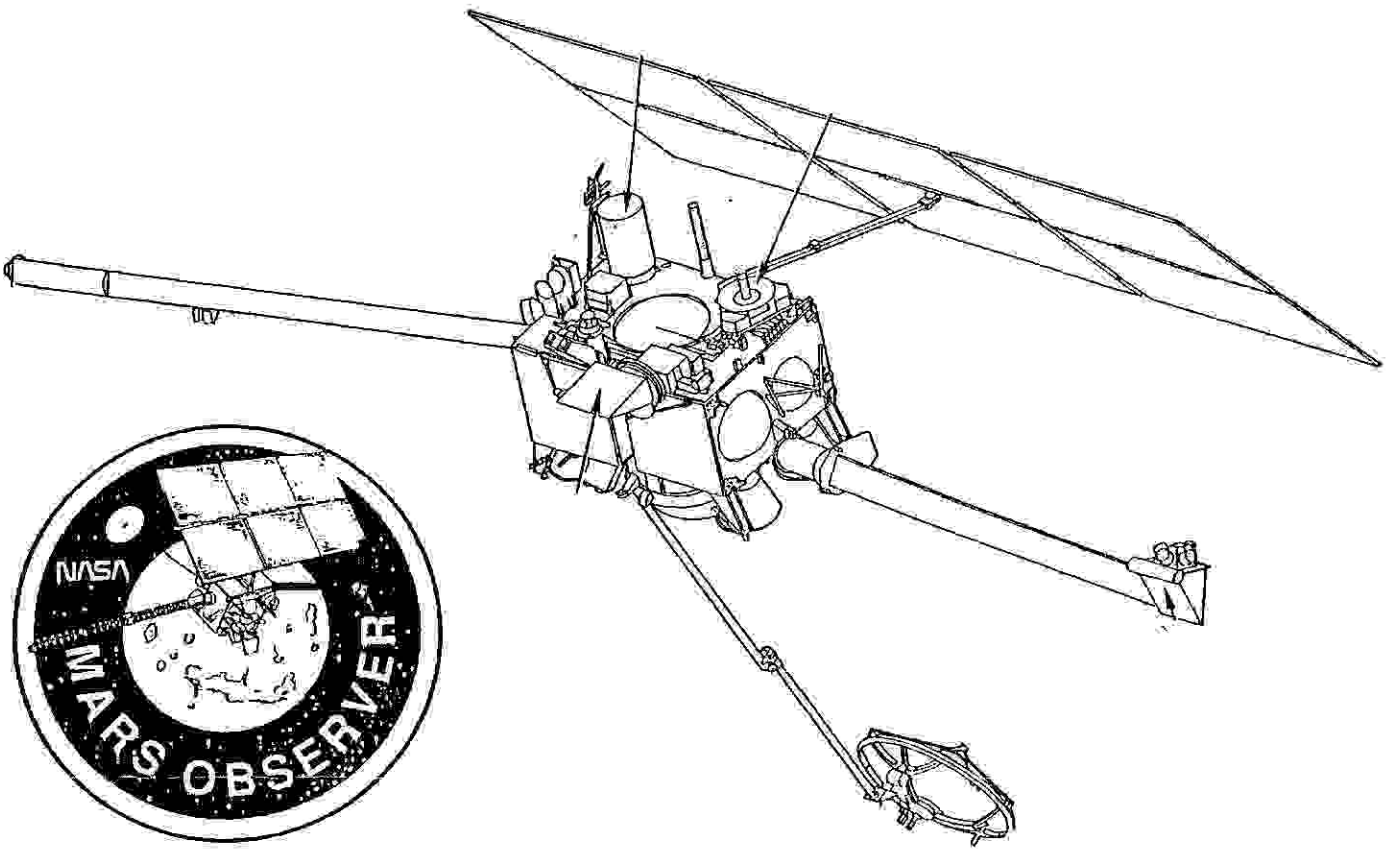
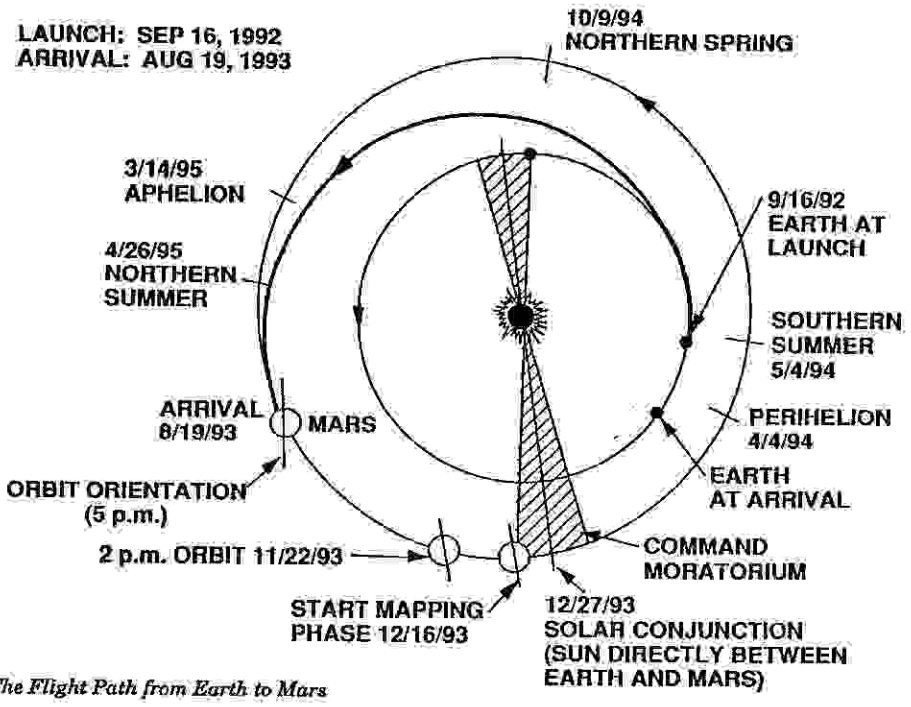
Desert Skies





