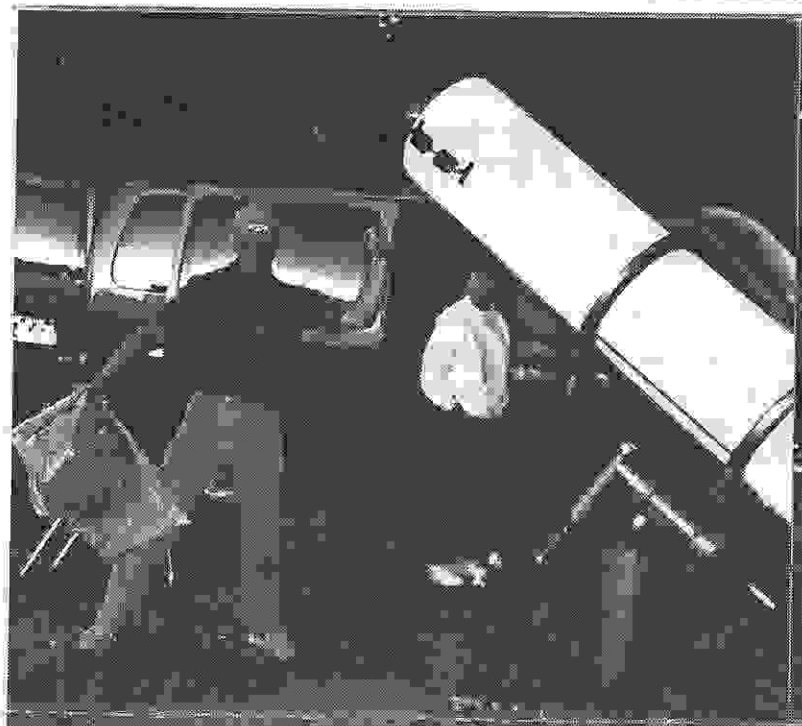
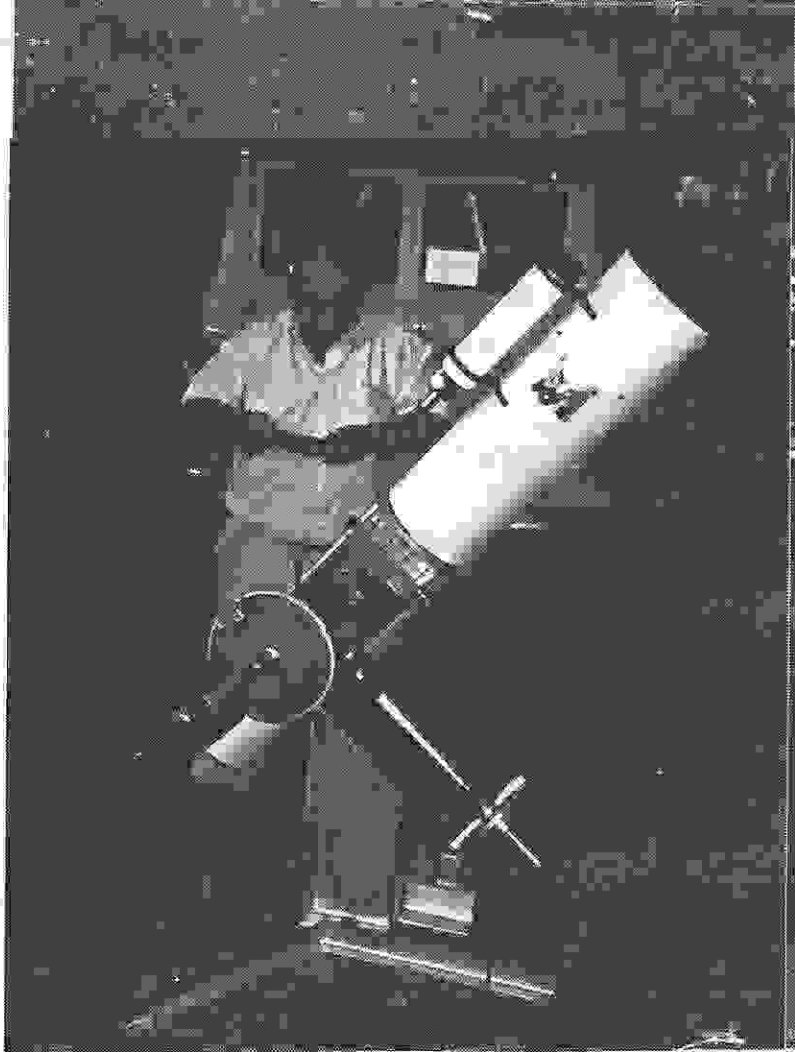
Desert Skies

July, 1993

The Newsletter of the Tucson Amateur Astronomy Association (TAAA)





GENERAL MEETING - Friday, July 2, 7:30 pm at the **NEW** Steward Observatory Auditorium.
Dr. Richard Green - "Creation of the Chemical Elements at Early Cosmic Times."

6:45 pm - pre-meeting "Beginners lecture" by Teresa Lappin will be "The Sun." All are welcome! ("old" Steward obs. room 204). See enclosed map for directions!

