Desert Skies

Tucson Amateur Astronomy Association

Volume XLII, Number 9

~~September~~ November, 1996

Calendar of Events

BEGINNERS LECTURE- Friday,November 1, 6:30 pm at the Steward Observatory Auditorium - room N210. Topic is A Tour of the Fall Constellations by Terri Lappin. All are welcome!

GENERAL MEETING - Friday, November 1, 7:30 pm at the Steward Observatory Auditorium -room N210. Topic is The Study of Earth-like Planets Around Other Stars by Nick Woolf.

YOUNG ASTRONOMERS CLUB - Nina Lehman has a broken bone in her foot and will not be able to host the Young Astonomers this month.

BOARD OF DIRECTORS MEETING - Thursday, November 7, 7:00 pm at the Conference Room at Flandrau Science Center.

STAR PARTIES & EVENTS:
November 2: Empire Ranch
November 9: Empire Ranch
November 13: Booth Fickett
November 20: Lulu Walker
November 22: Project Astro

Newsletter Schedule: Deadline for articles: Monday, November 18. Printing: Monday, November 25, Folding Party: Tuesday, November 26. Mailing: Wednesday, November 27. The newsletter is scheduled to be in the mail at least one week prior to the following month's General Meeting.

Cover: The Pryor family is ready for an evening's observing at the Kitt Peak Star Party with their 8 inch Dobsonian. Pictured from left is Rebecca, Cheryl, Ken, Sennin and Lianna. Photo by Philip Farnam.

TAAA Home Page: http://www.primenet.com/~lwilson/taaa/taaa.html

Office	Name	Phone	Email
President	Terri Lappin	579-0185	tlappin@as.arizona.edu
Vice-President	Larry Wilson	299-6608	lwilson@primenet.com
Secretary	Dave Harvey	797-2512	dave@astro.as.arizona.edu
Treasurer	Gary Rosenbaum	579-0185	garyr@astro.as.arizona.edu
Member-at-Large	John Kalas	620-6502	
Member-at-Large	Steve Kristman	795-9332	
Member-at-Large	John Polacheck	544-8152	jpolacheck@mem.po.com
Past President	Dean Ketelsen	293-2855	ketelsen@astro.as.arizona.edu
Chief Observer	Gil Esquerdo	290-0168	esquerdo@psi.edu
ALCorrespondent	Bob Gent		rlgent@aol.com
Newsletter Editors	Nancy Wagner &	579-1382	nlwagner@aol.com
	Nina Lehman	579-1382	ninalehman@aol.com
Star Parties	Karen Allen	749-5744	

Membership in the TAAA
Individual $23.00/year without Astronomical League Membership
Family $25.00/year with Astronomical League Membership
Senior Citizen (over 60) $23.00/year

Sky & Telescope subscription (optional) $27.00. 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

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. If you want Sky & Telescope:
   a) add $27 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.

Desert Skies Publishing Guidelines
All articles, announcements, news, etc. must be submitted by the newsletter deadline listed above. Materials received after that date will appear in the next issue. All submissions are retained by the editor unless prior arrangements are made. Partial page article submissions should be submitted on Wordperfect compatible files on a floppy. Full page articles, artwork, and photos should be camera ready. We will not publish slanderous or libelous material! Send articles, announcements, etc. to:

TAAA - Desert Skies
PO Box 91316
Tucson, AZ 85752-1316

OR email: ninalehman@aol.com or nlwagner@aol.com

Desert Skies is published monthly by the Tucson Amateur Astronomy Association, PO Box 41254, Tucson, Arizona 85717

President's Message

In preparing for last month's beginner's lecture I had a chance to get in writing what I think the TAAA needs to do in the next year. Putting needs and goals in writing give direction...this is a classic "how to get organized" skill which helps to focus your energy and time on what is important. Since I have performed this exercise, I thought I should share my goals for the TAAA with all members via this president's message. At the October board of directors meeting some of these goals were discussed and input from those at the meeting has been included.

Star Parties

In the past 10 years, the TAAA has grown significantly but attendance at star parties has dropped slightly. We should change this. Empire Ranch is our regular observing site. Increased lighting and a proposed mine threatens this site, but it is still darker than most member's back yards. I would like to encourage members to go to Empire if they haven't been there yet. New members may imagine a very poor road, but it isn't that bad! The vehicles at star parties may be mostly trucks and vans, but this is probably more a case of the size vehicle needed for telescope and gear rather than indicative of road conditions. The road is passable by most sedans and small cars. If the road is not for your vehicle, there is an area where you can park and then walk a short distance to the observing area. To increase attendance at Empire, the board discussed organizing car pools. This is good if you aren't sure about driving alone at night or aren't sure of the location. If there is membership interest in car pooling (or caravans), we can make a list of drivers available at the monthly meeting. Other ideas have been discussed about increasing star party attendance and some of them will be implemented.

Education Outreach

The TAAA has a strong education outreach program. With Project ASTRO up and running this month it will be even stronger. Our observing skills are used at school star parties and this is a real service to the community. Future goals are to create a teacher's manual for successful star parties. We will also be planning a Telescope Clinic for teachers. TAAA members can use their experience and knowledge of telescopes to show teachers how telescopes work, what needs to be done for broken telescopes, and how to find things in the sky. We will be scheduling a Telescope Clinic sometime next spring. I also think we could do something similar for our beginner astronomers who feel lost when it comes to using a telescope.

Telescope & Land Project

The biggest goal for the TAAA is our telescope and land project. I have thought long and hard about this. The project has been around for a long time and needs a good shot in the arm to get it moving again! The effort to find land continues to be the area of activity and there are new possibilities regarding land even as I write. I will not go into details here as they could change next month.

Now, regarding the shot in the arm that this project needs! I wish to create a Telescope Group that will provide leadership in all TAAA telescope projects. This Telescope Group would have authority over the maintenance and use of our telescopes (we have several) and the design of the 30" telescope. I would like to include individuals from the local community in this group. These people, experienced in telescope design and construction, could assist the Telescope Group in making decisions regarding the 30" telescope. This would tap into the skills of experts from such places as Kitt Peak and Steward Observatory. The board of directors came up with a list of possible participants for the Telescope Group and inquiries will be made to determine their willingness to help with our 30" telescope. These individuals could make valuable contributions to the project. With some community involvement, especially at the professional level, the project will gain some credibility that it has lost over the years.

Fundraising (for 30" and land)

Results of any fundraising effort depends heavily on having an attainable goal. We will not be successful with fundraising until a telescope design has been realized. Construction of part of the telescope (the mirror cell) should help to increase our chances of successful fundraising. The mirror cell has been roughly designed, but the final design still remains to be completed. This could be one of the first items for the Telescope Group to consider.

Well, these are some of my ideas. I am sure you have opinions or ideas. So...as always...give me a call.

Clear Skies!

Terri *

Meeting News

Basketball Game

Attention! U of A Men's Basketball scrimmage game is on the night of our meeting. Allow extra time for parking !

November's Speaker: Nick Woolf

Nick Woolf will speak on "The Study of Earth-like Planets Around Other Stars"

Nick Woolf received his B.S. in Physics in 1956 and his Ph.D. in Astrophysics in 1959 from the Manchester University in England. He has held the positions of Astronomer and Professor of Astronomy at Steward Observatory since 1974. He is currently involved in developing optical schemes for the study of Earth-like planets around other stars. He is also a project scientist for the Mt. Graham International Observatory and is studying possibilities for additional advanced technology telescopes for Mt. Graham which would take advantage of some of the special properties of that site. He shares the following about his experiences before coming to Steward Observatory:

"After leaving Manchester University, I had 6 months in Pretoria, South Africa where the 74 inch was before they moved it to Sutherland. Then I had a couple of years at Lick Observatory, where among other people I met was Joel Stebbins whose Ph.D. was in 1903 - a real link to the past. After that I was in Princeton for four years flying a 36 inch telescope, Stratoscope II from a balloon at 80,000 ft. Next I had a couple of odd years alternating between New York City at the Institute for Space Studies, and the University of Texas in Austin. Then I went to the University of Minnesota from 1968 to 1974, and from there came here.