The Flight Path from Earth to Mars

GENERAL MEETING - **Friday, Sept. 4**, 7:30 P.M. at Optical Sciences Auditorium - Speaker TBA.
7:00 P.M. - pre-meeting "Beginners lecture" about Saturn
in room 432 ALL are welcome!

NOTE: The September meeting will be held at the UA Optical Sciences Center Auditorium. See map in July or August Desert Skies.

EXECUTIVE MEETING -**Thursday, Sept. 10**, 7:30 P.M. at Flandrau Science Center.

30" MEETING - **Wednesday, Sept. 16**, 7:30 at the home of Duane & Sharon Niehaus.

STAR PARTIES - **Thursday, Sept. 3** - Star Party for Santa Rita High School*
Friday, Sept. 18 - Star Party for Women's Fitness Camp - Camp Y Otter.
Saturday, Sept. 19 - Star Party at Smithsonian Base Camp-Whipple Observatory*
Wednesday, Sept. 23 - Star Party at Pueblo High School.

Saturday, Oct. 17 - 4th Annual Chiricahua National Monument Campout & Star Party
Fri. & Sat., Oct.23 & 24 - All-Arizona Star Party

* see map inside this newsletter

biosphere

>>The Desert Skies submission deadline has been moved up to the 15th of the month...<<

TAAA EXECUTIVE

President	Dean Ketelsen	293-2855
Vice-President	Terri Lappin	579-0185
Executive Sec.	Dick West	574-0830
Recording Sec.	Sharon Niehaus	299-7328
Treasurer	Duane Niehaus	299-7328
Member-at-Large	Bob Goff	790-1452
Member-at-Large	Ed Vega	747-9323
Chief Observer	Andy Meyer	742-4549
Membership Coord.	Terri Lappin	579-0185
Past President	Tim Hunter	299-2972
Desert Skies ed.	Dolores Hill	325-9820
Asst. ed.	Rik Hill	325-9820
Publicist	Peggy Brown	571-0654

MEMBERSHIP IN THE TAAA

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

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

Rates for membership in the TAAA are given above. Members can subscribe to Sky & Telescope at the time of membership renewal, saving over 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, P.O.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 **15th of the month.** 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:
Dolores Hill, Desert Skies
4632 E. 14th St., Tucson, AZ 85711
or Lunar & Planetary Lab, UA campus mail

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.

****

ITEMS WANTED OR FOR SALE..... If YOU have placed an ad and sell the item(s) or no longer wish to run it, please call Dolores or Rik Hill at 325-9820 (home) or 621-6951 (work). Otherwise the ad will continue to appear. Thanks. -ed.

WANTED: Orthoscopic or Achromatic eyepieces for a 0.965" focuser. If you have moved to a 1 1/4 or 2" eyepiece and would like to sell your old 0.965's for a low price please let me know...
Call or write Paul Temple at (417) 432-3247 or P.O.Box 22, El Dorado Springs, MO 64744-0022.

FOR SALE: Celestron 2" Barlow (new)...$89; Celestron 1.25" Illuminated projection reticle (new)...$99; Meade Wedge for 10" SC (2120, LX-6, etc.)...$70. Call Larry Solomon at 743-7924.

FOR SALE: Hallicrafters SX-110 General Coventry handband receiver/matching speaker,crystal filtering EFO S(5?) meter.....$100. Call Mike Hurwitz at 321-1813.

FOR SALE: Dobbins achromat 6" f/10 in homemade tube assembly...$1000.
Call Mike Sweetman evenings at 297-2781.