EXECUTIVE MEETING - Thursday, July 8, 7:30 pm at Flandrau Science Center's Conference Room

30" TELESCOPE DESIGN, LAND & FUNDRAISING MEETING - Wednesday, July 14, 7:30 pm Niehaus residence - call for directions

STAR PARTIES - 10 July - Empire Ranch - See enclosed map for directions.
17 July - Empire Ranch

COVER: This montage of photographs show some of the activities at the Grand Canyon Star Party. Pictured are (clockwise from upper left) observer extrordinaire David Levine, Rich Livitski with his 20" binoculars, Barry Hirrell cooking up Grand Canyon Sausages at the Star-B-Que, and Derald Nye preparing for another night's observing. On the back cover is a quasi-group photo. Shown (from left) are Paul Lorenz, Rob Nyberg, Vicki and Dean Ketelsen, David Levine, and kneeling is Steve McAllister.

TAAA EXECUTIVE

President	Dean Ketelson	293-2855
Vice-President	Terri Lappin	579-0185
Executive Sec.	Rob Nyberg	745-0710
Recording Sec.	Sharon Neihaus	299-8541
Treasurer	Duane Niehaus	299-8541
Member-at-Large	Bob Goff	790-1452
Member-at-Large	Dave Harvey	797-2512
Chief Observer	Mike Terenzoni	577-6857
Mem. Coord.	Gary Rosenbaum	579-0185
Past President	Tim Hunter	299-2972
Newsletter	Dean Ketelsen	293-2855

MEMBERSHIP IN THE TAAA

Individual	$20.00/year
Family	$25.00/year
Senior Citizen (over 60)	$18.00/year

Sky & Telescope subscription (optional) $20.00 (as of July, 1992)

Rates for membership in the TAAA are given above. Members may subscribe to Sky & Telescope at the time membership renewal, saving more than 25% off the cost of a regular subscription. The subscription term must match your membership period.

Send one check, made payable to: Tucson Amateur Astronomy Association, to cover both membership and subscription to: TAAA, PO Box 41254, Tucson, AZ 85717. It is best to pay your dues 2-3 months before your membership actually expires.

Desert Skies Publishing Guidelines

* All articles, announcements, news, etc. must be submitted by the **2 days prior to Newsletter meeting.** The Newletter meeting is held on the Saturday 2 weeks before the next general meeting. Materials received after that date will appear in the next issue.
* All submissions are retained by the editor unless prior arrangements are made.
* Articles, artwork, and photos should be camera ready. Photos should be screened.
* We will not publish slanderous or libelous material!

Send articles, announcements, etc. to:
TAAA - Desert Skies
PO Box 41254
Tucson, AZ 85717

Send ADDRESS CHANGES to:
TAAA
Attention: "address change"
P.O.Box 41254
Tucson, AZ 85717

4 EASY STEPS TO MEMBERSHIP RENEWAL

1. Pay your dues 2-3 months early. **Your month of membership expiration is listed on your newsletter mailing label.**
2. a) Decide if you want Sky & Telescope, then add $20 to your membership rate.
   b) Include Sky & Telescope's renewal notice, if possible.
3. Write one check, payable to TAAA.
4. Send it to TAAA, P.O. Box 41254, Tucson, AZ 85717.

Call the Treasurer if you have any problems.

July's Featured Speaker: Dr. Richard Green

Dr. Green will be speaking to us on "Creation of the Chemical Elements at Early Cosmic Time." He is currently the acting deputy director of the National Optical Astronomy Observatories, and divides his time between his administrative duties and doing observational research.

Growing up in Omaha, Dr. Green developed an interest in the sciences through reading. He studied Physics at Harvard and was a graduate student at Cal Tech, where the astronomical aspects of physics caught his fancy. He learned to observe at Palomar Observatory, where as a post doc under Maartin Schmidt, he used the 18" Schmidt telescope to photograph 25% of the sky in search of objects with an ultraviolet excess.

In 1979 he joined Steward Observatory in a research faculty position and moved to NOAO in 1983. He still maintains an active interest in observational astronomy with his own research in the absorption lines seen in Quasars, and dabbles in the work of others with an adjunct faculty appointment at Steward, supervising three thesis students.

Beginner's Lecture
The Sun

Summer in Tucson means it's HOT!...Blame it on the Sun (local terrain and weather patterns play a big part too). Just how HOT is the Sun? Imagine how hot summers would be if we were closer to the Sun, or if the sun were a hotter star. While we may curse the Sun for bringing us the high temperatures, it makes life on Earth possible. At this month's Beginner's Lecture we will learn about the sun's structure, how it affects the Earth, and what features are visible through amateur telescopes.

The Beginner's Lecture starts at 6:45pm, 45 minutes before the start of the regular meeting. See you at 6:45pm on July 2nd in room 204.

Welcome New Members:

Richard Belden
Rick Blakley
Bill Cota
Leo Enfield
Arno Jones
Ted Kaseler
Keith Kumm
Chris Lancaster
Matt Parten
Joseph Salzman

Remember to pick up your Membership Packet, chocked full of items for the beginner, at a regular meeting. Talk to Gary Rosenbaum.

Grand Canyon Star Party a Success!

