East Valley Astronomy Club

June Newsletter 1996

EVAC MEETING HIGHLIGHTS

The May meeting was started by Robert Kerwin promptly at 7:30 PM with 50 people attending, 5 of whom were guests.

Florence Junction Site/Adopt-A-Highway/Handouts

Sam Herchak then spoke about safety concerns of the local site at Florence Junction which borders an artillery range. He produced an aeronautical chart that showed the boundaries of the range and the fact our observing site is well north of it. So even on weekends when it's active, the greater hazard is driving your car to the site.

Our first Adopt-A-Highway cleanup will have to wait until the fall as highway construction is still taking place in the area and it will soon be too hot. It was agreed to schedule any cleanup on a weekend that does not have another EVAC activity.

Nice handouts for getting started in astronomy and the best deep sky objects were obtained from the publishers of Astronomy and Sky&Telescope for the recent Astronomy Day in April. Sam gave out copies to anybody that wanted them.

Lowell Observatory Tour

Sheri Cahn announced a change of date for the Club Tour because of bus availability. The new date is July 20th! Please make note and confirm your reservation with Sheri if necessary.

EVAC Observing Programs

Robert spoke on the progress of several programs in the works. The first will be the Messier Program, where members will obtain the Club handout, observe all the objects with notes and/or sketches, then turn it in for review. Awards will then be handed out to those who have completed the project. Designed to improve observing skills, the Club hopes to follow on with two other deep sky programs, a lunar program, a double star program, etc. Anyone willing to help make these happen please contact Rob.

Miscellaneous

Chris Schur reported that the May 8th Hale-Bopp occultation was a non-event visually, even with the good skies in Payson and a 12.5" reflector. The Moon was simply too bright and overpowered the much dimmer comet. He also had recent Comet Hyakutake and Hale Bopp photos that he had taken. Gene Lucas offered shortcut directions to those driving to the Riverside Telescope Makers Conference (RTMC). Paul Dickson announced a "Couldn't make it to the Grand Canyon Star Party" star party for June 15th at Dugas Ranch. Look for more details later in this newsletter.

FEATURED PRESENTATION

EVAC members Tom Polakis and Bernie Sanden then reported on their recent observing trip to Australia in mid-March. Rather than shipping their own large reflectors for use down under, they contracted for 7 nights of observing at the Grove Creek Observatory. This is the Australian equivalent of the "Star Hill Inn" that you see advertised in the US. For about 50 US dollars per night, you are provided with sleeping facilities and quality telescopes at a quality (dark) site.

Arriving in Sydney, Bernie and Tom first visited and toured with Steve Mencinsky, a well-known amateur and expert deep sky observer. Tom became friends with Steve through contact on the internet!

IN THIS ISSUE

The trip then took them north to Loomberah and a night with Gordon Garradd, the famous comet observer and columnist in CCD Astronomy magazine. Gordon is an enterprising telescope maker and showed Bernie and Tom his hilltop observatory, which currently houses a 10" Newtonian reflector with an 8" Schmidt Cassegrain (SCT) mounted in the counterweight position!

Next stop was Coonabarabran, the "Astronomy Capital of Australia." This is the closest town to the famous Siding Spring Observatory. Here resident astronomer Rob McNaught met the pair for a private tour of the facilities. This included the 4-meter reflector (a near twin to the Mayall telescope at Kitt Peak), a 2.3-meter advanced technology telescope built in the early 1980's, and the UK Schmidt camera, which is the southern counterpart to the Palomer Survey Schmidt camera here in the US.

Rob's area of research is near-Earth asteroids, and while searching for these, has discovered almost a dozen comets. He is also known for finding a plate taken in April 1993 that captures Comet Hale-Bopp 2 years before its actual discovery. Being somewhat of a naturalist, he then took the pair on an animal watching tour in the nearby Warrumbungle National Park.

It was finally time for the main event at Grove Creek Observatory. Located about 150 miles west of Sydney, it lies on the inland side of the Great Dividing Range where sky conditions are ideal. The facilities house a vintage 14" Celestron SCT with excellent optics and a 12.5" f/4 Newtonian reflector, also of high quality. Being his first time down south, Bernie described what it's like for an experienced observer to "get lost" in the foreign sky. One unusual thing they both found themselves doing was looking north; but this was purely because of the newly arrived Comet Hyakutake.

This newsletter can't possibly describe all the terrific photos and narrative that Tom and Bernie provided, so I'll close with their advice for anyone hoping to make a similar trip. Plan to visit around March, when most of the extraordinary deep sky objects are well placed. If you get the luxury of a second southerly trip, then go close to November for a much better view of the Magellanic Clouds.

