fellow Stargazers! It's that time of year where we all spend a little time looking back and a little time looking forward.

For TVS, 2019 was a year full of accomplishments:

Our biggest achievement was completing the first major renovation of the club's observatory. Under the leadership of Chuck Grant and Gert Gottschalk, we completed repairs and a major upgrade of the Jack Marling Observatory at H2O, which included beefing up the building's foundation, replacing half of the flooring and several wall sections, repainting the exterior, installing new carpeting, replacing the battery and solar charger, and redesigning and rebuilding the electrical system. We also replaced the telescope mount with a modern Astrophysics AP1200 mount that had been donated to the club, carefully polar aligned and tested it, and put the telescope officially back into service on August 31st.

Equally impressive, we restored the derelict Quick Dome at H2O. Thanks to the initiative and hard work of Ross Gaunt, we cleaned out the dome, completed repairs to make it again water-proof and rodent-proof, and added new flooring and carpeting. Ross also installed a battery, solar charger, and solar panel and then designed and built a new electrical system. Finally, we purchased a new Software Bisque mount for the dome and installed it and a C14 telescope that had been donated to the club. After years and years of neglect, the Herb Quick Dome is again operational!

We continued to make a positive impact on our community by holding over 20 outreach events during 2019. With Eric Dueltgen organizing our involvement and dozens of club members participating throughout the year, we shared our enthusiasm for astronomy with the public at Yosemite National Park, Del Valle Regional Park, the Bankhead Theater, the Livermore Library, and many area schools.

Of course, we continued to hold our popular monthly club meetings, most with expert speakers from a variety of fields. Among others, our speakers in 2019 included a four-time space shuttle astronaut, a master observer of deep sky objects and frequent contributor to Sky & Telescope, a cosmochemist, and our own Rich Combs teaching us the ins and outs of binocular optics.

We held monthly club star parties throughout the observing season. This included four joint outreach and club star parties at Del Valle held in conjunction with the EBRPD, three members-only star parties at Tesla Vintners, and our two annual Open Houses at H2O.

Last, but certainly not least, Hilary Jones maintained our club website, keeping it constantly up-to-date and accurate, and Ken Sperber edited and published our informative monthly newsletters.

That was a lot! Congratulations and thank you to everyone involved in all these achievements and the many more I failed to mention.

Looking forward, we will of course continue to hold our monthly meetings, outreach events, and star parties, continue to maintain and improve our website, and publish our newsletters. Beyond that, the club's goals will shift a bit, aimed more at helping our club members successfully explore the heavens in 2020:

We will be completing the final phase of our renovations at H2O by installing a new custom-built truss OTA in the Marling Observatory. As described in the article below by Rich Combs, he is now putting the final touches on the OTA, and we plan to have it operational before this year's Open House events.

We will be opening the Quick Dome for use by all H2O keyholders, not just our Patron members. Stay tuned for future announcements on how you can use this valuable club resource.

We will be reinstating "What's Up?" presentations at our monthly meetings. These are 5-minute member presentation describing objects and events worth observing each month. Please contact me if you'd like to volunteer to be a presenter any time this year.

We plan to have more activities tailored for the beginner observers in our club. The details are still in the works, but will likely include beginner observing plans for some of our club star parties, organized parking lot observing sessions after our meetings, and help with selecting and using observing equipment. Suggestions for other activities are welcome!

Finally, we hope to develop our own set of observing lists and challenges, perhaps with awards. These will be similar to the Astronomical League programs but achievable in a much shorter amount of time.

Suggestions and help for improving our club are always welcome. Let's make 2020 another spectacular year for TVS!