The Grand Canyon Star Party turned out to be a marathon event, not only because of the daytime draw of the Canyon and the night time observing, but because all eight nights were clear! The skies were so dark and the Milky Way so bright that you felt guilty going to bed at 1am. The seeing was variable but often very good, and the wind was bad on one night, but the event otherwise was as perfect as one could ask.

A lot of the views were memorable ones. In good seeing, Jupiter looked great in nearly all the scopes. Like two years ago, it had a double shadow transit one night. Rich Livitski's 20" binoculars were the star performers of the show. One was amazed at almost every view. The Veil Nebula, the Whirlpool Galaxy and M101 in particular were unforgettable - better than most photographs you see of these objects.

The crowds we had were pretty good - down perhaps from last year because we had a less prominent observing area. Instead of observing from adjacent to the parking lot, we had a clearing to ourselves where we could leave the scopes set up and headlights were much less of a problem. The price you pay is that a lot of the crowd either didn't know we were there or refused to make the 100 yard walk to where the telescopes were set up. Daytime crowds seemed smaller than last year, and there seemed to be fewer international visitors - perhaps 40%, where last year they were in the majority. We had 5" binoculars and a Questar looking into the Canyon and Derald Nye had his 8" set up most days on Venus. The Sun was boring this year - only a single small spot for the first few days. My estimates of usage were about 5,000 daytime observers and perhaps around 2,000 nightime observers. We nearly reached my goal of a dozen scopes each night, with the sparse coverage midweek and on the last Saturday. By my figuring we had 22 people running telescopes over the 8 days - with 2 no-shows and 2 people appearing without preregistering (would you turn down a 20" telescope?). The one traveling the farthest was Dan Cade of Indiana, the least was a ranger working at the park. The event was marked by some tragedy as two observers had family members die as they were at the star party or in transit. Our sympathy goes out to Jonathan Wilkendorf and Deloy Pierce, who had to return to their families.

Many people deserve our thanks for the event coming off as smoothly as it did, none more than Chuck Wahler, the Park Ranger responsible for the group. He coordinated all of our activities, did the legwork in getting our campsites blocked out, admission fees waived, even checking out a slide projector and screen.

The marathon observer award goes to.....(drumroll).. David and Elinor Levine, who set up the Questar every day and the 12" every night. A very close second goes to Derald Nye, only because mechanical failure sent him home two days early. He showed thousands of people Venus and Jupiter in broad daylight, and was generally the first to arrive and get on Jupiter in the observing field. Barry and Kyra Hirrell, of the San Francisco Sidewalk Astronomers did a great job of sacrificing themselves by setting up near the lights of the parking lot to funnel potential observers to the observing field. Barry also rotated twilight slide show duty with Paul Lorenz and myself. He also supplied the main course at the kickoff Star-B-Que where his Grand Canyon Sausages (pork, cilantro, jalapenos, cheese, green onions and tequila - the flavor runs deep and wide!) were devoured by all present.

The most physically fit observer award goes to Eric Karkoshka, who took a night off by camping in the Canyon, went on to the Colorado River and Phantom Ranch Campground where he spent the afternoon, left at 4pm for the 10 mile hike out and arrived in time for the end of twilight and observed until after midnight. Steve McAllister gets our thanks even though he is a Bulls fan. He is the one who showed up with a 20" and said he would stick around until at least the end of the NBA finals. He arrived late on game nights but was a star party marathoner in every way. Paul Lorenz stayed the entire week and did a great job on his slide shows. Those who I have not already mentioned who stayed at least three days included Rich Livitsky (LA area), Rudy and Carol Rostash, Art Edwards, Frank Honer (Phoenix area), Dan Cade, Rob Nyberg, Mike Terenzoni, Vivian Lewis, Deloy Pierce (Salt Lake City area), Duane Niehaus, and Mike Fortier (La Quinta, CA).

Many thanks to all of you for your suppport and help in making the 1993 event the best yet! Next years event has been approved for the 4th-11th June, 1994 - make your plans now!

-Dean Ketelsen

TAAA Spring Picnic Rescheduled

Since the May picnic was rained out, Eduardo Vega has pushed to reschedule. Since the monsoons are nearly upon us, we have planned for September 18th as a reasonable choice. Mark your calendars, more details in the September newsletter.

TAAA Projects Update

There are a number of TAAA projects for which many people do not know the current status or may not even know they exist. The following update will appear from time to time to update the membership. If you would like to take part in the organization of any projects, please contact any Executive member. If any projects have been skipped, please call Dean.

30" project - The lightweight primary was polished by Bob Goff and Dean Ketelsen to an accuracy of 1/4 wave or so. Final figuring with null lens and interferometer is planned. Most aspects of the cell have been designed, no construction has taken place. Work on the 30" is currently shelved in favor of fundraising and land acquisition.

Land acquisition - A land search committee has examined 4 or 5 sites in the last 5 years, all with some feature that dooms the site as an easily accessible dark sky site that we can afford. We have a new land committee, headed by Dave Harvey, that is searching for sites for consideration. We anticipate a tour of several areas by the committee this summer to evaluate available land and its applicability to our needs. Land is addressed at the Executive meeting on the Thursday after the general meeting.

Fundraising - The fundraising committee is headed by Sharon Niehaus. Current interests are in summer astronomy camps for kids, automatic donation by members, applying to foundations for grants. Fundraising is addressed in a meeting on the Wednesday after the Executive meeting, usually at the Niehaus residence.