"I got into astronomy before Sputnik. I was interested in the topic when young, but did not even imagine there was any possibility of working in the field - it seemed to be for rich folks wanting a hobby! Among other points of contact, I heard Fred Hoyle give the Rieth Lectures on radio in 1947. Then when an undergraduate studying physics, it suddenly became clear that there were possibilities of actually doing this as a living - rather, a sort-of-living, because the good young astronomers I met at that time were as poor as church-mice. One of the turning points was when Fred Hoyle visited Manchester, and gave a talk about work he had just been doing on stellar evolution.

"At that point, I had to also decide how I would make a living if astronomy fell through. That is a standard need for anyone going into the field today too. I decided that I would work in optics, and use it in astronomy if possible, but there would be uses of optics for industry too. I still think that is a good choice for anyone today.

"I was taught observing by amateur astronomers while I was an undergraduate. We had a double telescope made by Grubb (1890 vintage) it had a 6 inch refractor on one side, and an 8 inch reflector as a "counterweight". One of the strange features of the weight driven clock drive was that it only had one-eighth of a circle in its worm wheel. If you observed too long, you would run out of gear, and had to wind up the weight, find the object again in hour angle, and start observing again."

Peace,
Nick Woolf *

Beginner's Lecture: A Tour of the Fall Constellations

By Terri Lappin

The summer triangle is now in the western sky at sunset and the constellations of fall are overhead. This month's beginners lecture will be a tour of the fall constellations. Objects easily found with small (6" - 8") telescopes will be described, including Messier objects in Andromeda, Pegasus, Auriga, and Taurus. Remember, that as with most skills, experience makes it easier to do. Some objects take a little searching around before you can find them. Hopefully, you have a finder scope on your telescope. The bigger, the better! *

Club News

January 1997 Newsletter Deadline

Please note, due to many of our members (including your editors) taking time out to vacation at Christmas time, the deadline for inputs for the January 1997 issue of Desert Skies is December 11. This leaves your editors 3 days rather than 7 days for putting it together and getting it to the printers. Please make a special effort to get your inputs in to us early. The earlier the better. We shall be glad to start working on the January 1997 Desert Skies any time prior to December 11. If you have any submissions, please send them as early as possible.

Thank you, Nancy Wagner and Nina Lehman, Editors, Desert Skies. *

Holiday Party

The TAAA HOLIDAY PARTY will be on Wednesday, December 11th at 7:00 PM in the new Sky Room of the China Rose Restaurant. Location: 5101 E. Speedway Blvd.. Dinner: buffet and non-alcoholic drinks. Cost: $ 10.00 per person (includes tip). Friends and family welcome. RSVP and include a check payable to "China Rose". Reservations can be made at the November TAAA General Meeting or by mail (c/o John Polacheck, 6841 N/. Skyway Dr., Tucson, AZ 85718). For more information call: 544-8152. Space is limited to the first 100 who respond. Last minute reservations can be made at the December meeting, if space is still available.

Ex-president of the TAAA, Tim Hunter, and his wife, Carol, will be our de facto hosts. The Star Room is newly remodeled with astro photos and ceiling constellations. Food, as always, will be excellent. Bring lots of cheer and a few slides to share with the group.

DON'T BE DISAPPOINTED.....MAKE YOUR RESERVATIONS SOON !!*

1997 Calendars and Other Goodies

At the November meeting we will begin selling the Exploring the Universe 1997 calendars from the publisher of "Astronomy" magazine. This wall calendar measures 13.5" X 10.5" and features 13 astronomical images. Included are descriptions of celestial events for many dates, plus room for writing in family activities or appointments. Buy yours from the TAAA for $10 and save $2.95 plus shipping charges. Last year these calendars went fast, so be sure to get yours! *

Astronomy Magazine Subscriptions

Gary will be accepting money for Astronomy magazine subscriptions at the November meeting. The regular subscription rate is $34.95, but by ordering through the TAAA your cost is $20. In the past we collected subscriptions only at the end of the year, but with changes at Kalmbach Publishing we will be able to accept subscriptions at any time of the year. If your subscription is due to expire you can renew through the TAAA. While it isn't absolutely necessary, it does help to have a renewal slip or the mailing label from your magazine to ensure your current subscription is renewed. *

The Halloween Astronomy Project

Halloween...little ghosts, goblins, and space aliens abound! What better time to treat these creatures to a peak through your telescope. Their parents will enjoy it too! This year the treats for the kids include Jupiter and Saturn on a moonless evening.

Set up your telescope near the sidewalk with a jack-o-lantern or similar attention getting, but dim, light source nearby. Spooky music gets attention too! Leave your patio lights off to draw kids away from your front door and towards you and the telescope. Then watch the Dr.Jeckle/Mr. Hyde reaction when the meanest, ugliest looking monster gets a look at the thin rings around Saturn. While most masks have large openings for eyes, kids may see better if they remove their masks. Be sure to have a step ladder handy for the little ones. The tendency is for people to support themselves by leaning against the telescope so warn them not to touch your telescope. It's best to use an eyepiece with some eye relief. These are easiest for the public to look use.

Instead of the usual Tootsie Roll, offer astronomical candies like miniature Milky Ways, Star Bursts, or Mars Bars. You may get one or two youngsters with a real interest in the night sky. Consider picking up something special from Stellar Vision, The Nature Company, or Starizona for these kids...help spark their interest in science!

For the past 5 years we have had a telescope outside on Halloween and are the hit of the neighborhood! We are known as the "people with the telescopes" in our neighborhood. Both the kids and the adults get a kick out of the experience and many forget that they are there for the goodies! Several gremlins come back for a second and third look.

I am interested in hearing any stories about your experience with the Halloween Astronomy Project. Tell me how many kids look through your telescope and what objects you show them. I hope that TAAA members can make the Halloween Astronomy Project an annual event in their neighborhood.
Terri *

Tucson High School Telescope Project

BY PATRICK WOIDA

Bob Goff and I are charging right along with the Tucson High School Telescope. We're going to make a 30" reflecting telescope that uses a design based on ALL SPHERES, no parabolas. This design will give better optical performance than a classical cassigrain. The project will be built by students, access will be provided to all the city high schools and there will be public evenings too.

The University of Arizona has entered into a one-of-a-kind collaboration with the project backed by VP Casanovich and Steward Assistant Director, Buddy Powell. The Steward Mirror Lab will cast the 30" primary this January while they do the Large Binocular Telescope 8 meter mirror.

For additional information contace Bob Goff or Patrick Woida at: goffaxe@azstarnet.com and pwoida@rigel.as.arizona.edu. *

Project ASTRO

BY GARY SOWINSKI

Project ASTRO seeks to enhance science and astronomy education by creating and fostering partnerships between teachers and astronomers in the Tucson area. By participating in Project ASTRO, TAAA members can share their love for astronomy and the excitement of science with future generations. The Project ASTRO Tucson Coalition will build on the extensive local astronomy resources including: the University of Arizona Steward Observatory, Lunar and Planetary Lab, and Flandrau Science Center; the Tucson Amateur Astronomy Association; and the National Optical Astronomy Observatories (NOAO): Kitt Peak National Observatory, National Solar Observatory, and U.S. Gemini Program.

Project ASTRO intends to pair 20 astronomers with approximately 25 teachers for the 1996-1997 school year. Students will be in grades 4 to 9, and most of the students will be between 10 and 15 yeas of age. Astronomers from the TAAA will be given equal standing with professional astronomers from among the other Tucson coalition member organizations. TAAA astronomers are most likely to participate in one of three ways:

- in the classroom,
- in after school (evening) activities among school astronomy clubs or other youth organizations such as the Girl or Boy Scouts (ideal for astronomers who work during the day), and
- by supporting star parties or observing sessions, or by making or repairing telescopes.