The talk concluded at 9:15 PM when Sheri Cahn unwrapped the brownies and Rob Kerwin brought out the complimentary soft drinks.

JUNE GUEST SPEAKERS

Members' Show and Tell Night. Members of the club will be presenting their projects that they been working on. If you would like to make a presentation please contact Tom Polakis at 967-1658.

Beginner Lecture

By Silvio Jaconelli

Have you ever wondered what it would be like to have a group of both knowledgeable and experienced amateur astronomers to answer your questions on equipment capabilities? Or to recommend the best star charts to use? Or to pass opinions as to the usefulness of the various filters in the marketplace?

We had such a group for the exclusive use of EVAC members on Saturday, May 4th at the home of Tom Polakis. It turned out to be as fulfilling as I had hoped. Several "rookies" like me got the opportunity to ask all (very many!) of our questions to Tom Polakis, Bernie Sanden, Robert Kerwin, and Frank Honer, all of whom had volunteered their time in the interests of educating novices like myself. Each volunteer gave a short presentation on a selected topic such as the principles of optics, filters, use of star charts, etc. There was a lot of hands-on participation by the novices.

Well, what did I get out of it? Firstly, the most pleasing views through a scope are those from an exit pupil of between 2mm and 3mm, or which give magnification roughly 10 to 15 times the objective size in inches. That the best all-around 'scope for my use is a f6 reflector (I have a 4" refractor!), that my 6x30 finderscope and wideband skyglow filter would make good things to take to a swap meet (!). I also borrowed some books on finding my way around the sky, and got some tips on how to star-hop. As a result, in one hour I was able to star-hop my way through a dozen double stars in Bootes using the advice I had received.

Criticisms? Only one, the evening went by too quickly !!!

Dugas Star Party

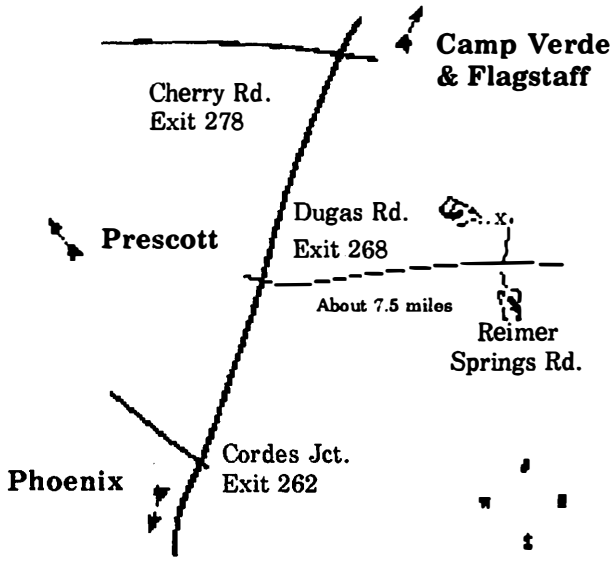
A. K. A.
The "I Can't Make It To The
Grand Canyon" Star Party

Saturday, June 15

For those of you who don't have the time to get to the Grand Canyon, here is a much closer star party also held at high altitude.

The Dugas site has been used along time by SAC. For those living in north Phoenix, the site isn't much further than Buckeye Hills, but since its at 4000+ feet in altitude, it will be much cooler. Bring warm clothes and insect repellent. There are tentative plans for a port-a-pottie on site if a company can be located to deliver it.

From Interstate 17, go about 7.5 miles east on Dugas Rd. Turn left at Reimer Springs Road. This will be the only road that goes left for several miles. After turning left, follow the road over the ridge (about 300 yds) and you are at the site.



OF COMET RED FLAG AND THE BLINKING NEBULA

by Mike Sargeant

For those who may be deterred from sharing our Florence Junction site with big men in green suits be assured that you will not be showered with flying missileoids.

Our site is on joint use state land. The Army has a range at least six miles southeast of our observing site. Because the road we use to access our new site enters a region on which the Army holds maneuvers, the State requires the Army to post exercise dates, and to raise flags and a flashing warning light at the access point flagpole during live fire practice to caution those who may be four-wheeling many miles into the area.

After the exercise of 19 through 21 April, contact was made with Range Central Florence [(520)868-4894]. According to Warrant Officer King, the training area is accessed on Cottonwood Canyon Road off Highway 89 some miles southeast of Florence Junction.

Range Central's office is located between the INS Detention Center and the Unit Training Equipment Site just outside of Florence. They welcome visitors and he or Sergeant Kennedy can show the training areas on maps for those who may be penetrating deeply into the region. The have no plans to invade Florence Junction and the Magma Arizona Railroad.