Mirror Making Class - The Flandrau Planetarium has donated us space for the start up of a telescope making class. With the donation of the Fultz estate of Alan Fultz' shop from Prescott (complete with finished telescopes, optical supplies, machines and tools)we have everything we need. The lab space we will be receiving is currently occupied by a LPL lab soon (few month time frame) to vacate to new space. A class can hopefully be organized a few months after that. It may be late fall before it all happens.

Ed Byers Leaving the Business

After making high quality right ascension drive gears for 40 years, the Edward R. Byers Company will be going out of business later this year. As of the Riverside Conference, a few gears were left and this may be the last opportunity to get them. No other manufacturer makes gears of the same quality. If you are interested in getting a gear, call Byers soon. Look in the Starry Messenger or back issues of Sky & Telescope for a phone number.

Doubles in the Claws of Scorpius

These warm and humid nights are excellent for double star observing owing to the steady seeing of a warm and humid air mass which causes the air to stratify or layer in levels.

Our first star to view is Xi Scorpii, a beautiful multiple star system with six stars being seen in large telescopes and five appearing in amateur telescopes. Xi Scorpii A has a magnitude of 4.8 and Xi Scorpii B a magnitude of 5.1 with a separation of 0.5 arc seconds at position angle 79°. Xi is a binary star with a period of 46.5 years and the most difficult pair to resolve - try using a 12" telescope. Xi Scorpii C has a magnitude of 7.3 and is separated from the main pair by 7.6" in P.A. 51°. This star is a dwarf and orbits the main pair in about 1000 years.

Four arc minutes to the south is Struve 1999. This system is now believed to be part of the whole Xi Scorpii system because it has the same proper motion as the main pair. Struve 1999 consists of a magnitude 7.4 star and a 8.1 magnitude star separated by 11.6" in P.A. 99°. Both are dwarf stars, another star about 9th magnitude lies 80.7" away at P.A. 83°. This whole vast system is about 80 light years from Earth.

Our next stop is another multiple star Nu Scorpii, a quadruple system if you use at least a 6" telescope, triple in smaller instruments. The close pair have magnitudes of 4.3 and 6.8 separation 1.2" at P.A. 2°. Use 200x to resolve this pair. The more distant pair lies 41.4" away at P.A. 337°. With magnitudes of 6.4 and 7.8, these stars are separated by 2.3" in P.A. 51°. Use 100x in 3" and 4" telescopes to split this pair.

Now slip over to Beta Scorpii, a bright easy pair, magnitudes 2.6 and 4.9 separation 13.6" and P.A. 21°. This beautiful duo with colors of white and blue is one of the Summer's best doubles to observe.

Now move south towards Pi Scorpii. Two degrees northwest of Pi is 2 Scorpii, a close pair of stars, magnitudes 4.7 and 7.4 separation 2.5" and P.A. 274°. Both of these stars are blue-white - use 150x to 200x in 3" to 6" telescopes to resolve this one.

Now move back east towards Antares to Sigma Scorpii. This is an unequal pair of stars magnitudes 2.9 and 8.5 with a wide separation of 20.0" and P.A. 273°. Use 50x in 3" telescopes to pick up the fainter star.

Next move north out of Scorpius to Rho Ophiuchi, a quadruple star which forms a triangle of stars. The close pair, magnitudes 5.3 and 6.0 are separated by 3.1" in P.A. 344°. A white pair, these stars are resolved in a 2.4" telescope at 100x. The other two stars, magnitudes 7.0 and 7.9 flank each side of Rho.

From Rho, move south to Antares, an orange colored supergiant star. Antares, magnitude 1.2, has a companion of magnitude 5.4 separated by 2.9" located westward of the primary at P.A. 275°. This is a big scope double, use high power 200x and at least a 6" telescope. I have never seen the companion in anything less than an 8" telescope. In an 8" f/10 reflector, it appears as a green dot nestled close to orangish Antares. Why not try a 80A blue filter to reduce antares orange glare and accentuate the bluer companion.

From Antares drop south to Herschel 4850, a yellow pair of stars, magnitudes 5.9 and 6.6 separated by 5.4" at P.A. 354°. This pair is nice in a 2.4" telescope at 100x.

From H 4850 move southwestward to Brs O 12, the 12th star of the Brisbane Observatory List. These white stars are an easy pair to split at low power. The stars have magnitudes of 5.4 and 6.9 separation 22.8". P.A. 320°. Now move out of Scorpius into Lupis to a star called Xi Lupi, a splendid pair of white stars. With magnitudes of 5.3 and 5.8, separation 10.4" and P.A. 49°, they are a beautiful site in a 2.4" refractor at 50x.

On these balmy July nights after the monsoon storms end and the skies begin to clear, why not take out your telescope and look at some of these beautifully paired star systems?