FOR SALE: Cave 8" f/6, equatorial mount, rotating rings, clock drive, setting circles, 2" focuser, 2 eyepieces, Cannon camera adapter.....$600. Call Walt Brown (for Rip Loman) at 325-2189.

FOR SALE: Epson LQ-2250 twenty-four pin, wide carriage, color dot matrix printer, $450.
Call Dan Knauss at 881-2639.

WANTED: 25mm eyepiece; **FOR SALE:** Small diagonal for Newtonian telescope; 20th wave, 7/8" minor axis, custom made;OR WILL TRADE FOR 1 1/4" diameter eyepiece with 16-18mm focal length.
Call Gilbert Friedman at 571-1662.

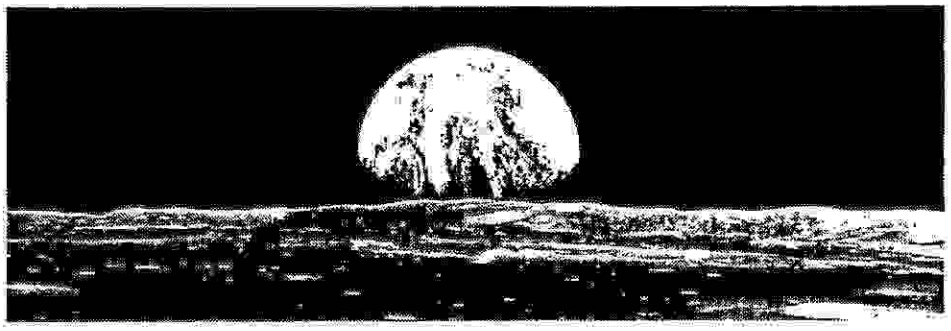
SERVICE: Newtonian telescope mirrors tested FREE for club members by Bob Goff (call 790-1452).

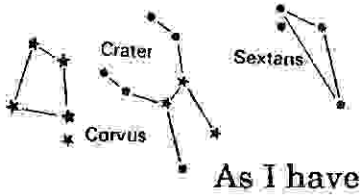
NEEDED: Donations of astronomy magazines to give away at star parties along with the TAAA brochure.

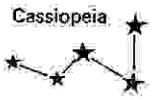
FOR SALE: CELESTRON binocular viewer (mint condition, like new, used only once);
TELEVUE 2" star diagonal (excellent condition) with 1 1/4" adapter and Schmidt-Cass. adapter.
Call John Zajac at 299-3203 (answering machine is always on).

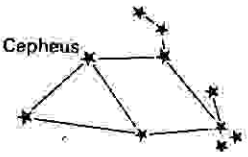
WILL TRADE: 4.8mm NAGLER eyepiece (excellent condition) and additional cash for 7mm Nagler eyepiece.
Call John Zajac at 299-3203 (answering machine is always on).

FOR SALE: NEW (never used) 13mm Plossl TeleVue eyepiece...$80; two Celestron polarizing filters, 67mm dia. @ $10.00; 10 rolls of Ektapress print film, 1600 ASA, hi-contrast...$6/roll or $25/Propack (5 rolls). (This is the film Mike used for the award-winning photo in the September issue of ASTRONOMY); calymenina trilobites from Morocco...$10 ea. Call Mike Terenzoni at 577-6857.









Meeting Location for September

As I have been unable to get a commitment from Steward Observatory for the use of the new auditorium, we will again meet at the Optical Sciences Center, the same place we have been for the last two months. For those of you who have not been there, OSC is south of the Mall (3rd Street for those of you coming off Campbell Ave.) and east of the parking lot east of Cherry Ave. We meet in room 408.

All Arizona Starparty and Chiricahua National Monument Correction

At the last meeting, August 7th, I inadvertently stated these events take place in September. I was off by a month. The Chiricahua National Monument Star Party and Campout take place on 17 October. We are limited to 20 people and 5 cars in the group site, so overflow would need to get individual campsites. Details will be in the next newsletter.

The All-Arizona Star Party will be held on 23 and 24 October, 1992. We are trying to arrange permission to have it at the new Arivaca site we are considering obtaining. If you have a strong viewpoint about the location, please give me a call, in the meantime, details will be in the next newsletter.