Internet E-mail

HUBBLE SPACE TELESCOPE ON TRACK FOR MEASURING THE EXPANSION OF THE UNIVERSE

PRESS RELEASE NO.: STScI-PR96-21

From: GUNDY@avion.stsci.edu

Two international teams of astronomers, using NASA's Hubble Space Telescope, are reporting major progress in converging on an accurate measurement of the universe's rate of expansion -- a value which has been debated for over half a century.

"We have five different ways of measuring the Hubble Constant with HST," said Dr. Freedman. "The results are coming in between 68 and 78 km/sec/Mpc". (For example, at an expansion rate of 75 km/sec/Mpc, galaxies appear to be receding from us at a rate of 162,000 miles per hour for every 3.26 million miles farther out we look).

Two months ago, a second team, led by Allan Sandage, also of the Carnegie Observatories, Abhijit Saha (Space Telescope Science Institute), Gustav Tammann and Lukas Labhardt (Astronomical Institute, University of Basel), Duccio Macchetto and Nino Panagia (Space Telescope Science Institute/European Space Agency) reported a slower expansion rate of 57 km/sec/Mpc.

The value of the Hubble Constant allows astronomers to calculate the expansion age of the Universe, the time elapsed since the Big Bang. Astronomers have been arguing recently whether the time since the Big Bang is consistent with the ages of the oldest stars.

The ages are calculated from combining the expansion rate with an estimate of how much matter is in space. The younger age values from each team assume the Universe is at a critical density where it contains just enough matter to expand indefinitely. The higher age estimates are calculated based on a low density of matter in space.

"A point of great interest is whether the age of the Universe arrived at this way is really older than the independently derived ages of the oldest stars," said Saha, an investigator on both Hubble teams.

"The numbers lean on the side that the stellar ages are a little lower, or that the hypothesis that we live in a critical density universe needs to be questioned," said Saha. "As further results accumulate over the next few years, we hope to tighten the constraints on these

UPCOMING CLUB EVENTS

- **Verde Valley Astronomy Festival, June 6-8**
- **EVAC Local Star, June 8, Sunset**
  New Florence Junction site
- **Grand Canyon Star Party, June 8-15**
- **EVAC Club Meeting, June 12, 7:30 pm**
  SCC, Physical Science Bldg., Room 172
- **I Can't Make It To The Grand Canyon Star Party,** June 15, Dugas Site. See Article and Map.
- **EVAC Local Star, July 6, Sunset**
  New Florence Junction site
- **EVAC Club Meeting, July 10, 7:30 pm**
  SCC, Physical Science Bldg., Room 172
- **EVAC Deep Sky Star, July 13, Sunset**
  Vekol Road site
- **Lowell Observatory Tour, July 20,** See Article.

issues."

THE OBSERVATIONS

The Key Project team is midway along in their three-year program to derive the expansion rate of the Universe based on precise distance measurements to galaxies. They have now measured Cepheid distances to a dozen galaxies, and are about halfway through their overall program.

The Key Project team also presented a preliminary estimate of the distance to the Fornax cluster of galaxies. The estimate was obtained through the detection and measurement with the Hubble Space Telescope of pulsating stars known as Cepheid variables found in the Fornax cluster. The Fornax cluster is measured to be approximately as far away as the Virgo cluster of galaxies -- about 60 million light-years.

The Key Project team member who led this effort, Caltech astronomer Barry Madore said, "This cluster allows us to make independent estimates of the expansion rate of the Universe using a number of different techniques. All of these methods are now in excellent agreement. With Fornax we are now at turning point in this field."

The team is measuring Cepheid distances to the Virgo and Fornax clusters of galaxies as a complementary test. Their strategy is to compare and contrast expansion numbers from a variety of distance indicators.

The Key Project team is systematically looking into a variety of methods for measuring distances. They are using Cepheids in a large sample to tie into five or six "secondary methods". One such secondary method relates the total luminosity of a galaxy to the rate at which the galaxy is spinning, the Tully-Fisher relation. Another secondary method makes use of a special class of exploding star known as a type Ia supernova. This phase of the Hubble Constant research will be completed within another two years.

In contrast, the Sandage team focused on a single secondary distance indicator, one of the same indicators also used by the Key Project team, the type Ia supernova. Sandage maintains that these stars are "standard bombs" according to theory. He suggests that when they explode they all reach exactly the same intrinsic brightness. This would make them extremely reliable "standard candles," (objects with a well-known intrinsic brightness) visible 1,000 times farther away than Cepheids. Since they are intrinsically brighter than any other standard candle, they offer the opportunity for an accurate measurement of the Universe's overall expansion by looking out the farthest.