- Jeff Brydges

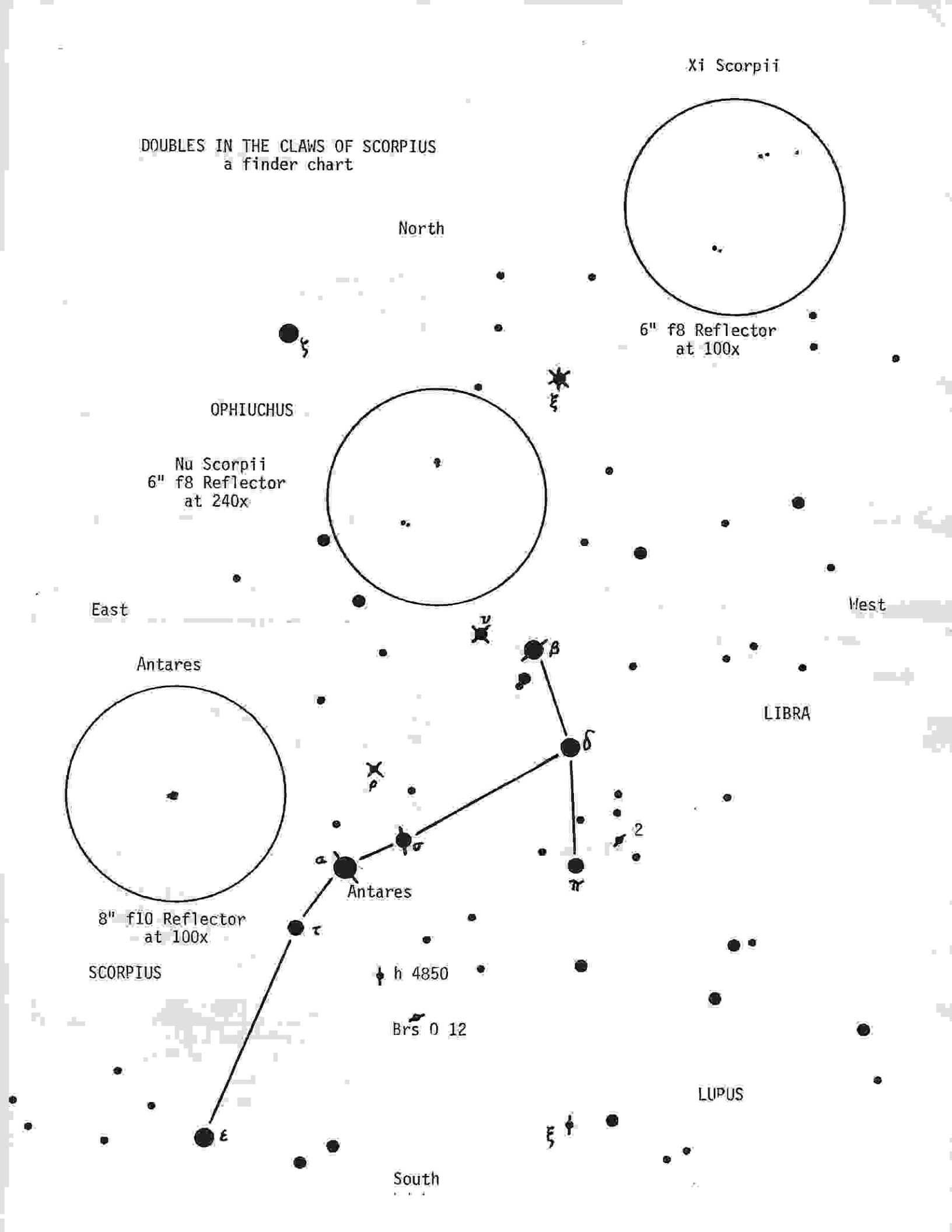
Desert Skies Classified

For Sale: 14.5" Sky Designs Dobsonian - superb optics. $1500 - call Gordon Gower, 749-0398.

For Sale: Edmund Scientific 4.25" f/10 Newtonian with equatorial mount and finder. Focuser is mising rack gear. 20 years old, $60. Gilbert Friedman 571-1662.

For Sale: Celestron 8" complete with tripod, wedge, 3 eyepieces and a set of color filters. 12 years old, excellent condition, $850. Marty Sade 797-0374.

For additions or changes to this list call Dean, 293-2855.


DOUBLES IN THE CLAWS OF SCORPIUS
a finder chart
Xi Scorpii
6" f8 Reflector
at 100x
North
OPHIUCHUS
Nu Scorpii
6" f8 Reflector
at 240x
East
West
Antares
LIBRA
8" f10 Reflector
at 100x
Antares
SCORPIUS
h 4850
Brs 0 12
LUPUS
South

OBSERVER'S REPORT

June gave Arizona stargazers opportunity to make up for lost time, turning out to be the year's best month yet weatherwise. Most of the state was clear during dark sky time, even up north. Unfortunately by the time you read this the fun will be over, for the real monsoon season will be upon us.

Many thanks again go to Demo Galanos and his 7 inch f/9 Astrophysics refractor for taking care of the boy scout star party June 4th on Mount Lemmon. While for many of us this was meeting night, Demo once again used his high end refractor to the delight of children and adults alike. Terri Lappin and Anthony Faulkner are also to be thanked for taking care of a short notice star party south of town for the Arthritis Foundation. Apparently a hay ride was the bonus added to the reward of showing the universe to these special children.