An Afternoon with the BLM

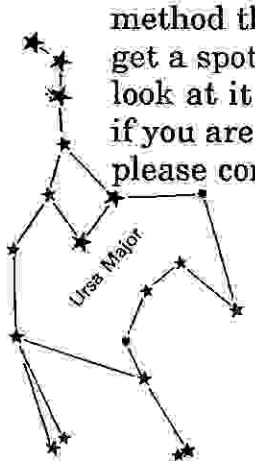
On thursday, 13 August, Teresa, John Zajac and I spent the afternoon with John Gottio and Tom Terry of the Bureau of Land Management (BLM) cruising the hills near the site we have been considering near Arivaca. We have pretty much three options in trying to obtain land from the federal government, ie. BLM. (Believe me, the state is a lot less friendly when you talk about obtaining land.) The three options are:

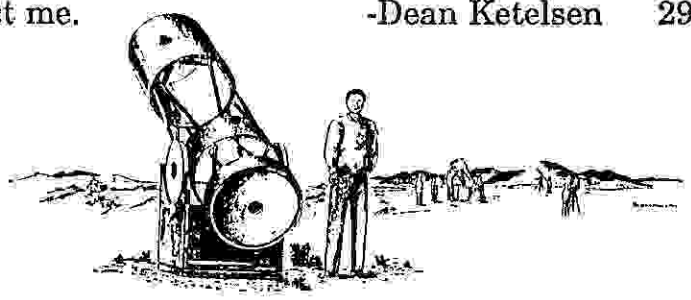
1. Direct sale of the land at appraised value - not always a sure thing if it has to go to public auction.

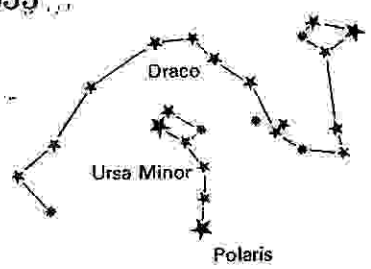
2. R&PP lease - recreational lease to use the land and make improvements, ie. put up buildings and such, at which time as our development plan is met, we obtain a patent to the land at a 50% discount to the appraised value and we would effectively own it. The disadvantage is that if we ever wanted to sell it, the buyer would have to qualify for the R&PP lease as well.

3. Right-of-Way - The BLM could grant us a right-of-way to a small acreage at low or no cost over a negotiable period of time. To meet the no-cost clause, we would have to qualify that the right-of-way would "benefit the public good" for which the BLM folks think we would qualify if we hold observing sessions for the public and school groups. Disadvantage - we would never retain ownership, but it sounds like the period of negotiation could be made very long and can be renewed.

We had never heard of the right-of-way method for obtaining land. It is the method that TV stations obtain sites for antennae and such. Particularly if we can get a spot for next to nothing (there is a one time application fee of $600), we should look at it and save our money for building structures. Anyhow, the work goes on - if you are interested in helping out with site surveys and helping develop a site plan, please contact me. -Dean Ketelsen 293-2855







from Andrew J. Meyer . . .

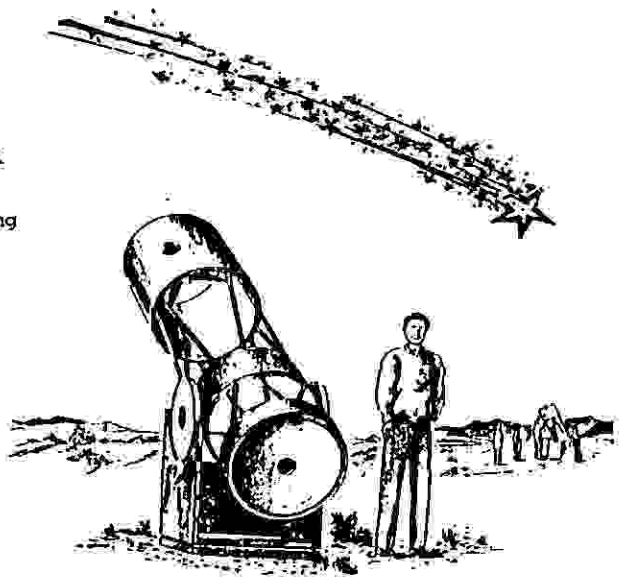
CELESTIAL CALENDAR for September 1992 (all times are in MST):