Although both teams are still in disagreement over the precise rate at which the Universe is expanding and on how old it is, they are optimistic that their estimates will continue to converge with further observations and analysis.

SCIENCE BACKGROUND - CLOSING IN ON UNDERSTANDING THE EXPANDING UNIVERSE

WHAT'S THE DIFFERENCE BETWEEN AN OPEN AND CLOSED UNIVERSE?

An open universe expands forever; a closed universe expands, but decelerates until it eventually reverses direction and begins to contract; a "critical density" universe is exactly midway between these scenarios and so will expand indefinitely, always slowing down but never quite coming to a halt. If, for example, you throw an object up in the air, it falls down due to gravity. But if the object moves fast enough (say, by rocket) it can escape from the Earth. By analogy the Universe itself may not have enough density to halt its own expansion.

WHAT'S THE RELATIONSHIP BETWEEN MASS DENSITY AND AGE OF THE UNIVERSE?

The rate of the Universe's expansion reflects how much gravity and hence, matter, it has. Like going up a steep hill, the galaxies outward rush should have slowed if the Universe has a lot of mass, and this implies a younger universe. If the Universe has little mass, and so is barely decelerating, then galaxies would have taken more time to reach their current positions, like rolling along a flat floor.

The rate of the Universe's expansion should be slowed by the mutual gravitational pull of all matter contained in the Universe.

WHY DO THEORISTS FAVOR A CRITICAL DENSITY UNIVERSE?

In formulating the simplest models of the expanding universe theorists favor the notion that space contains the exact amount of matter that keeps the Universe precisely balanced between expanding forever and collapsing under gravity. Assuming such a "critical density" makes it easier to explain a number of observed properties of the space, including the large-scale structure of galaxies.

DOES THE UNIVERSE CONTAIN ENOUGH MASS TO REACH CRITICAL DENSITY?

A fundamental problem is that telescopic observations show that the Universe contains only 1/100 the luminous (i.e., stars and galaxies) mass that it needs to reach critical density. Astrophysicists hold that dark matter must account for the rest. Observational evidence showing that dark matter affects the rotation rate of galaxies, and behavior of clusters of galaxies, boosts estimates of the amount of matter in the Universe to 10% of the value needed to reach critical density. To date the remaining 90% of the required mass to reach critical density is missing and unaccounted for.

WHY HAS IT TAKEN MORE THAN 60 YEARS FOR ASTRONOMERS TO CALCULATE AN ACCURATE VALUE FOR THE HUBBLE CONSTANT?

First, astronomers discovered that establishing an accurate distance scale to faraway galaxies has been more difficult than anticipated. Second, while astronomers can simply and accurately measure a galaxy's velocity, the measurement may not represent the expansion velocity of the Universe at that distance. The reason is that each galaxy possesses a gravitational force. Velocities are altered when more massive galaxies, which have stronger gravitational forces, pull smaller galaxies toward them.

WHY ARE THE TEAMS OPTIMISTIC THEY ARE CONVERGING ON A SINGLE VALUE FOR THE HUBBLE CONSTANT?

The historically debated values of the expansion rate of the Universe have differed by up to a factor of two, but the estimates of the two Hubble teams are now within 25 percent. Hubble Space Telescope has taken this decades-old debate out of gridlock and on toward a solution. That's because Hubble can see and measure certain key celestial distance markers out to ten times farther from Earth than ground-based telescopes.

HOW DO THE TEAMS MEASURE COSMIC DISTANCES?

Both teams base their results on studying a class of celestial milepost marker, called Cepheid variable stars, whose pulsation rate is a direct indication of their intrinsic brightness.

Freedman's team is systematically looking into a variety of methods for measuring distances. They are using Cepheids in a large sample to tie into five or six "secondary methods." One such secondary method relates the total luminosity of a galaxy to the rate at which the galaxy is spinning, the Tully-Fisher relation. Another secondary method makes use of a special class of exploding star known as a type Ia supernova. These secondary distance indicators are needed to look deeper into the Universe to get a more representative rate for the expansion of space (the gravitational fields of nearby clusters may yield an inaccurate value because the expansion rate may be affected by the local motion of galaxies).

In contrast, the Sandage team took the "fast track" to focus on a single secondary distance indicator, one of the same indicators also used by the Key Project Team, the type Ia supernova. Sandage maintains that these stars are "standard bombs" that all reach exactly the same intrinsic brightness. They are visible 1,000 times farther away than Cepheids, allowing for an accurate measurement of the Universe's overall expansion.