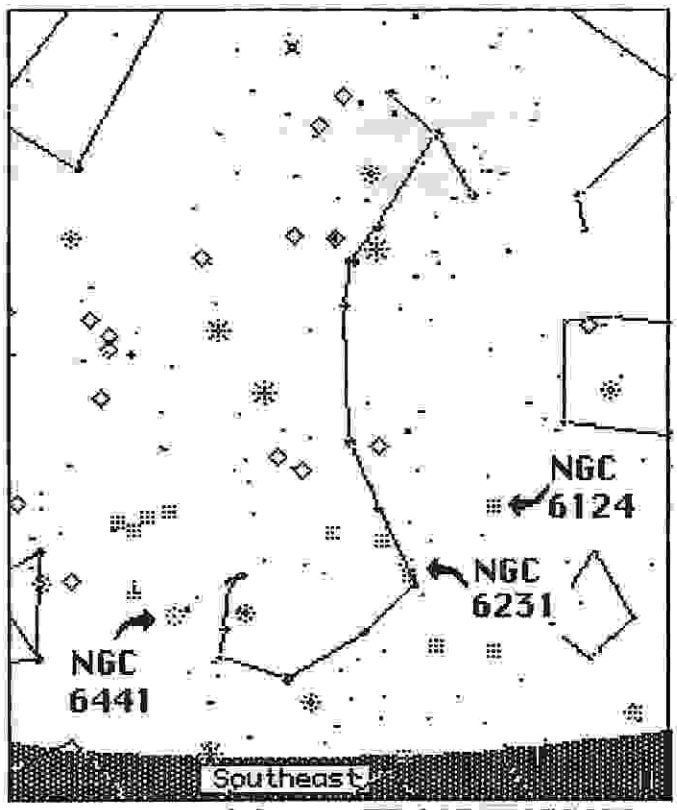
The big event this month was the Grand Canyon Star Party. Clear weather, large crowds and dedicated TAAA members made for a satisfying and highly successful event. Although many members deserve commendation for their efforts, Dean Ketelsen deserves high praise. Dean spent a considerable amount of time throughout the year planning and setting up this event. While up at the canyon he was faithfully seen showing the international crowd our national wonder through his Japanese battleship binoculars. The success of his efforts can be seen in what I see as a growing and popular event. Other members deserving praise for their work at the canyon are David and Eleanor Levine, Derald Nye, Bob Goff, Eric Karkoshka, Rob Nyberg, Paul Lorenz and Andy Meyer. If I've left anyone out please forgive me, I only arrived for the last half of the week's activities. See Dean's article elsewhere for a complete description of this event.

July is a month where many of us (in spite of the clouds) try to look south in the direction of the richest areas of the Milky Way. Some of this month's rewards for Tucson stargazers are objects in Scorpius that most other amateurs don't see well due to their low altitude. Three of these objects that I've found to characterize the rich area of this part of sky are the open clusters NGC 6124 and NGC 6231, and the globular NGC 6441. All of these objects can even be seen in binoculars, although you'll need high quality ones to see NGC 6441.

NGC 6124 is a 7th magnitude open cluster of about 100 9th through 12th magnitude stars. This cluster fills an area of about 25 arc minutes, making the largest of the three described here. At TSP this cluster reminded me of a smaller version of M41, the cluster below Sirius. Take a pair of binoculars or low power telescope and see for yourself. You'll find 6124 approximately 6° west of the bright binocular double star zeta Scorpii.

Much richer and "tighter" than 6124 is NGC 6231, a 5th magnitude open cluster that ranks as one of the most spectacular in the sky. Eight magnitude 7 and over 100 10th through 13th magnitude stars fill just 15 arc minutes of sky. This makes this object superb for most any telescope. Higher power views lose some of the structure of the cluster, but fill the field with brilliance. Binocular or low power telescope views show fainter open clusters surrounding 6231 (such as Herschel 12 and NGC 6227 located to the north) but also reveal a trail of stars lined up to the northeast. This "star trail" marks one of the spiral arms of our galaxy, lying over 5000 light years from us. Of course many of the stars that make up this arm are obscured by interstellar dust and gas. Look for 6231 also off of the bright binocular double star zeta Scorpii, this time by scanning just north.

Finally, NGC 6441 is an 8th magnitude globular cluster only 4.5 arc minutes from the 3.5 magnitude star G Scorpii (just east of the "stinger stars"). The close distance of the globular to this bright star makes this round, rich cluster striking to the eye. It also helps that 6441 is only 3 arc minutes in size. On seeing this globular your first reaction may be that you've found a comet. To resolve this object you'll need a large telescope because its stars are 17th magnitude and fainter. Here's a chart to increase your chances of locating these objects:



LOOKING SOUTH FROM TUCSON, JULY 6, 8:30 P.M.

Hoping to see you observing in spite of the monsoons, clear (or at least fair) skies!

Michael Terenzoni

STARSPOTS
by David Oesper
The Aberration of Starlight

In 1725, the English astronomer James Bradley (1693-1762) began to observe the positions of γ Draconis and other stars in an attempt to discover stellar parallax. At that time, it was known that the stars were "very distant", but Bradley hoped to use the Earth's orbit as a baseline to trigonometrically determine the distance to at least one of the nearer stars. Using a telescope that was 212 feet long and mounted vertically in a chimney, Bradley carefully measured the positions of γ Dra and other stars at the same sidereal time each night using a reticle eyepiece. What he found was totally unexpected. During the course of a year, *all* of the stars in the field traversed a circular path of diameter 41 arcseconds! Rather than concluding that all the stars were at a distance of 0.16 light years, Bradley realized that the stars were traversing paths that were 90 degrees out of phase with what should be seen if this were due to parallax. Clearly, he had discovered something new.