To participate in the classroom or with an after school group, the astronomer must:

- commit to remain in the program for the 1996-1997 school year,
- attend and participate along with the teachers in a two day hands-on training workshop that is being planned for November 22 and 23,
- attend a planning meeting with the teacher, or club or group leader (a commitment of approximately one hour),
- make at least four classroom or club visits during the 96-97 academic year (a commitment of approximately one hour four times during the school year),
- be available for consultations by phone with the teacher between class visits,
- recruit, when possible, other astronomers to assist with observing sessions or field trips, or telescope making or repair sessions, and
- participate in follow-on workshops and cooperate with staff to assess and improve the program.

Because of the strength and resources among the Tucson coalition members, the astronomers will be well supported. The ASP that developed Project ASTRO publishes a comprehensive manual for astronomers and teachers. The manual is filled with class projects, subject material, and lecture topics. All astronomers who commit to the program will receive a manual for free at the training workshop in November. Lecture outlines, notes, and suggested reading for 12 one-hour lectures on such topics as "A Tour of the Solar System", "Comets and Asteroids", "Was There Life on Mars?", "Light and How Astronomers It", and "The New Planets" are being assembled and will be available to all TAAA astronomers participating in the program. Slide sets, view graphs, and class handouts for each of the lecture topics are also being assembled and will be available through the TAAA. Flandrau is a NASA Teacher Resource depository, and has significant instructional material available for the teacher and astronomer, including numerous high quality NASA video tapes which are available for checkout and class room viewing. NOAO also has outreach material available that could be used in the classroom. An inventory of this material will be available through the TAAA. Professional astronomers from among the coalition members will also be asked to make additional classroom resources available to the program. An inventory of those resources will be available through the TAAA as well. TAAA members will be available to assist in planning and organizing class lectures or projects. Since many classrooms have INTERNET access, a resource packet on astronomy related websites has been compiled and is available through the TAAA, and a catalog of interesting public domain software for use in the classroom is being compiled for MACINTOSH as well as Windows computers. The catalog as well as the software will be available through the TAAA.

TAAA members may not realize that the Flandrau Planetarium hosts a great number of school and class visits during the year. Flandrau personnel conduct the planetarium session, and the children experiment with the exhibits in the science center before or after the planetarium session. A visit to Flandrau is an ideal field trip for Project ASTRO students. The partner teacher will assist in making sure that the astronomer and class are both prepared and the class receptive. Approximately 15 TAAA members expressed interest in Project ASTRO at the September meeting. Since this is a three year program, though, we would like to have many more members participate. Many members asked about the level of support they would receive. Our unique position as a Tucson coalition member places an enormous amount of resources at the finger tips of the Project ASTRO astronomer. I have been working to inventory and organize the resources, so that the teachers and astronomers have access to the materials immediately after the November workshop. With your partner teacher's help, it should be easy to organize and develop four one-hour class or group sessions from among the wealth of resources available. All that is required is a love for astronomy and a sincere desire to share that love with children.

Project ASTRO application forms for astronomers and teachers will be available at the November meeting or by contacting me at "sowinski@arizona.edu". I will try to have a Project Astro manual at the November meeting as well. Members who took application forms at the September or October meetings can turn them into me as soon as they are filled out. *

Special Interest Groups

Computers In Astronomy Subgroup

By Roger Tanner

The 15th meeting of the subgroup was held at my house where the meteor trail monitoring setup was discussed and Derald Nye described the graphical ephemeris calculator he used during the late 50s to find and photograph the path of earth orbiting satellites through the sky.

The meeting with the meteor monitoring system was set up by myself and Andrew Tubbiolo. The idea came up during a discussion between Andrew and myself on how we could monitor the upcoming Perseid meteor shower. After considering various optical means we sort of arrived at the idea that we could monitor the trails left by meteors with a FM radio. We talked to some individuals in the Steward radio lab about their meteor trail monitor setup on the top of Steward Observatory. What we intended to do is get an A/D converter interfaced to a PC and monitor the strength of the radio signal in a blank FM band. What this is based on is the fact that incoming meteors leave behind a trail of ionized gas which we see as the glowing trail. But the ionization lasts much longer than the visible light. When this trail is in the sky it acts as an conductive wire and radio waves reflect off if it. If you tune a FM receiver to an blank band, i.e. where you cant hear any stations, you will hear a steady hiss. The meteor trail will reflect a station in this band down to your receiver where you will hear it fade in and the slowly out. We setup a tuner and antenna to listen and watch for this during the meteor shower and heard somewhat more meteors than we saw.

The antenna is a simple Radio Shack TV antenna with a Radio Shack 10 dB video amplifier on the output. The signal is fed to my old analog FM stereo tuner. It has good sensitivity and more importantly, a analog signal strength meter. Many modern all-digital tuner have only a bar display of signal strength and this would not give a signal of very high resolution. The meter driving circuit was tapped for its voltage, only a few tens of millivolts for a typical meteor signal. This signal was amplified and filtered with an op amp filter having a gain of about 30 and a filter frequency of 8 Hz. We triggered the A/D with a 9.7 Hz clock and the output of the A/D is read a nibble or half byte at a time into the status lines of the PCS parallel port. We wrote the program in C and complied it to run under DOS. Windows wouldn't probably be timely enough to make sure we didn't miss any data at the port. The program is set to take 6000 samples and write to disk which represents about 10 minutes of data. The analysis program is still under construction and should be done soon, depending on work and school for both of us. Eventually we would like to get many stations up and recording simultaneously to get some correlation on the trails and see if we could define a direction or distance.

We didn't get it running in time for the Perseids but it is running now every so often. It needs a fixed antenna location where it is shielded from the computer. This is one of the lessons were learned in debugging the system, the computer is a major source of interference. The other thing we learned is that one of the status lines on the parallel port has its polarity reversed, a high voltage on this port will read in software as a low voltage and vice versa. One drawback is that it takes a whole computer to run this thing, although it could be an old 8088 or anything as it isn't working very hard. One of the members related as to how he was going to try this with a chart recorder instead of a computer which should work very well. The present antenna pattern tends to see meteors near the horizon rather than over head, this means is wont correlate with visual sightings very well. We would like to get a upward omnidirectional antenna to see the meteors overhead.

Next Derald got out his large orbit calculator. This is a heavy cardboard unit about 30 square with many clear plastic overlays that was printed at the university Derald attended. This is what he used to compute the ephemeris of an orbiting satellite given the orbital parameters. In the days of readily available computers and orbital calculation software it is difficult to image how hard it would have been for someone to calculate the orbit with only a slide rule and the equations. The calculator was used to calculate where in the sky to point a large format aerial camera to photograph the passage of the satellite against the background stars. He would get his parameters from the computation center and he would plot the azimuth for several points on the orbit on a map of the globe with the US laid out on it. This would tell him where the satellite would be in azimuth by not elevation. For that he used the orbital height and a lookup table on the lower part of the calculator to find the elevation for the orbital inclination and the altitude. He had a overlay for the full earth globe that had the azimuth and elevation lines on it for his latitude. He would plot out several points on the orbit on tracing paper. The other side of this calculator has a map of the bright stars in the night sky. The tracing paper when flipped over and aligned with the Polaris and RA lines for his GMT would show the path through the sky vs. time. Another overlay had the regions of sun light and shadow for various altitudes of spacecraft and he could find the point where the satellite would enter shadow and plan to catch it with the camera before it disappeared.

The K37 camera he used had an AeroEktar 12 focal length lens, F2.5, which was originally for 9 square glass plates. His camera was modified to take 8 x 10 glass plates. He showed us one of the plates he had taken of Echo. Echo was a early US satellite that was just a large metalized balloon put high in orbit and used to test passive radio transmission. It was easy to see being so big and reflective. He would hold a piece of board over the front of the camera until the satellite entered the field of view. He then shuttered the camera every so often to identify where the satellite was at specific times. He had a WWVV receiver and a plotter to record the times the shutter was opened and closed along side a chart with the WWVV time signals on it.