Marling Scope: New OTA By Rich Combs

It's a common superstition among amateur telescope makers that completion of a new telescope will be followed by at least two weeks of cloudy skies. At the risk of tempting fate, as you can see, the Jack Marling telescope upgrade is nearing completion. We are upgrading from a 17.5" f/4.5 mirror to an 18" f/4.5 which was donated to the club and tested by Gert Gottschalk. We also will be using a new Astrosystems 4.5"secondary, tested as 1/18 wave PV, with Supremax coating. The solid aluminum optical tube which weighed 135 lbs will be replaced with a truss tube arrangement (see image on p.5), weighing 82 lbs, even with the slightly larger mirror. This will be attached to our recently acquired Astro-Physics 1200GTO

continued on p.5

TVS Member Astrophotos

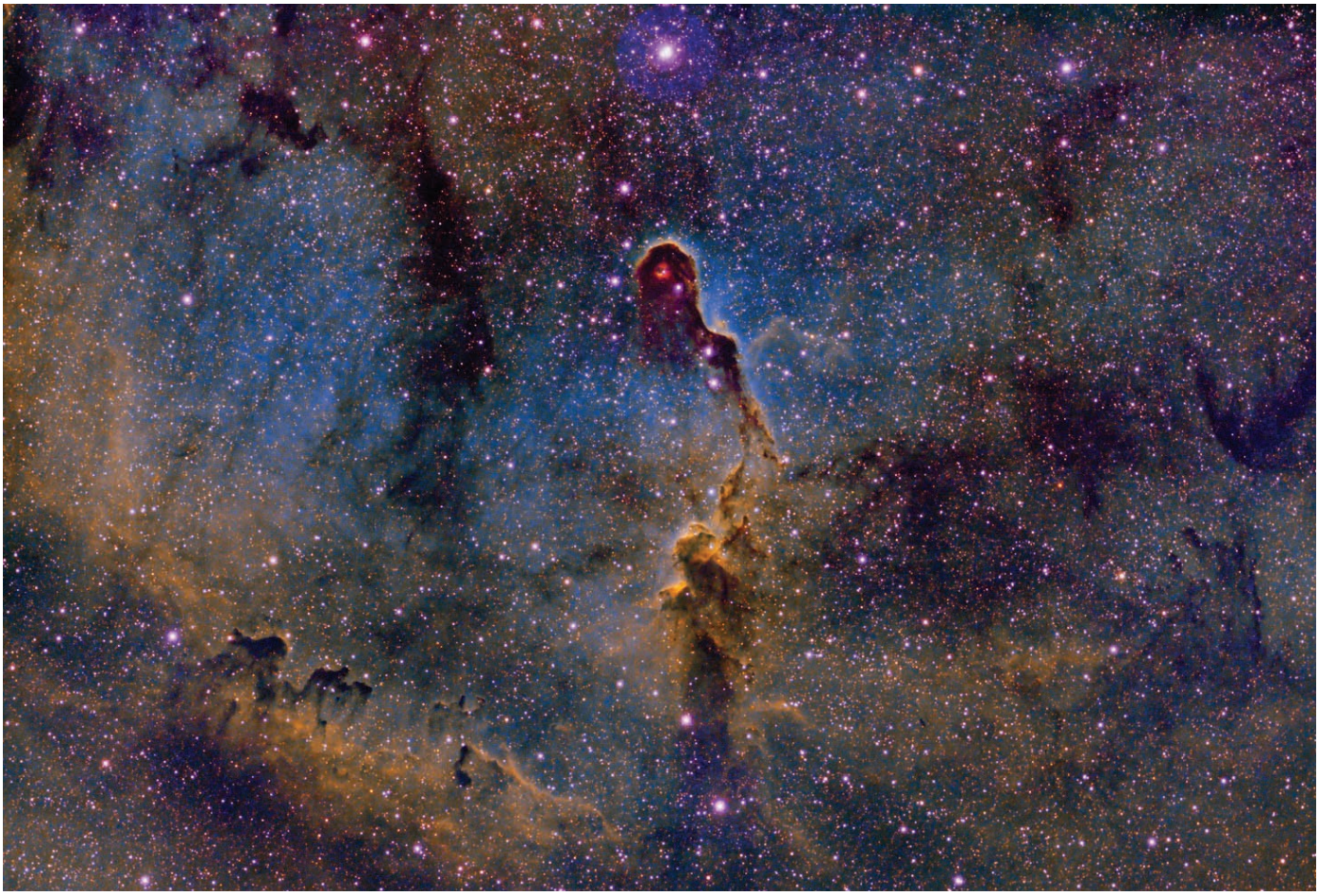


Image Caption: Mo Yassine took this image of IC1396A, the Elephant Trunk Nebula, using narrowband filters that isolate SII, H-alpha, and OIII. The total exposure time was 4.8 hours using Celestron Edge HD 1100 with Hyperstar 3 and using a ZWO ASI1600mm-Pro camera.