By 1728, Bradley explained this phenomena as the *aberration of starlight*, a term which he himself coined. Here's an analogy. Let's say you are standing in the rain with an umbrella over your head on a day when there is no wind. You stay dry. But now, you start running in a particular direction at constant speed. In order to keep dry, you need to tilt your umbrella slightly in the direction of motion to keep from running into the rain out in front of you as you rush into it. You might call this phenomenon "aberration of raindrops". Light behaves the same way. The Earth orbits the Sun at an average speed of 29.8 km/s. This causes the observed positions of stars to be shifted slightly toward the direction of motion of the Earth at any given time. The equation for this is:

$$\Delta\theta = \arctan\left(\frac{v\sin\theta}{c + v\cos\theta}\right)$$

where:

$\Delta\theta$ = the star's angular displacement in the direction of motion

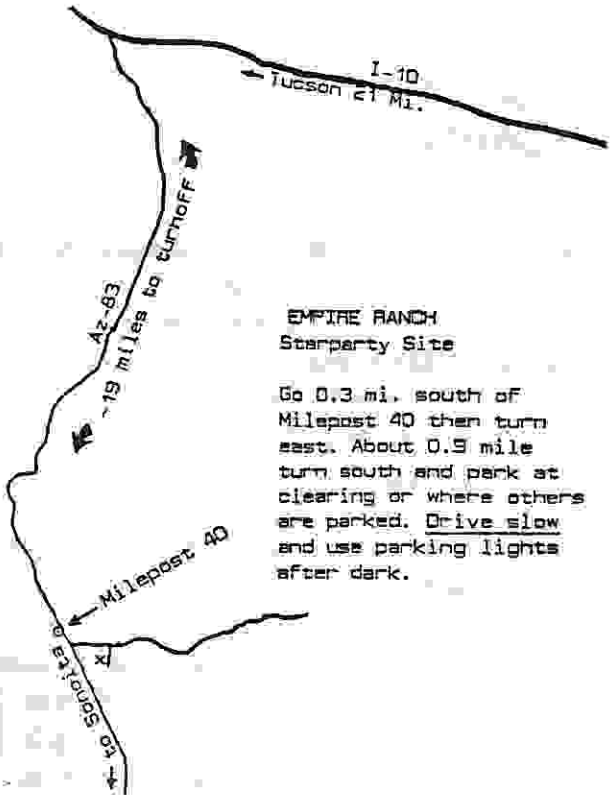
v = the velocity of the observer

θ = angle between the direction of the star and the direction of motion

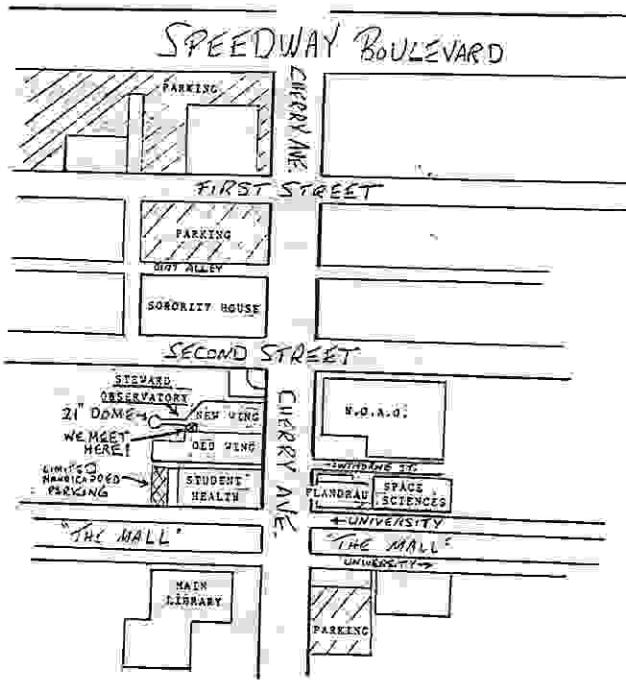
c = the speed of light

During the course of a year, a star at the north or south ecliptic pole is seen to move around a circle of angular radius 20.5 arcseconds. Stars on the ecliptic (the plane of the Earth's orbit) oscillate to and fro along lines of angular half-length 20.5 arcseconds. At an intermediate ecliptic latitude β (angle measured from the ecliptic plane), the aberration forms an ellipse with semi-major axis 20.5 arcseconds and the semi-minor axis 20.5 sin β arcseconds.