The next meeting is not setup and I am looking for people who would like to talk about some project they are working on, large or small, or can arrange a presentation that would be great. If you have any ideas call me at home, 574-3876 or at work, 621-1218, or email at rtanner@seds.lpl.arizona.edu.

*

Dark Skies for November

DARK SKIES (no twilight, no moonlight) for Tucson in 24-hour MST: 18=6pm, 20=8pm, 22=10pm, 0=12am
RISE, SET, VISIBILITY for sun and bright planets: rise for morning object, set for evening object

Th/Fr	31/ 1	18:57 - 22:02	Su/Mo	10/11	18:51 - 5:26	Th/Fr	21/22	4:23 - 5:34
Fr/Sa	1/ 2	18:56 - 22:54	Mo/Tu	11/12	18:50 - 5:26	Fr/Sa	22/23	5:24 - 5:35
Sa/Su	2/ 3	18:56 - 23:46	Tu/We	12/13	19:06 - 5:27	Sa/Su	23/24	- - -
			We/Th	13/14	20:02 - 5:28			
Su/Mo	3/ 4	18:55 - 0:39	Th/Fr	14/15	21:02 - 5:29	Su/Mo	24/25	Full Moon
Mo/Tu	4/ 5	18:54 - 1:31	Fr/Sa	15/16	22:05 - 5:29	Mo/Tu	25/26	- - -
Tu/We	5/ 6	18:53 - 2:25	Sa/Su	16/17	23:09 - 5:30	Tu/We	26/27	18:46 - 19:01
We/Th	6/ 7	18:53 - 3:19				We/Th	27/28	18:46 - 19:52
Th/Fr	7/ 8	18:52 - 4:15	Su/Mo	17/18	0:13 - 5:31	Th/Fr	28/29	18:46 - 20:44
Fr/Sa	8/ 9	18:52 - 5:13	Mo/Tu	18/19	1:16 - 5:32	Fr/Sa	29/30	18:45 - 21:36
Sa/Su	9/10	18:51 - 5:25	Tu/We	19/20	2:19 - 5:32	Sa/Su	30/ 1	18:45 - 22:29
			We/Th	20/21	3:21 - 5:33			

Weekend Sa/Su	Sun Set	Sun Rise	Mercury Set	Vi	Venus Rise	Vi	Mars Rise	Vi	Jupiter Set	Vi	Saturn Set	Vi	Vi=Visibility
2/ 3	17:31	6:41	17:32	-	3:54	-3	1:16	1	21:29	-2	3:38	1	-3 brilliant
9/10	17:25	6:47	17:38	-	4:06	-3	1:06	1	21:07	-2	3:09	1	0 conspicuous
16/17	17:21	6:53	17:46	-	4:19	-3	0:56	1	20:46	-1	2:40	1	3 moderate
23/24	17:18	7:00	17:57	8	4:32	-3	0:45	1	20:24	-1	2:12	1	6 naked eye limit
30/ 1	17:17	7:06	18:11	6	4:45	-3	0:33	1	20:03	-1	1:44	1	9 binoculars limit

By Erich Karkoschka

Star Parties & Events

Booth-Fickett School
November 13

We need about 4 telescopes to make this yearly event a success. Start up time is 6:00 pm, and we are usually finished by 9:00 pm. Booth-Fickett Magnet School is located at 450 S. Montego Drive. It is off Kolb Road between Broadway and 22nd Street. See you there! *

First Annual Star Party for 55,000
November 16

In following the first principle of sidewalk astronomy (go where the people are!), I'm going to hold the first annual star party for 55,000 prior to U of A's homecoming football game with UCLA on 16 November. There will be lots of potential observers, a quarter moon, Jupiter and Saturn - what more do you need?! Of course, a parking place would be nice, but unfortunately not available. Planning is key as cars without the proper permits are not allowed on campus anytime after mid-morning. What I did last year was to store my scope at the Mirror Lab under the east stands in the morning, then get dropped off well before game time to set up and share the views. Though I set up by 3:30 before, the first hour was slow but during the next couple there was always a line to look thru the 5" binocs at the moon. If there is some interest, we might even set up a couple stations, perhaps over on the mall by Flandrau as well as by the stadium. Give me a call and we can organize something that will be fun and as hassle free as possible. If you won't do it, who will?? -Dean Ketelsen 293-2855 *

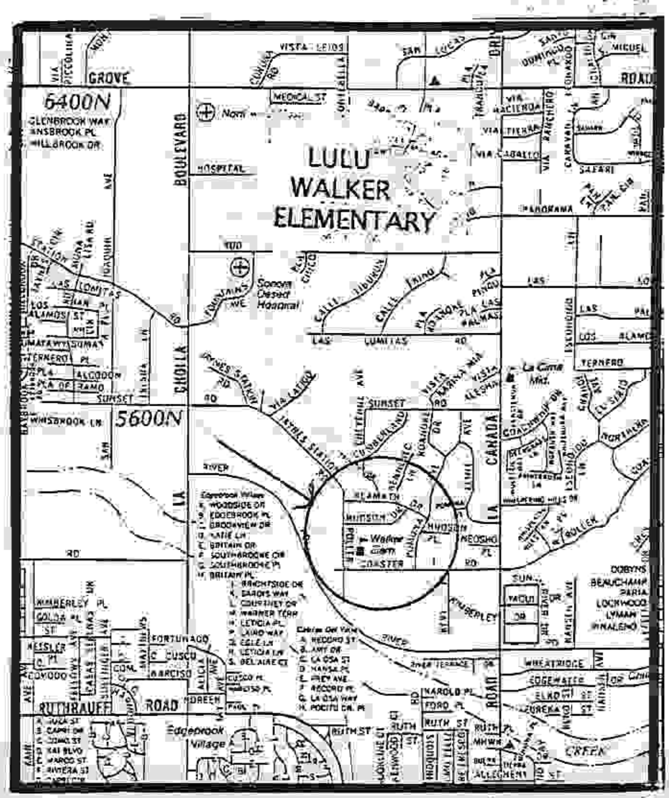
Lulu Walker Elementary School
November 20

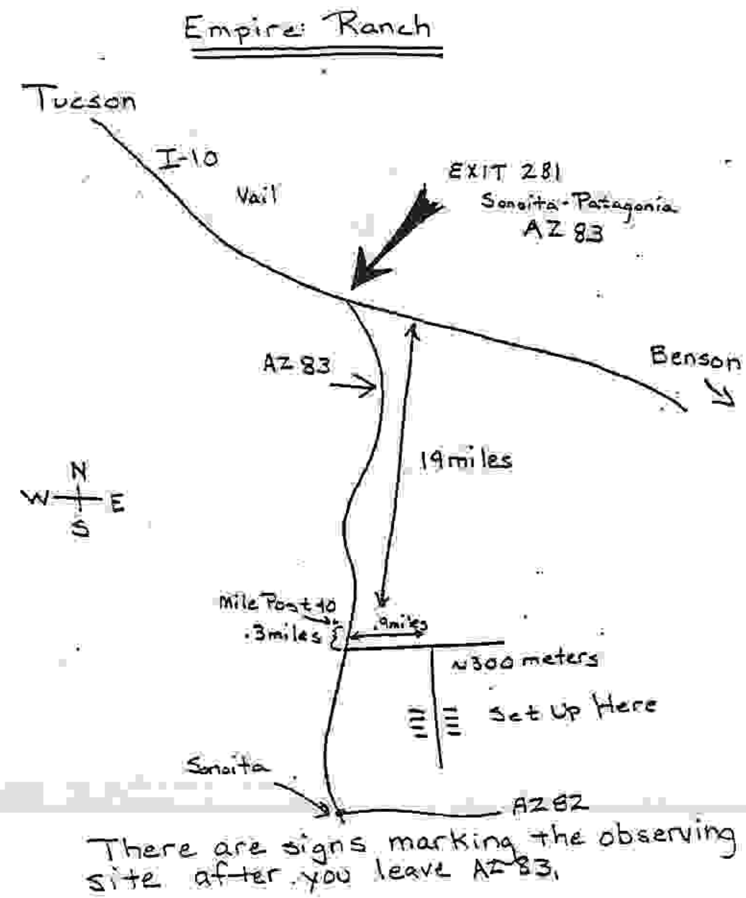
Lulu Walker Elementary is located near Rollercoaster and La Canada. We need about 5 scopes. The kids make a good showing every year , so let's do our best and give them a good look at the night skies. Start up time will be 6:00 pm. *