Marling Scope: New OTA (continued)

mount at Hidden Hill Observatory. The image plane is located for use with a TeleVue Paracorr coma corrector which can be used visually with our 31mm Nagler eyepiece, or with cameras for imaging. Its little brother, a 10" truss tube scope, which was a prototype, is available in our loaner program. Shown assembled, but without the mirror cell, the new OTA will now be disassembled for final adjustments and painting. Thanks to the various club members who gave assistance and suggestions. Look for a grand unveiling, most likely at the February general meeting. And anticipate cloudy skies in February!

Caption: Rich Combs performs the final fit test of the new OTA!

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

All times are Pacific Standard Time

January

13	Mon	Algol at minimum brightness for ~2 hours centered on 10:46pm
16	Thu	Algol at minimum brightness for ~2 hours centered on 7:36pm
17	Fri	Last-Quarter Moon (4:58am)
20	Mon	The crescent Moon, Mars, and Antares form a triangle in Scorpius and Ophiuchus (Predawn)
22	Wed	Jupiter trails the crescent Moon by ~6^{o} (Predawn)
24	Fri	New Moon (1:42pm)
27	Mon	The crescent Moon and Venus are about 6^{o} apart. Neptune <1^{o} from Venus (Evening)

February

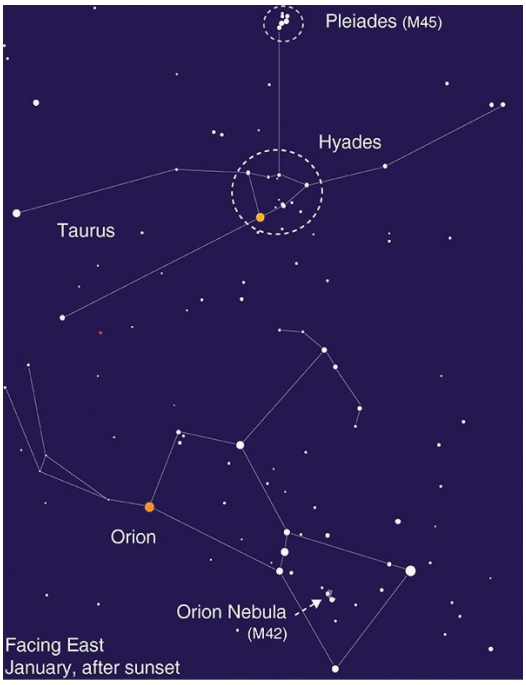
1	Sat	Venus shines brightly in the southwest (Dusk)
1	Sat	First-Quarter Moon (5:42pm)
5	Wed	Algol at minimum brightness for ~2 hours centered on 9:21pm
8	Sat	Full Moon (11:33pm)
10	Mon	Mercury reaches greatest eastern elongation; visible in the west-southwest (Dusk)
15	Sat	Last-Quarter Moon (2:17pm)
16	Sun	The Moon is ~1^{o} from Beta Scorpius (Dawn)
18	Tue	Mars emerges from being occulted by the Moon at ~4:27am, being only ~8^{o} above the southeast horizon
19	Wed	The Moon and Jupiter are ~4^{o} apart in Sagittarius (Dawn)1
20	Thu	The thin crescent Moon is 2^{o} to the lower-right of Saturn (Dawn)
23	Sun	New Moon (7:32am)
27	Thu	The crescent Moon and Venus are ~5^{o} apart (Dusk)
28	Fri	Algol at minimum brightness for ~2 hours centered on 7:55pm