The phenomenon of the aberration of starlight offered further proof of two important facts to Bradley and his contemporaries: that the speed of light is finite (if it were infinite, no aberration would be observed), and that the Earth is indeed in orbit about the Sun. Furthermore, through Bradley's painstaking observations over many years, he was able to detect a phenomenon he called *nutation*. The Moon, in its complex orbit around the Earth, causes gravitational perturbations on the Earth. One of these effects is to cause the Earth's polar axis to traverse a circle 18 arcseconds in diameter every 18.6 years, this being superimposed on its precessional motion. Though Bradley discovered stellar aberration and nutation, he was not able to detect stellar parallax. Even the nearest star, Proxima Centauri (not visible from England), executes a parallactic ellipse only 1.5 arcseconds in diameter - an effect a dozen times smaller than that of nutation. The discovery of stellar parallax would have to wait until 110 years later when German astronomer Friedrich Wilhelm Bessel (1784-1846) measured the parallactic ellipse of the star 61 Cygni, having a major axis of only 0.6 arcseconds.



Meeting Location



TAAA Executive Meeting, 10 June 1993: The meeting was called to order @ 7:45 PM @ the Flandrau Conference Rm. Exec. Comm. members present were: Dean Ketelson, Derald Nye, Terri Lapin, Gary Rosenbaum, Rob Nyberg, and Mike Terenzoni. Absent were: Duane Niehaus, Sharon Niehaus, David Harvey. Assoc. members present were Bob Goff, David Levy, and Tim Hunter.

I. Land Search Issues: Item was tabled.

II.Fundraising News: Committee report by Terri Lapin

A. Raffle: After discussion, motion by Rob Nyberg, seconded by Terri Lapin to develop a raffle within the association for an eyepiece, using part of credit the assoc. has at Stellar Vision.

B. Annual Auction: Suggested that the annual auction be cancelled and replaced with one or more swap meets, possibly at the annual picnic. No action taken.

C. Brochure: The Committee is developing a brochure describing TAAA star parties for convention groups.

D. TAAA Slide talk: Who has the slides? Maybe Gene Fioretti or Duane Niehaus.

E. Science/Astronomy Camp: May be ready with a plan for next Summer. After discussion a motion was made and passed to send Terri Lapin to the ASP astronomy education seminar next month in San Diego. Est. cost is $275. Terri will make a summary presentation to the membership this Fall.

F. Solicitation letter: may be ready by Sept.

G. 40th Anniv. Banquet: Is there interest in the Assoc. for this event?

H. 40th Anniv. T-shirt: We could use the logo design developed last year.

III. Bulk Mail: Rob Nyberg and Terri Lapin will get permit for August newsletter mailing. Save minimun $300 year in mailing costs for newsletter.

IV. Constitutional Reform: Reviewed proposed changes to Constitution; Gary Rosenbaum & Terri Lapin will prepare draft for final review @ next mtg.

V. Locate 16" @ Sabino Cyn?: Terri Lapin and Gary Rosenbaum will draft a letter to Sabino Canyon authorities, asking if they have interest in locating a public telescope there and will followup.

VI. Sky Publishing and the TAAA: David Levy and Terri Lapin reported on their efforts to secure a greater discount for association members than the current 10%. So far no change in Sky Publ. policy. Bob Goff suggested his business may become a book dealer.

VII. Upcoming Events:

A. Upcoming Speakers: Bob Goff and Gary Rosenbaum will plan main speakers for the Summer and Fall.

B. Grand Cyn SP June 12-19

C. Smithsonian SP June 26

D. Rescheduled Picnic @ Vega-Bray is Sept. 18

E. Universe '93, San Diego, CA

VIII. Treasurer's Report

IX. A.L. News: Derald Nye received a ballot for A.L. Secy. Motion was passed to vote for candidate Anna Reyes.

The meeting was adjourned @ 10 PM. Respectfully Submitted, Rob Nyberg, Exec. Secy.

DARK SKIES for Tucson (in MST)

1993 JULY — no twilight, no moonlight

Th/Fr	1/ 2	-
Fr/Sa	2/ 3	-
Sa/Su	3/ 4	-
Su/Mo	4/ 5	-
Mo/Tu	5/ 6	-
Tu/We	6/ 7	9:13pm - 9:21pm
We/Th	7/ 8	9:13pm - 9:52pm
Th/Fr	8/ 9	9:12pm - 10:21pm
Fr/Sa	9/10	9:12pm - 10:51pm
Sa/Su	10/11	9:12pm - 11:21pm
Su/Mo	11/12	9:11pm - 11:53pm
Mo/Tu	12/13	9:10pm - 12:28am
Tu/We	13/14	9:10pm - 1:07am
We/Th	14/15	9:09pm - 1:51am
Th/Fr	15/16	9:09pm - 2:42am
Fr/Sa	16/17	9:08pm - 3:39am
Sa/Su	17/18	9:07pm - 3:53am
Su/Mo	18/19	9:07pm - 3:54am
Mo/Tu	19/20	9:06pm - 3:55am
Tu/We	20/21	9:05pm - 3:56am
We/Th	21/22	9:04pm - 3:57am
Th/Fr	22/23	9:35pm - 3:58am
Fr/Sa	23/24	10:13pm - 3:59am
Sa/Su	24/25	10:51pm - 3:59am
Su/Mo	25/26	11:32pm - 4:00am
Mo/Tu	26/27	12:17am - 4:01am
Tu/We	27/28	1:06am - 4:02am
We/Th	28/29	2:00am - 4:03am
Th/Fr	29/30	2:57am - 4:04am
Fr/Sa	30/31	3:55am - 4:05am
Sa/Su	31/ 1	-

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