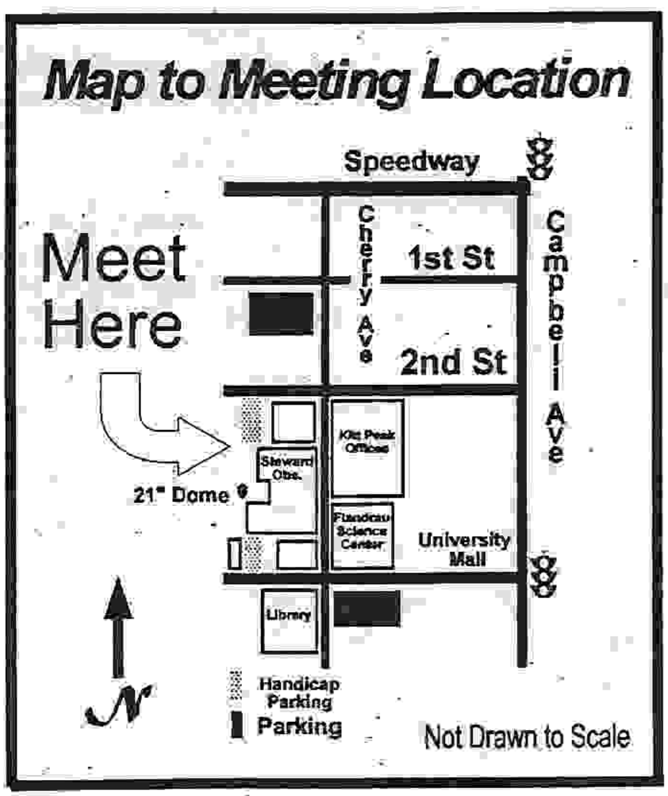
Project ASTRO Star Party
November 22

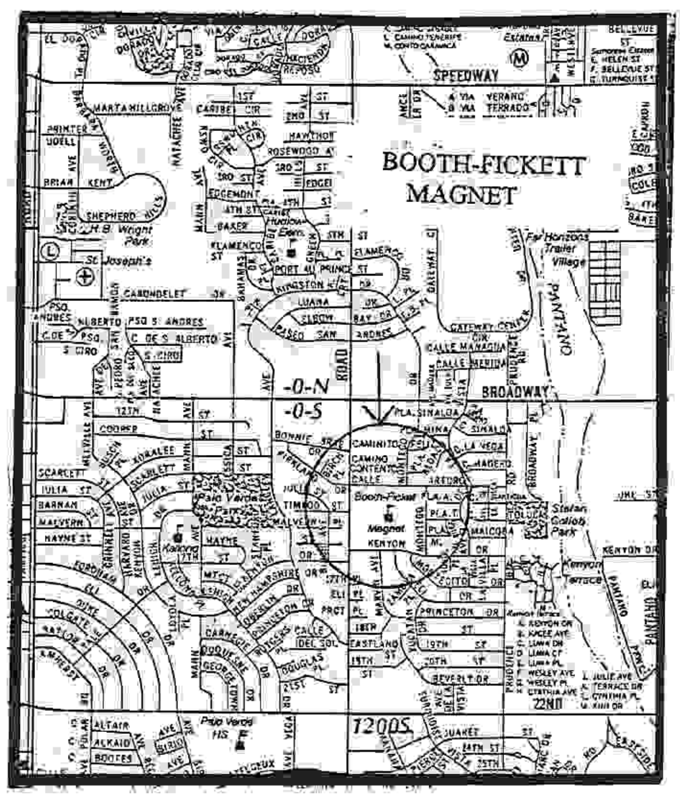
We will have a star party on the mall outside Flandrau Science Center for astronomers and teachers attending the Project ASTRO workshop. Telescopes should be set up around 6:30pm. The workshop attendees will number close to 45 adults so three or four telescopes should be sufficient. We should be finished by 9pm. A sign up sheet will be at the meeting. *

Maps


LULU
WALKER
ELEMENTARY
6400N
5600N
GROVE
BOULEVARD
CHOLLA
CANADA
RUTHRAUFF
ROAD
Sonoran Desert Hospital
LAS LOMITAS
SUNSET
RIVER
CREEK
Edgebrook Village


Empire Ranch
Tucson
I-10
Vail
EXIT 281
Sonoita-Patagonia
AZ 83
Benson
AZ 83
19 miles
N
W
E
S
Mile Post 40
.3 miles
.9 miles
~300 meters
Set Up Here
Sonoita
AZ 82
There are signs marking the observing site after you leave AZ 83.


Map to Meeting Location
Speedway
Meet Here
Cherry Ave
1st St
2nd St
Campbell Ave
Kitt Peak Offices
Steward Obs.
21" Dome
Flandrau Science Center
University Mall
Library
N
Handicap Parking
Parking
Not Drawn to Scale


BOOTH-FICKETT
MAGNET
SPEEDWAY
BROADWAY
-0-N
-0-S
Palo Verde Park
Booth-Fickett Magnet
Stefan Gollob Park
Kenyon Terrace
Far Horizons Trailer Village
Palo Verde HS
1200S
22ND
PANTANO

Notes From Other Clubs

What's New at Flandrau

By Mike Terenzoni

If you get this newsletter before Halloween, consider checking out Flandrau's new Halloween laser show: "Light Fright". This in house production features ghostly and monstrous laser images choreographed to audible apparitions such as: "The Monster Mash", "Flying Purple People Eater", "Werewolves of London", "Scary Monsters" and the "War of the Worlds" radio broadcast. "Light Fright" ends on Halloween night, when four consecutive shows starting at 6:30 pm will be shown. Before then, show times are Friday at 8:30 p.m., Saturday at 3:30 and 8:30 p.m., and Sunday at 3:30 p.m. Cost is $5, but is only $4 for 8:30 shows on Friday and Saturday nights (which have regular planetarium admission), and only $4 on Thursdays to high school students, U of A students, faculty and staff.

Current planetarium shows are "Through the Eyes of Hubble" and "Under Arizona Skies". "Through the Eyes of Hubble" is narrated by Star Trek's Dr. Beverly Crusher, Gates McFadden. Included in the show are observations of Comet Shoemaker-Levy 9's crash into Jupiter, atmospheric storms on Saturn, the birth and death of stars, colliding galaxies, evidence of the existence of black holes and many other discoveries that may shed light on the fate of the cosmos itself. Spectacular large screen video effects highlight this show. "Under Arizona Skies" explores constellations and planets in Arizona's amazing night skies. For More Information on Flandrau Planetarium Show Dates and Times Please Call: (520) 621-STAR

Flandrau will have two new shows coming up in the near future. The first will be our traditional Christmas show called "'Tis The Season" which will open the day after Thanksgiving. The other will be "Comets Are Coming" which at this time is scheduled to open either on the first or second week of December. As you might imagine, "Comets Are Coming" will discuss the recent bright opposition of Comet Hyakutake, and the upcoming, hopefully brighter opposition of Comet Hale-Bopp. Stay tuned for details! *

Discovery Park Looking for Speakers

Discovery Park is located in Safford, AZ and serves as the visitor's center for the Mt. Graham International Observatory. This is also home to the Gov Aker Observatory, a 20" Cassegrain telescope that was once located at the Steward Observatory Kitt Peak Station. Discovery Park offers public lectures once or twice a month. Thomas Willmitch, the coordinator of Gov Aker Observatory, is looking for speakers over the next few months. His number is (520) 428-6260. Travel expenses will be covered. *

Update from the Astronomical League

By Bob Gent

Hi! My name is Bob Gent, and I'm a new member of the TAAA. I also serve as the Astronomical League's Western Region Representative. What is the Astronomical League? The league was formed over fifty years ago, and it is a federation of over 200 astronomical clubs, societies, and associations. Currently, there are over 13,000 members from all 50 states and several foreign countries. Organizationally, the League is composed of regions, and our region is the Western Region of the Astronomical League, WRAL. This region is composed of the states of Arizona, California, Hawaii, and Nevada. Late next year, we hope to hold our first regional meeting and star party.