T Sept. 1 Aurigid meteor shower, peaks 2am (maybe, as date of peak is erratic, ZHR 30 (?).
W Sept. 2 4pm, Mercury 1.2° N of Regulus, both 11° W of the Sun in the morning.
T Sept. 3 3:38pm, **FIRST QUARTER MOON.**
7pm, **Star Party at Santa Rita High School**, call Mike Tengnzoni for more details.
F Sept. 4 7:30pm, **TAAA General Membership Meeting**, main auditorium. Neophytes arrive at 7pm for some stimulating instruction.
S Sept. 5 M76 discovered by Mechain, 1780
S Sept. 6 12pm, Moon passes .91° N of of Neptune.
M Sept. 7 Epsilon Perseid meteor shower, ZHR <10.
T Sept. 8 Sol's N pole most inclined (7.25°) towards Earth. Most sunspots occur on Sol's N hemisphere than its S for unknown reasons.
W Sept. 9 11am, Moon at apogee, 63.7 earth-radii away.
T Sept. 10 7:30pm, **TAAA Executive Meeting**, Flandrau Science Center, all members welcome.
F Sept. 11 7:17pm, **FULL MOON.** Shine on, shine on Harvest Moon...
S Sept. 12 7pm, Comet Giclas at perihelion.
S Sept. 13 This day did not exist in England and America in 1752 when these countries finally adopted the Gregorian calendar reform.
M Sept. 14 9pm, Mercury at superior conjunction, passes into the evening sky.
T Sept. 15 11pm, Mercury .49° N of Jupiter. Both are only 2° from Sol.
W Sept. 16 7:30pm, **30" Telescope Design, Land and Fundraising Meeting** at Duane Niehaus', see map elsewhere.
T Sept. 17 11am, Jupiter at conjunction with Sun, passes into the morning sky.
F Sept. 18 6pm, **Star Party for Women's Fitness Camp**, Camp Y Otter, see map elsewhere.
S Sept. 19 12:54pm, **LAST QUARTER MOON.**
Star Party at Smithsonian Base Camp, see map elsewhere.
S Sept. 20 2am, Moon passes .86° S of Mars.
M Sept. 21 Kappa Aquarid and Piscid meteor showers, ZHR ?
6pm, Mercury at greatest latitude N of ecliptic (7.0°).
T Sept. 22 11:43am, **autumn equinox.**
W Sept. 23 6:30pm, **Star Party at Pueblo High School**, see map elsewhere.
T Sept. 24 8pm, Moon at perigee, distance 56.4 earth-radii.
F Sept. 25 Olaus Roemer, Danish astronomer, born 1644.
S Sept. 26 3:40am, **NEW MOON.**
S Sept. 27 2pm, Moon passes 2.5° S of Spica.
Rosh Hashanah begins at sunset.
M Sept. 28 8am, Moon passes 4.1° S of Venus.
T Sept. 29 Comet 1880 III discvered by Hartwig, 1880.
W Sept. 30 7pm, Moon passes 3.2° N of Antares.

DARK SKIES for September 1992 (in MST):

M/T	Aug. 31/1	9:02pm -	4:35am
T/W	Sep. 1/2	9:45pm -	4:36am
W/T	Sep. 2/3	10:32pm -	4:36am
T/F	Sep. 3/4	11:22pm -	4:37am
F/S	Sep. 4/5	12:16am -	4:38am
S/S	Sep. 5/6	1:11am -	4:39am
S/M	Sep. 6/7	2:06am -	4:40am
M/T	Sep. 7/8	3:02am -	4:40am
T/W	Sep. 8/9	3:56am -	4:41am
W/T	Sep. 9/10	none	
T/F	Sep. 10/11	none	
F/S	Sep. 11/12	none	
S/S	Sep. 12/13	none	
S/M	Sep. 13/14	none	
M/T	Sep. 14/15	none	
T/W	Sep. 15/16	7:51pm -	8:18pm
W/T	Sep. 16/17	7:49pm -	8:59pm
T/F	Sep. 17/18	7:48pm -	9:47pm
F/S	Sep. 18/19	7:46pm -	10:40pm
S/S	Sep. 19/20	7:45pm -	11:40pm
S/M	Sep. 20/21	7:44pm -	12:45am
M/T	Sep. 21/22	7:42pm -	1:53am
T/W	Sep. 22/23	7:41pm -	3:02am
W/T	Sep. 23/24	7:39pm -	4:11am
T/F	Sep. 24/25	7:38pm -	4:53am
F/S	Sep. 25/26	7:37pm -	4:53am
S/S	Sep. 26/27	7:35pm -	4:54am
S/M	Sep. 27/28	7:34pm -	4:55am
M/T	Sep. 28/29	7:36pm -	4:55am
T/W	Sep. 29/30	8:23pm -	4:56am
W/T	Sep. 30/1	9:14pm -	4:57am

Times listed are for Tucson, Arizona when:
(1) Moon is below the horizon
(2) Sun is >18° below the horizon
(astronomical twilight)



Astrology Lives ?

Fact 1: The positions of heavenly bodies impact greatly on our night-to-night astronomical lives.

PROOF: If by chance Jupiter, Saturn, or any other major body of the local system is in the night sky, I feel compelled to give it at least a quick glance through the eyepiece, before moving on to the night's observing session. Indeed, as in the case of Mars, as it approaches Earth, its influence grows stronger--hence more and more astronomers feel compelled to gaze at it from night to night.

Fact 2: The Moon controls what days the weekends and your vacation fall.

PROOF: While it is true that the Moon isn't full every weekend, you will also note that this body influences how much free time you have. When the Moon is new and its antiwork luminescence is nil you will most often find it to be a Monday. If it should be a weekend or if M31 is exerting its "gotta get some time in with the scope" influence--your spouse's primal "Get out and clean that garage" urge will be at a fever pitch.