WHY IS OBSERVING THE FORNAX GALAXY CLUSTER IMPORTANT?

Earlier results derived from the Virgo cluster have been questioned because that cluster is so large that possible inaccuracies in the distances of individual galaxies from its center might affect some findings. The Fornax cluster is more compact than the Virgo cluster, so there is much less range for uncertainty in the distances of member galaxies from its center.

MEASURING THE EXPANSION RATE OF THE UNIVERSE

The following is a brief history of how astronomers have developed ways to measure the Universe's expansion rate.

1900 - 1910
Harvard astronomer Henrietta Leavitt begins measuring the brightnesses of stars in a class known as Cepheid variables, bright, young stars with masses of perhaps 5 to 20 times that of our own Sun. She measures the distances of stars in the Small Magellanic Cloud, a diffuse-looking nebula (from the Latin word "fuzzy"), visible in the Southern Hemisphere. Leavitt discovers that these stars reveal their intrinsic brightness by the way their light varies. This makes them reliable milepost markers for measuring astronomical distances.

1910 - 1920
Albert Einstein develops his General Theory of Relativity in 1917. Applying Einstein's theory to the evolution of the Universe, several theoreticians discover the possibility that the Universe is expanding or contracting. But Einstein dismisses this possibility because there was no evidence that the Universe is in motion. He believed the Universe is static, and proposes the existence of a hypothetical "repulsive force," called the cosmological constant that prevents galaxies from falling together.

1920 - 1930
Astronomer Edwin Hubble discovers Cepheid variable stars in several nebulae. These nebulae, he concluded, are galaxies far outside our Milky Way Galaxy, and that they were similar in size and structure to our Milky Way.

Astronomer Vesto Slipher makes measurements of the velocities of spiral nebulae, which shows they are all receding from Earth, but he does not realize they are remote galaxies.

In 1929, Hubble made another startling discovery: The more distant the galaxy from Earth, the faster it moves away. Hubble discovered a correlation between the distance of a galaxy and its recession velocity. This relationship is called the Hubble law and the relationship between the distance and velocity is known as the Hubble Constant. Both theories have helped astronomers better understand the evolution of the Universe. Astronomers need an accurate value for the Hubble Constant to estimate the size and age of the Universe.

1930 - 1950
Hubble's observations lead to the realization that, in a uniformly expanding universe, galaxies would have

been closer together in the past. Early in the Universe, the density (and temperature) of matter would have been very high. This leads to a model for the evolution of the Universe, called the Big Bang theory. The theory says that the Universe began in an extremely hot and dense state and has been expanding and cooling ever since then. To test and constrain the Big Bang theory, astronomers work on making solid measurement of the expansion rate (needed to determine the size and age) and check this against an independent estimate based on the ages of the oldest stars in the Universe.

1950s
Before calculating an accurate value for the Hubble Constant, astronomers try to fine tune the cosmic distances. In 1952, Carnegie astronomer Walter Baade finds that the distance scale to galaxies is wrong because of an error in the luminosity scales of stars.

1960s
Astronomers detect the cosmic microwave radiation left over from the Big Bang, as predicted by theory.

Measurements of the density of light elements (such as hydrogen and helium) in the early universe also provide support of the Big Bang theory.

1970s
In the mid-1970s, Carnegie astronomer Allan Sandage discovers that some stars used by Edwin Hubble to estimate distances weren't as bright as once thought.

Though, distances to the nearest galaxies have been measured using Cepheids and other methods, unfortunately, astronomers cannot see Cepheids in distant galaxies. NASA begins construction on Hubble Space Telescope. One of the primary goals is to find Cepheids in more distant galaxies, opening the way to pin down an accurate value for the Hubble Constant.

1980s
Carnegie astronomer Wendy Freedman and Caltech astronomer Barry Madore conclude that dust in the spiral galaxies where Cepheids are located, significantly dims and reddens these stars, causing an error in the distance scale.

Astronomers refine "secondary" methods for measuring the relative distances among galaxies. Among them are measuring the brightnesses and rotational velocities of entire galaxies and the measurement of another class of younger, more massive supernovae (exploding stars). Relative distances, however, do not alone provide a measure of the Hubble Constant. The situation is like the case of a road map with no scale printed on it. Two cities may be closer to each other than to a third city. Without a scale, no one will know the actual distances between those cities. Similarly, to measure the Hubble Constant, astronomers must know the actual distances to galaxies. Following the road map analogy, if the actual distance between two cities is known, then the actual distances among all other cities are established. Cepheids provide the absolute distance scale for celestial objects.