At last month's TAAA meeting, I gave a brief talk about the League. I'd like this to be the beginning of continuous League news updates for the members of the TAAA. If you have any questions about observer's awards, League conventions or star parties, please let me know. I am at your service.

The big news is the Astronomical League's 1997 convention. ALCON '97 will be held over the Fourth of July weekend at Copper Mountain Resort in Colorado. Among many exciting activities, we have been invited by the University of Denver Astronomy Department to view through new telescopes at the highest operational observatory in the world. This facility is located on top of Mount Evans, Colorado at 14,260 feet elevation. I hope to see many of you there next year.

Many of us are aware of the League's efforts in fighting light pollution. Each year, the League officers collect donations to help reduce light pollution in West Texas near the McDonald Observatory. Funds have been used by McDonald personnel to purchase and install filters, shields, and low intensity lights. This will have a long lasting beneficial impact on astronomy near Fort Davis. All members of the League can feel proud that we were able to help in this project.

There are many other popular League star parties and conventions sponsored by regions or member societies. For example, the Texas Star Party is run by the SW Region of the League. This event and many others would not be possible without the long hours and dedicated work of League volunteers. In fact, there are no paid positions in the League, even at the national level. The people who work for the League do it all for the love of astronomy.

In addition to conventions and star parties, the League publishes the Reflector, a quarterly journal with updates about League's activities. All members

of the League receive this journal as a benefit of membership. The League also sponsors the National Young Astronomer Award. Charles Allen, the League's vice-president, has chaired this award for the past several years. If you have any questions about the NYAA, please contact me; I serve as vice-chair.

League volunteers have run the observing awards for years. Many astronomical observers wear their Messier pins proudly at meetings and other events. League members have also published a wide variety of astronomical guidebooks available at discounts to all members. For example, the League's Handbook on Messier Objects is available for only $3.50 -- a real bargain. Other more serious observers are interested in the Herschel 400 awards. Recently, the League approved a new program called the Arp Catalog Observers and CCD award.

Of special benefit to new clubs just forming, the League has kits to help a club get started. If group liability insurance is needed, the League is there to help out. Just recently, the League has activated a new League home page. These are only a few of the many benefits of joining the Astronomical league.

But what does all this cost? One might imagine that the cost of running a national organization like this would be astronomical. But thanks to their mutual love of the night skies, volunteers do all this work for free. The bottom line is that clubs like the Tucson Amateur Astronomy Association pay less than $2 per year per member to belong to the League. I, for one, believe this is one of the greatest bargains I've ever received.

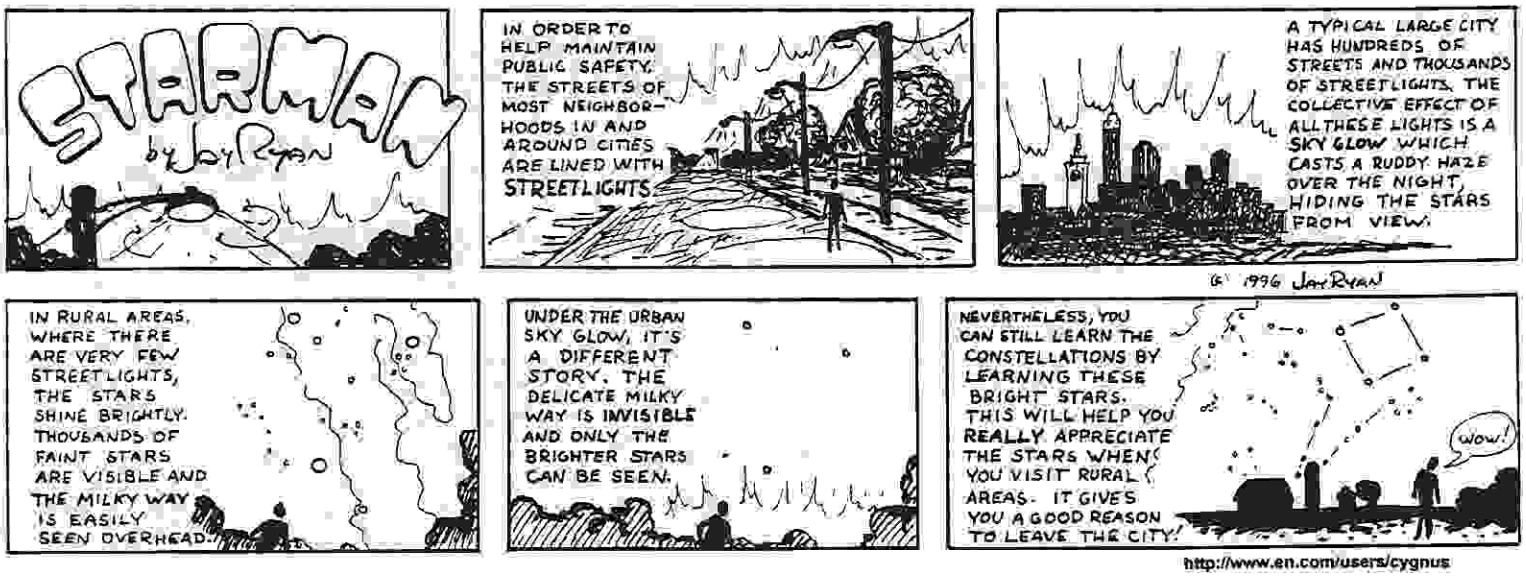
Now the bad news. The cost of running the League, even for an all volunteer organization, is going up. To cover increased costs for printing, postage, new observing awards, and other services, the League dues for club members will be increased to $3.00 per year per member. For the TAAA, this is a big bill every year. But I hope that you will all agree with me that it's worth it to support the national level organization.

Thanks to the long hours of many dedicated League volunteers, I have been able to attend the Texas Star Party, the Winter Star Party, ALCON, and most of all, I have developed lifelong friendships with fellow astronomers. Ask yourself again. Was any of this worth three dollars a year?

Bob Gent, WRAL Rep.
TAAA Member and Alcor
RLGent@aol.com
(520) 721-5060

PS: Bob is looking for volunteers to help with WRAL star party planning and other activities. Please contact him if you are able to help. *

Starman



Observing Reports

November Observing

As we come up on the month of November, temperatures should be starting to drop (I am not entirely convinced of this yet) and observing should be much more pleasant. Last month's lunar eclipse was one that I and many others will remember for quite some time. I was particularly struck by the coloring, as eclipses for the past few years have been rather dark and grey. Additionally, the sight of Saturn perched just a couple of degrees from the eclipsed moon provided a nice touch.

Saturn is just past opposition and can be seen easily in the western sky during twilight. The rings of the planet have finally returned after their hiatus last year. While only tipped a few degrees, the planet is beginning to look like we are used to. In addition, many observers are reporting seeing white clouds in the equatorial region yet again. A band that spans 45 degrees across the globe has been seen without difficulty over the past couple of weeks.

While we are losing comet Hale Bopp to twilight, comet Tabur has been stealing some of the attention from H-B. Just now moving into the evening sky, it should be between magnitude 5.5 and 6 when you read this. As of mid October it is located in Ursa Major, and is heading south. It should be easy to observe with binoculars in late twilight. Sorry I don't have an ephemeris for it!

While still relatively unimpressive, Mars is rising just after midnight. With a 6" disc, good optics and good seeing will be necessary to see any detail. If you are patient though, opposition is just around the corner....