Fact 3: Even those who claim they don't believe in the SCIENCE? of Astrology, use it in their nightly observing sessions.

PROOF: How many times have you had perfect seeing conditions, dark skies, and all weekend? Everything is going great! You have just begun to observe some faint nebulosity or perhaps a distant Sb galaxy. Life doesn't get much better, does it? Then an evil heavenly body casts its influence over your life.

Let us digress for a moment to clarify a definition:

Quoting from "Astrology for Astronomers:"

Heavenly body: One of countless beautiful objects in the night sky. An object not of this world, not to be confused with movie stars.

Heavenly body, Evil: see cloud.

A cloud is up in the sky and it isn't touching the ground, so by definition it is a heavenly body. We all know how clouds would affect our outlook on life in the above situation--SO ASTROLOGY IS REAL! You may even attempt to fight the clouds' influences with a curse originating from the early tribes of Mt. Wilson, Palomar, and Kitt Peak:

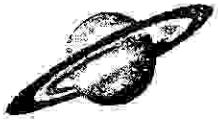
#$%^&*@ CLOUDS!!!!

Thereby you admit their influence! At last, you pack up for the night--thereby PROVING the validity of the basic fact of Astrology--that is YOUR life was changed by the positional changes of a heavenly body!

Q.E.D: SO THERE!

I, for one, hope this clears up this nasty debate. I am sure that at least one learned colleague can vouch for this paper's accuracy. Hats of to his scientific method, and great chicken bar-b-ques!

[reprinted from the November 1991 issue of *The CVA Observer*]

1972 1969 **BEGINNER'S LECTURES** 1966 1960

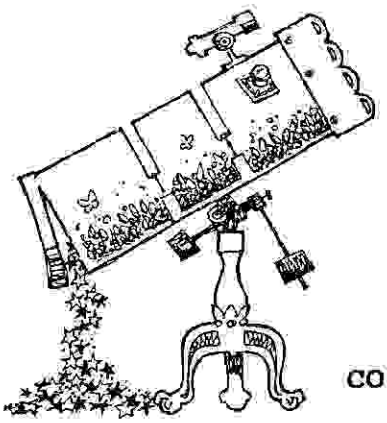
September 4th at 7:00pm in room 432, Optical Sciences Building

The first in a series of lectures presented by the Tucson Amateur Astronomy Association geared specifically for those wanting to learn basic astronomy will be held this month. Come learn about Saturn--its physical characteristics and how best to observe this beautiful planet.

The beginner's lectures will begin at 7pm on the same night as our regular meetings. We will be meeting in room 432 of Optical Sciences, just down the hall from the main lecture auditorium (look for signs).

While these beginner's lectures will have no required books, you may find it helpful to look over some suggested beginner level books which will be brought to this first meeting. Participation in our star parties will be strongly encouraged, but not required. A number of TAAA members have volunteered to work one-on-one with beginners at the star parties. A list of these members will be made available to our beginner's.

Caution: Remember--you don't need to own a telescope to enjoy astromomy, but these lectures may make you want to look through one. For some, one look is all it takes...soon you will be wanting a telescope of your own!



PUBLIC STAR PARTY

COSPONSORED BY TAAA AND WHIPPLE OBSERVATORY

We will be holding the third Santa Cruz Valley Public Star Party at the Whipple Observatory headquarters on Saturday, September 19th, starting at 6:30pm. The headquarters are located at the base of Mt. Hopkins in the Santa Rita Mountains south of Tucson. It is about 40 miles from the University of Arizona, most of which is interstate driving and the entire route is paved. You will not need to drive any dirt roads. The site is reasonably dark and great for public star parties. This date has been selected to coincide with the last quarter moon, so the skies will be dark during the event. Facilities are available and AC power can be provided if necessary (call Teresa if you need AC power). An announcement and map can be found in another part of this newsletter. In the event of clouds or rain call the public information phone number listed on the announcement to check on go/no go status.

Arrive by 6:00pm to set up the telescopes. A short talk will be presented by one of the staff astronomers. Arrive earlier and bring a picnic dinner if you wish. There is a picnic area, but no grills are allowed.

Teresa 579-0185

STAR PARTY

See The Stars Through A Telescope

Free and open to the public

Saturday, September 19

Smithsonian Institution's
Fred Lawrence Whipple Observatory Offices
near Amado, Arizona

☆☆ ☆☆ ☆☆

On view: Planets, double stars, star clusters, galaxies and perhaps meteors.

The Fred Lawrence Whipple Observatory and Tucson Amateur Astronomy Association present this opportunity to see the stars under dark Southern Arizona skies.

6:30 p.m.	Informal lecture on Astronomy by Observatory staff (in Visitor Center)
7:15 p.m.	Observing begins (on Visitor Center grounds)

Telescopes will be provided by and operated by TAAA members with the support of Observatory staff.