NASA Night Sky Notes

Spot the Young Stars of the Hyades and Pleiades

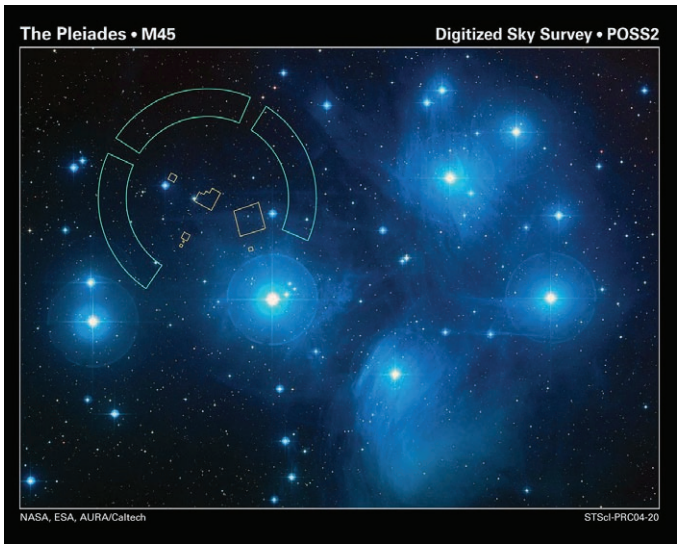
By David Prosper

Orion is the last of a trio of striking star patterns to rise during the late fall and early winter months, preceded by the diminutive Pleiades and larger Hyades in Taurus. All three are easily spotted rising in the east in early January evenings, and are textbook examples of stars in different stages of development.



As discussed in last month's Notes, the famous Orion Nebula (M42), found in Orion's "Sword," is a celestial nursery full of newly-born "baby stars" and still-incubating "proto-stars," surrounded by the gas from which they were born. Next to Orion we find the Hyades, in Taurus, with their distinctive "V' shape. The Hyades are young but mature stars, hundreds of millions of years old and widely dispersed. Imagine them as "young adult" stars venturing out from their hometown into their new galactic apartments. Bright orange Aldebaran stands out in this group, but is not actually a member; it just happens to be in between us and the Hyades. Traveling from Orion to the Hyades we then find the small, almost dipper-shaped Pleiades star cluster (M45). These are "teenage stars," younger than the Hyades, but older than the newborn stars of the Orion Nebula. These bright young stars are still relatively close together, but have dispersed their birth cocoon of stellar gas, like teenagers venturing around the neighborhood with friends and wearing their own clothes, but still remaining close to home - for now. Astronomers have studied this trio in great detail in order to learn more about stellar evolution.

Figuring the exact distance of the Pleiades from Earth is an interesting problem in astrometry, the study of the exact positions of stars in space. Knowing their exact distance away is a necessary step in determining many other facts about the Pleiades. The European Space Agency's Hipparcos satellite determined their distance to about 392 light years away, around 43 light years closer than previous estimates. However, subsequent measurements by NASA's Hubble Space Telescope indicated a distance of 440 light years, much closer to pre-Hipparcos estimates. Then, using a powerful technique called Very Long Baseline Interferometry (VLBI), which combines the power of radio telescopes from around the world, the distance of the Pleiades was calculated to 443 light years. The ESA's Gaia satellite, a successor to Hipparcos, recently released its first two sets of data, which among other findings show the distance close to the values found by Hubble and VLBI, possibly settling the long-running "Pleiades Controversy" and helping firm up the foundation for follow-up studies about the nature of the stars of the Pleiades.



Caption: Close-up of the Pleiades, with the field of view of Hubble's Fine Guidance Sensors overlaid in the top left, which helped refine the distance to the cluster. The circumference of the field of view of these sensors is roughly the size of the full Moon. (Credit: NASA, ESA and AURA/Caltech)

You can learn more about the Pleiades in the Universe Discovery Guide at bit.ly/UDGMarch , and find out about missions helping to measure our universe at nasa.gov.

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.

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

_____ Patron member ($100). Patron membership grants use of the club's 17.5" reflector at H2O. You must be a member in good standing for at least one year, hold a key to H2O, and receive board approval.

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.