And finally, remember to go out and observe the Leonid meteors this year. The shower peaks on the 17th. Everyone is waiting to see if the shower will produce a repeat of the 1966 storm that is so well known. Activity has increased in the past years, a precursor to the arrival of the shower's parent comet Tempel-Tuttle. The first quarter moon may pose some difficulty early in the night, but will not be a problem after midnight once it has set.

Now that the weather has improved, get outside and observe. There a number of interesting events this upcoming month, as well as your old favorites in the fall sky.
Clear skies,
Gil Esquerdo *

All-Arizona Star Party

By Dean Ketelsen

The 16th annual (or something like that) All-AZ Star Party was sponsored by the East Valley Astronomy Club (Scottsdale) this year and was held about 20 miles south of Arizona City. This site is really convenient to observers from both the Phoenix and Tucson areas as the driving distance is the same for both. Few from the Tucson area seem to attend, however. The site is relatively low at 1800 feet elevation and is surrounded by cotton fields. The worst part about the site is the dusty access road, but it is a good site and provides shirtsleeve weather for those normally nippy October nights.

The Friday-Saturday event enjoyed good weather its first night. Unfortunately, I attended the second night which the cloud gods decided to attend also. We did get some good observing in, though, and an extended chance to meet a few new folks and catch up with old friends. Of the TAAA members there were Hazel Lawler, Glen Nishimoto, Matt O'Brien, Dick Buchroeder, Robert Gent, Paul Dickson and myself. Some of our Grand Canyon Star Party friends joining us were Mike Spooner all the way from Page, Marilyn Unruh from Prescott, Sam and Anne Herchak, and Margie Williams from Phoenix. New this year was a swapmeet on Saturday and it appears that only Dick Buchroeder was prepared to deal with a carload of astronomy surplus spread out on blankets. I got there about sunset and got talked into getting a lot of his gear he obviously didn't want to bring back home. Some of it, like the $30 observing chair, got put to work right away!

My self-proclaimed task involved taking some Schmidt camera images of Hale-Bopp, so I missed viewing thru a lot of scopes, but Glen and I traded astrophoto tips back and forth as the comet cruised towards the SW horizon. As luck would have it, the clouds moved in shortly after, providing us with an extended break. Margie Williams was in the mood to discuss the Grand Canyon Star Party and her desire to kidnap me to the North Rim this year. Neither of us have heard from the Pierce family and the "what ifs" dominated the conversation if they do not sponsor the North Rim version in '97.

Mike Spooner came down from Page with the 9" folded refractor he had at the Grand Canyon this year. I was looking forward to observing Saturn with it. It did not disappoint, but he was vaguely complaining that the seeing was better the night before. His little 6" F/12 reflector set up there also gave some astounding views. He claims he does optics for fun, but he does a great job of it too!

With thickening clouds and a long day behind me, I left orders for Glen to wake me up if it clears and I got a good 3 hour nap in before he knocked on the van at 2:30. The sky had improved a lot and many areas were totally clear. I got the Schmidt camera going again and was able to experiment with some new slide film and capture comet Tabur before twilight started. While intermittently snoozing, my sleepy eyes detected a few dozen cars still there about sunrise. By the time the heat drove me from my sleepy state there were only a half dozen. After packing up and chatting with Margie and Mike one more time, I ambled over to Hazel's trailer for some of her stories of her summers on the road. I finally left about 9:30 for the 1.5 hour ride home.

We really need to get more folks up to this event. While the TAAA is larger than any of the Phoenix groups, we consistently have the poorest attendance even though the driving time is the same for us all. Lets get the word out and try to do better next time!

*

New Supernova Found

On October 12, 1996, Piero Mazza and Stefano Pesci of Milano, Italy discovered a 14th magnitude supernova in NGC 5308 using a 16-inch reflector. This supernova is located about 20" southwest of the nucleus of NGC 5308. This galaxy is located north of Alcor and Mizar and is shown on the Norton 2000.0 Star Atlas. According to preliminary analysis of its spectrum it appears to be a type Ia supernova which was one week past maximum brightness at the time of discovery. (Some information given here was compiled from an IAU circular via Bob Gent.)

*

Kitt Peak Star Party

DEAN KETELSEN

Well, we had a full crowd of 50 attendees at this fall's event at Kitt Peak's picnic area, and a great time it was! Unfortunately, we had about 8 folks on the waiting list that didn't have a chance to attend - better luck in the spring!

Thanks to Chris Koenig's plea for more docents at the meeting the night before, a number of TAAA members went up to the visitor's center to check out some of the changes that have taken place there. By 4pm though, most were down at the picnic area setting up scopes or just doing some exploring in the area. There were some good looking scopes there too - Marilyn Unruh from Prescott had her new 16" Dob there, Matt O'Brien had Ed Blair's 8" Tri-Shiefspiegler set up on the hill, and Phil Farnam had a pair of 20X100 binoculars. There were others, or course, but these stood out in my mind.

As usual, there were massive amounts of food at the potluck table. The most innovative entry - Larry Wilson and his 3 large pizzas! The setting sun alerted folks to the passage of time and everyone got ready to observe. Starring early in the evening was Jupiter and comet Hale-Bopp. Seeing did not appear too impressive early, but still, Hale-Bopp was an exciting sight with it's dust jet activity.

Of special interest of late was the visual appearance of a geostationary satellite. I spotted it earlier in September while observing in the Chiricahuas, and it was again brought to my attention by Jim Varney of California. Located down around 17h and -8 degrees, it emits 3rd magnitude flashes of light every 12 seconds for about 5 minutes before disappearing until the next night. Larry Wilson and I picked it up at 8:40 and were able to show it to a number of folks in the 5" binoculars before it disappeared.

Speaking of binoculars, Phil's new 20X100s blew my old battleship binocs out of the water. 20 years of optical progress with flourite optics and multi coatings made a wonderful difference in contrast and image brightness even though there were nearly a full inch smaller in diameter! They also have interchangeable eyepieces allowing magnification of 20 or 37, making them even more versatile.

The seeing settled down later and I must say that I had a great view of Saturn through the 8" Shiefspiegler. We must have had the magnification up over 300 with little breakdown of the image. Thanks Matt for bringing it out and thanks Ed Blair for lending it out to him for a while.

Just before moonrise I realized that comet Tabur should be clearing the trees in the northeast. Unfortunately, most every scope was packed up by then. We were able to prevail upon Roger Tanner to drag his tripod mounted binoculars far enough over to see it - a dim smudge with the barest hint of an ion tail only 10 degrees off the horizon. It was a suitable curtain call to hail the moonrise and close out another successful night of observing near the National Observatory.

*

THE WONDERFUL STAR

The famous long period pulsating red variable star Mira, Omicron (o) Ceti is now at minimum magnitude at the start of this month. It is expected to brighten over the next 3½ months toward a maximum in the second week of February 1997. An interesting project through this winter would be to watch Mira as it makes gradual progress toward maximum light.

Mira was first noticed by the Dutch amateur astronomer David Fabricus on August 13, 1596. Then it disappeared and reappeared several times and this puzzled early astronomers. Johannes Hevelius was the one who called o Ceti by the Latin name Mirae which in English is Mira, pronounced (MY-rah). The name Mira means "The Wonderful" because this star was the only one known at that time to exhibit such unexplained behavior. Astronomers have been observing Mira regularly since 1638, and today the American Association of Variable Star Observers (A.A.V.S.O.) continues to monitor it.

Mira is a red giant star with a diameter of 400 to 500 suns when at maximum. Mira's size, temperature, and spectrum all change as it cycles through it's period in about 11 months or 332 days on average. At minimum Mira is a very cool star with a temperature of 1900°K and a spectrum of M9e. When Mira is at minimum it has a pretty tomato red color as seen in a small telescope, and as Mira rises to maximum it appears more orange than red. At maximum Mira has a temperature of 2500°K and it's spectrum shifts to M5e. Interestingly like cepheid variables, Mira-type variables are largest, brightest, and hottest around the time of maximum.