Small flashlights and binoculars are useful to bring. Please cooperate with staff directing parking when you arrive. For more information call 670-5707. If the sky is cloudy, call 670-5707 anytime Sept. 19 for recorded information about star party cancellation. (Directions to Observatory office and map are printed on reverse.)

☆☆ ☆☆ ☆☆

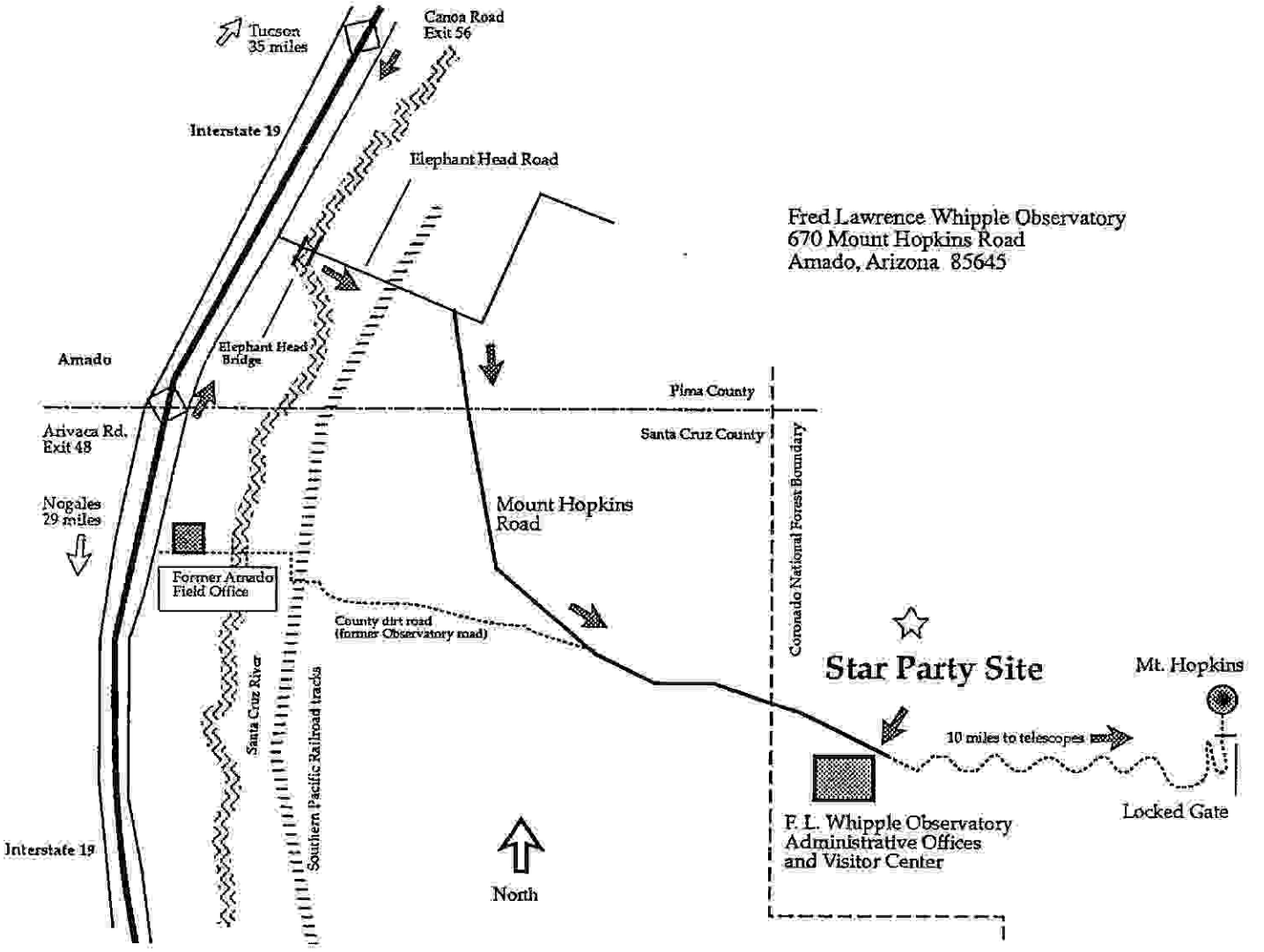
Fred Lawrence Whipple Observatory
P.O. Box 97, Amado, Arizona 85645 602/670-5707

How To Find The Observatory Offices

The new administrative complex for the Fred Lawrence Whipple Observatory is 43 road miles south of Tucson and 38 road miles north of Nogales, Arizona.