1990s
Using the Hubble Space Telescope, 14 internationally-based astronomers move toward pinning down the Hubble Constant. The astronomers' proposal, called the "Key Project on the Extragalactic Distance Scale," has three goals. The first is to measure Cepheid distances to about 20 galaxies and calibrate five secondary methods for measuring the relative distances to galaxies. The second is to measure Cepheid distances to galaxies in two of the nearest massive clusters of galaxies, Virgo and Fornax. The third is to check for errors in the Cepheid distance scale.

Want Ads

For Sale: Celestron C5+, Excellent condition, recently collimated by Photon Instruments. Includes Celestron light duty tripod, case for optical tube, visual back, 1-1/4" star diagonal and 25mm eyepiece, 5x24 viewfinder. DC clock drive with hand control, runs off 9 volt battery. $900.00. Contact Bill Dellinges at 983-6651 (Apache Jct.).

Astronomical Adventures is offering a $50 discount to our members in addition to a $50 donation to our club/society for each member that attends. Additionally, a scholarship is also being offered to the member of our choice for every six of our members that attend. Astronomical Adventures offers a unique astronomy and informative sightseeing vacation to Northern Arizona. Stargaze under extraordinarily dark skies from a high desert plateau with 36", 30",14.25",13.1" reflectors and a 4' refractor. All telescopes, reference library, expert assistance and instruction are provided. Day activities include guided tours to: Grand Canyon, Meteor Crater, Lowell Observatory, Sunset Crater, Sedona and Red Rock Country, Indian ruins, Astronaut Hall of Fame, Museum of Northern Arizona, the largest lava cave in the state, and more. Prices start at $395 per person for 6 days and nights. Meals and Lodging not included.

To repay his appreciation for the significant contributions that astronomy clubs have given him and the general public, the proprietor is extending this offer to our club/society and its members . For additional information check the Internet, or contact:

Astronomical Adventures
2542 N. Fourth Street Suite 200
Flagstaff, Arizona 86004
(205) 539-7223
http://rahul. net/Astro-Mall

Editor's note

I have recently acquired a flat bed color scanner and I intend on scanning photographs for the newsletter. That is once I get over the learning curve. If you have anything that you would like to share with the club please submit it to me (address on back of newsletter). If you would like the document returned, please include a SASE or make other arrangements.