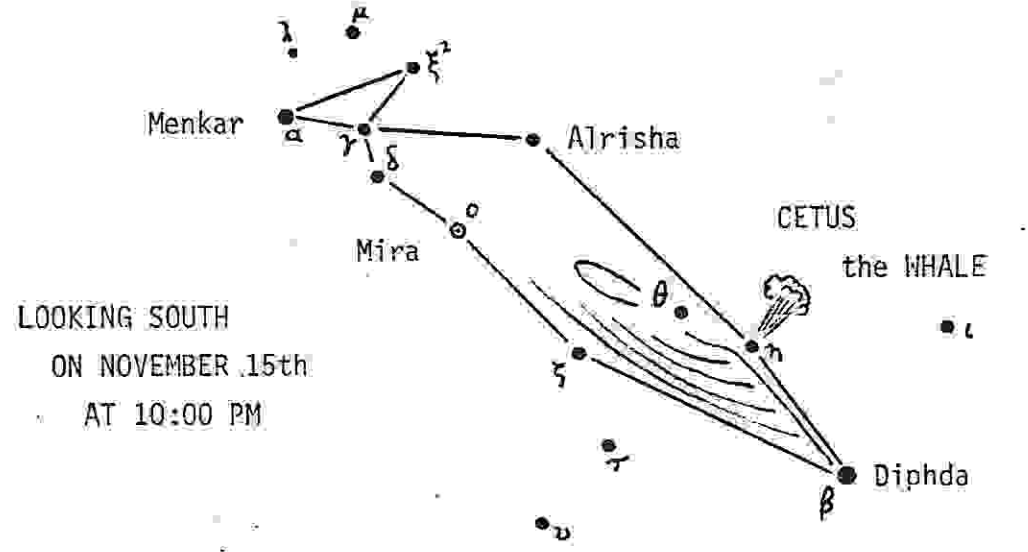
Another interesting feature similar to cepheid behavior is that Mira-type variables usually rise to maximum quicker than they fade to minimum. In Mira's case it takes about 112 days to reach maximum verses 220 days to fall back to minimum.

Mira is an old star which is switching from burning mostly hydrogen to burning helium in it's core. Because of this the core has shrunk and the atmosphere has expanded and is very tenuous. Mira is cool enough in it's outer atmosphere to have steam present like some other red giant stars. Mira lies about 200 light years from Earth and has a luminosity of about 250 suns at maximum.

To find and observe Mira locate 2½ magnitude Menkar, Alpha (α) Ceti and Diphda, Beta (β) Ceti another 2nd magnitude star some 40° southwest from α Ceti. Mira is located about 13° or 30% of the way along a line drawn from these two stars. Use the binocular chart provided to match up the starfield near Mira. To estimate Mira's magnitude use the numbered stars. Find one slightly brighter than Mira and one a little dimmer-now make your estimate. Do this about once every 20 days or so over the next few months. Record your observations and when you are finished next spring you may want to plot your observations and make your own light-curve for Mira.

Mira truly is a wonderful star. It has kept astronomers interested in it's behavior for 400 years now. And hopefully it will keep you amused through these winter months and on into next spring.

By Jeff Brydges



TAAA Board of Directors - 10 October, 1996

Minutes of the TAAA Board of Directors Meeting 10/10/96

Officers/members in attendance.
Teresa Lappin, Larry Wilson, Gary Rosenbaum, Dave Harvey, John Polacheck, Bob Gent, Ingrid Saber, Bob Schwartz, John Kalas, Mark Chambers
Agenda: Events/meetings:

Star Parties: November 2 - Empire Ranch
November 9 - Empire Ranch
November 13 - Booth-Fickett
November 20 - Lulu Walker
November 22 - Project ASTRO - Flandrau
Meetings: November 1 -General Membership - Nick Woolf - detecting life on other planets.
Beginners Lecture - OPEN
December 6 - General Membership - Don Davis (?)

Treasurers Report:

Current total cash Assets:	$39,318.97
Current Fixed Assets:	$35,734.00
Total Liabilities & Equity:	$76,246.10
Net Income for August:	$1,043.13

Bob Schwartz reported that he met with Gary Rosenbaum regarding current investments the club has. He recommends that we consolidate the four separate bank accounts into a single or couple of money market accounts to increase our interest bearing capabilities. He will report next month on options for these accounts.

Land: Bob Schwartz report a possible opportunity to lease land from the Tucson Indian Center (TIC) in much the same way and area that Kitt Peak has. He will continue his investigation.

Holiday Party: Protracted discussion on where and when to hold a party over the holiday season for TAAA members. Teresa will call various restaurants for possible reservation of banquet room for same.

Project ASTRO Status Report: Teresa Lappin reported that a Telescope Clinic will be organized and sponsored by the club to help teachers learn how to use and repair telescopes for use in project ASTRO. Clinic to be held sometime early next spring.

Goals for next Year: Teresa handed out an outline of club/Board goals for this political year. Short discussion followed.

Association Handbook: Discussion tabled till next month.

Old Business: Bob Gent asked that he receive the current mailing list for the AL Reflector as the last update was made some 14 months ago. Gary Rosenbaum agreed to deliver same by Monday to Bob. Bob also volunteered to be the ALCOR for the club. Teresa accepted his offer and Bob gent is now the offical ALCOR for the TAAA. The TAAA lost the 4th Avenue Street fair lottery for a booth for this year. Discussion turned to possibly setting up a display and huckster table at the DSP meeting this month to sell TAAA photos and spread general information about the club to the general public visiting the conference. Teresa agreed to contact Mark Sykes regarding this possibility.

Meeting Adjourned at 8:50 p.m.

Desert Skies Classified

FOR SALE: The Santa Clarita Astro Club. has sweat shirts for sale, XLG, good quality, $15.00 plus postage. Black with pale blue and white design (planets and galaxies). Dean Ketelsen has one if you want to see what it looks like. Call or write: Patty Domay, 22408 3rd St., Newhall, CA 91321, or Phone: (805) 255-3625. (11-96)

FOR SALE: 80mm f11 refractor, ALT-AZ mount, hard maple tripod, star diagonal, terrestrial Porro prism, sun filter, 3 Ploss eyepieces, $500. Call Jeff Brydges at 888-0591. (12-96)

FOR SALE: Meade LX200 HP f/10 10" scope with V3.34 software. Very good condition and ready for deep sky viewing or astrophotography. Includes $1,700 worth of accessories. Asking $3,500 OBO. Phone Jim Waters, Phoenix AZ, EVAC Member at (602) 554-8789, 8:00 to 5:00 pm. (12-96)

FOR SALE: (1) Freq. Drive Corrector. input: 12VDC 1.0A output: 115VAC 7W Freq adjustable from 50-65Hz Hand Paddle with Fast/Slow buttons 40/63Hz, and map light 12VDC accessory plug on unit. Low battery indicator. $100 OBO. (2) Stepper Motors. Manuf: Fuji Electric Co. Ltd. Model: GPF2945-2A (PM type) Step angle: 1.8deg Volts: 1.8DC Current: 4.8A/Phase 6 wires $20 OBO for both. Contact Enrique, 520-882-9525, home, 520-318-8226, work or email: chavez@noao.edu. (01-97)

FOR TRADE: Three telescopes: (1) - 6-inch f8 reflector, DOBS mount; (2) - 6 inch 44.3 RFT reflector with a 2-degree field of view. DOBS mount; (3) - 60mm Celestron refractor, alt-az. Mount. Want to trade all three for a 4-inch refractor with alt-az mount. Call Gilbert Friedman at 571-1662. (01-97)

WANTED: 1.52 inch diameter (minor axis) secondary mirror for Newtonian telescope. Call Frank at (520) 825-5540 or email fcathell@aol.com.

Your ad will run for 4 months unless specified. Month and year of last appearance is last item of ad. For additions or changes to this list, call Nancy or Nina at 579-1382 or email to ninalehman@aol.com or nlwagner@aol.com.