Bob Kearney

East Valley Astronomy Club

June1996

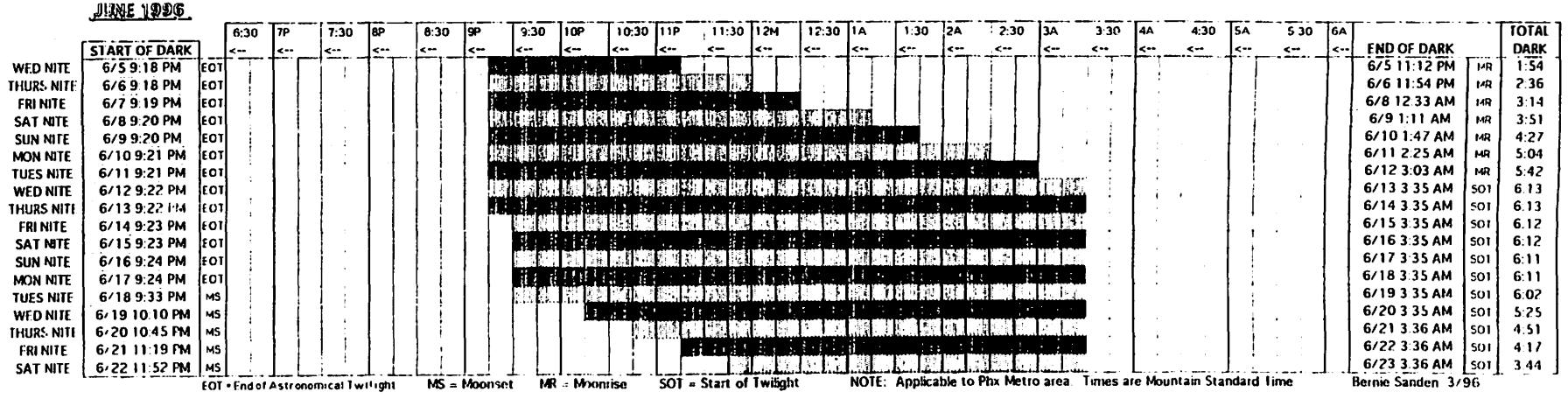
prepared by Sam Herchak

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	1 *ALL MONTH NOTES
2	3 *4:51 AM Occ	4 *11:12, 11:53 PM —> *12:06, 1:59 and 4:22 AM Gal Moons *Excellent S Lunar Libration	5 *1:27 and 2:08 AM Gal Moons *10:58 and 11:22 PM Gal Moons *2:16 AM Dione Eclipse	6	7 *2:38 and 4:01 Occ *9:45 PM Asteroid Tokio Occ	8 Local S Party *Grand Canyon SP Begins
9	10 *2:00 AM Mercury at Elong. *9:00 Venus in Conj. Sunset 7:38 PM	11 *3:07 AM Occ Sunrise 5:18 AM	12 7:30 PM EVAC Mtg *10:21, 10:27,, 11:01 PM—> *1:06, 1:38, 3:21 and 3:53 AM Gal Moons	13 *12:13, 1:06 and 1:14 AM Gal Moons *4:30 AM Moon, Mars, and Mercury Conj.	14	15 Dugas Deep Sky *Grand Canyon SP Ends
16	17 *11:02, 11:51 PM —>	18 *2:51 AM Gal Moons	19 *11:55 PM —> *8:36 PM Occ	20 *12:01, 12:15, 12:41, 1:19, 2:47, 2:50, 3:01, 3:28, 4:26 AM Gal M *June Solstice	21	22 *9:06 PM Occ *PM Jupiter/SAO 187584
23 *4:30 AM Mercury 1.6 deg N of Venus	24 *11:00 AM Vesta Stationary Sunset 7:42 PM	25 Sunrise 5:20 AM	26 *Charles Messier Born, 1730	27 *11:23, 11:32 PM —> *2:09, 2:35, 2:55, 3:54, 4:34 and 4:36 AM Gal Moons	28 *1:39 and 1:48 AM Gal Moons *7:30 PM SAC Mtg	29
30 *8:58 PM Blue Moon	1	2	3	4	5	6 EVAC 1987

All Times are LOCAL - add 7 hrs for Universal Time

Flip over for event details

Date	Start	Title	Description
6/1/96	12:00 AM	ALL MONTH NOTES	CALENDAR NOTES: See 1996 EVAC Occultation Predictions in the February newsletter for details on lunar occultation events (Occ). "Gal Moon" refers to at least 3 events of Jupiter's satellites. See Sky&Telescope (S&T) and Astronomy (Astro) magazines for more info. There are no meetings of the Phoenix Astronomical Society (PAS) until September. PLANETS: MERCURY is a difficult object in the AM sky. After dawn, it's only about 3 degrees above the NE horizon. VENUS goes from a difficult PM object to a difficult AM object this month, passing inferior conjunction on the 10th. Telescope viewers will be rewarded with the large cresent appearance of the planet however. Mars is still a difficult AM object, low in the NE not far from Mercury. JUPITER dominates the evenings now, rising about 9 PM. Watch Jupe float by a 6th mag star on the 22nd. It's a busy month for its Galilean satellites; many events can be observed on single nights in June. SATURN is slowly climbing away from the AM Sun, rising by 2 AM in the SE. URANUS, NEPTUNE, and PLUTO are all well placed in the evening sky. See the Apr S&T, May Astro, or your favorite almanac for finderchartS. OBJECTS OF INTEREST: Minor planets Vesta and Ceres, Comets Hale-Bopp and Kopff. With all the Solar System objects to watch and bad weather around the corner, be sure to get out every night you can in June!
6/5/96	2:16 AM	2:16 AM Dione Eclipse	Rare eclipse of Saturn's Moon Dione. See Jun Astro, pg 61.
6/7/96	9:45 PM	9:45 PM Asteroid Tokio Occ	Possible occultation of 8.8 mag star SA0159939 by asteroid 498 Tokio. See Jun S&T pg 73.
6/10/96	2:00 AM	2:00 AM Mercury at Elong.	Mercury at greatest western elongation in the AM sky, but still low and quite difficult.
6/10/96	9:00 AM	9:00 Venus in Conj.	Venus reaches inferior conjunction with the Sun and not visible near this date.
6/22/96	11:00 PM	PM Jupiter/SAO 187584	Jupiter closes within 2 arcminutes of this 6th mag star.
6/24/96	11:00 AM	11:00 AM Vesta Stationary	Asteroid 4 Vesta is stationary relative to background stars. Finderchart in May S&T pg 71.
6/28/96	7:30 PM	7:30 PM SAC Mtg	Saguaro Astronomy Club meeting, Grand Canyon University, Fleming Bldg, Rm 105. Camelback and 33rd Ave.
6/30/96	8:58 PM	8:58 PM Blue Moon	No difference in color, but this is the second full Moon in one month, making it a "Blue" Moon.



EAST VALLEY ASTRONOMY CLUB
TOUR OF LOWELL OBSERVATORY
SATURDAY JULY 20, 1995

The East Valley Astronomy Club will be taking a busload of people to Flagstaff to tour Lowell Observatory. We will visit the original site in Flagstaff at Mars Hill and the dark-sky site at Anderson Mesa, 20 miles to the south. The tour promises to be more behind-the-scenes than the typical tour. Here's a rough agenda, subject to slight changes.

Mars Hill:

Clark 24-inch refractor: A historic instrument, built in 1896, which was used in Percival Lowell's famous observations of Mars.

The Pluto Camera: Clyde Tombaugh discovered Pluto using plates from this astrograph in 1930. The telescope and dome were refurbished in 1935.

21-inch photometric telescope: This instrument is used primarily for accurately measuring the brightness of stars.

The Rotunda: Originally the library, this historic room contains exhibits concerning the early history of the observatory, including the blink comparator used by Tombaugh in the Pluto discovery.

Anderson Mesa:

Perkins 72-inch telescope: Shared with Ohio State University, this telescope is used mostly for taking spectra.

Hall 42-inch telescope: The observatory's workhorse telescope, used for a variety of different types of observations. The telescope features a large spectrograph used for the study of sun-like stars.

Navy Prototype Optical Interferometer: The world's largest interferometer operating in visible light. It enables extremely precise measurement of star positions and even imaging of star surfaces.

Cost: The tour will cost you $15, which will pay for the charter bus fare and tour guide expenses.

Where/When: We will meet at 7:00 a.m. sharp at the Valley Fair Shopping Plaza, on the southeast corner of Mill and Southern, in Tempe. We should get back by 9:00 p.m.

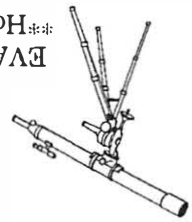
Bring: A sack lunch, for a picnic area in Flagstaff.
Warm clothes and an umbrella - it's the monsoon season at high elevation.
Money - we'll make a fast food stop on the way back. Also, Lowell has a new visitor center and gift shop.

Here's how to get on board this trip. Fill in the form below. Write a non-refundable check to "East Valley Astronomy Club" for $15 per person. Mail your check and this form to:

Sheri Cahn
4220 W. Northern #116
Phoenix, AZ 85051

Name: _____
Number of People: _____
Amount Enclosed (Number of People x $15): _____
Telephone: _____

EAST VALLEY ASTRONOMY CLUB
Robert G. Kearney, Jr., Editor
2120 W. 8th Ave.
Mesa, AZ 85202



EVAC member since 1/17/92!
Hope to see you at the meeting June 12th

EAST VALLEY ASTRONOMY CLUB

President:	Vice-President:	Treasurer:	Secretary:	Properties:
Robert Kerwin	Tom Polakis	Sheri Cahn	Sam Herchak	Steve O'Dwyer
837-3971	967-1658	246-4633	924-5981	926-2028

MEMBERSHIP&SUBSCRIPTIONS: $20.00 annually. Reduced rates available to members for *Sky&Telescope* and *Astronomy*. Contact Sheri Cahn, 3721 W. Hayward Ave., Phoenix, AZ 85051, (602)-246-4633.

CLUB MEETINGS: Second Wednesday of every month at the Scottsdale Community College, 7:30 PM. Normally Room PS 170 or 172 in the Physical Sciences Building.

NEWSLETTER: Published and mailed out the week before the monthly Club meeting. Send your thoughts and stories for publication to: Robert G. Kearney, Jr., 2120 W. 8th Ave., Mesa, AZ 85202, (602)-844-1732. Email to: JRKearney@aol.com.

CHANGE OF ADDRESS: Notify Bill Smith, 1663 S. Sycamore, Mesa, AZ 85202, (602)-831-1520. Email to: bsmithaz@aol.com.

EVAC LIBRARY: The library contains a good assortment of books, downloaded imagery, and helpful guides and is usually brought to the Club meetings. Contact Steve O'Dwyer for complete details, (602)-926-2028.

BOOK DISCOUNTS: Great savings for members through Kalmbach and Sky Publishing Companies. Contact Sam Herchak, 145 S. Norfolk Cir, Mesa, AZ 85206-1123, (602)-924-5981.

EVAC PARTY LINE: Let other members know in advance if you plan to attend a scheduled EVAC observing session. Contact Robert Kerwin, (602)-837-3971. Email to: p24493@gegpo7.geg.mot.com.