From Tucson, drive south on Interstate 19 to exit 56 (Canoa). At the bottom of the exit ramp, turn left and drive under the freeway to the frontage road on the east side. Turn right and drive south three miles to Elephant Head Road. Turn left and drive east, crossing the Santa Cruz River on Elephant Head Bridge. One mile east of the river, turn right on Mount Hopkins Road. Drive southeast about seven miles to the Observatory Office (end of pavement)

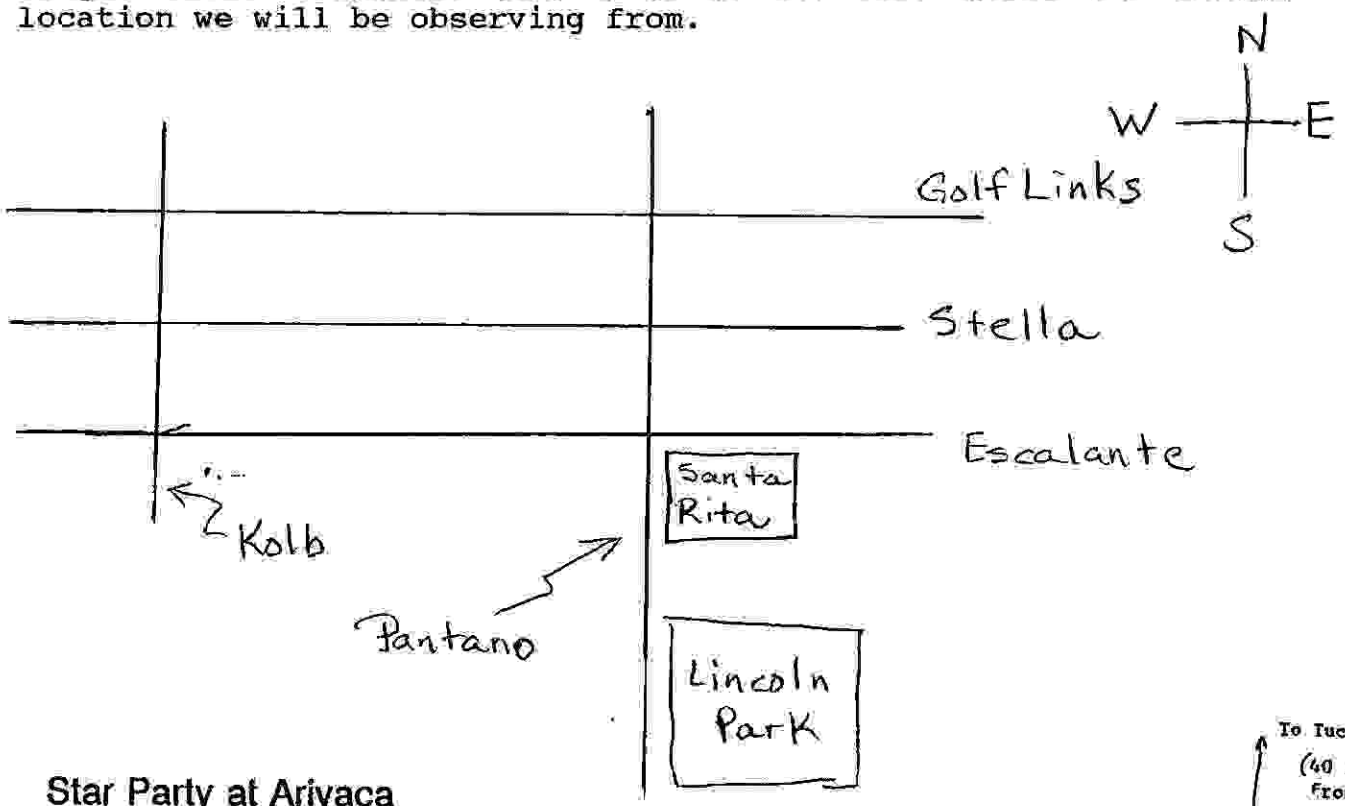
From Nogales, drive north on Interstate 19 to exit 48 (Amado/Arivaca Junction). At the end of the exit ramp, turn right and then left onto the frontage road. Drive north for about two miles to Elephant Head Road. Turn right and drive east, crossing the Santa Cruz River on Elephant Head Bridge. One mile east of the river, turn right on Mount Hopkins Road. Drive southeast about seven miles to the Observatory Office (end of pavement).

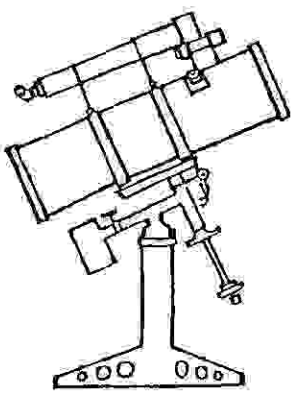


STAR PARTY FOR SANTA RITA HIGH EARTH SCIENCES CLASSES

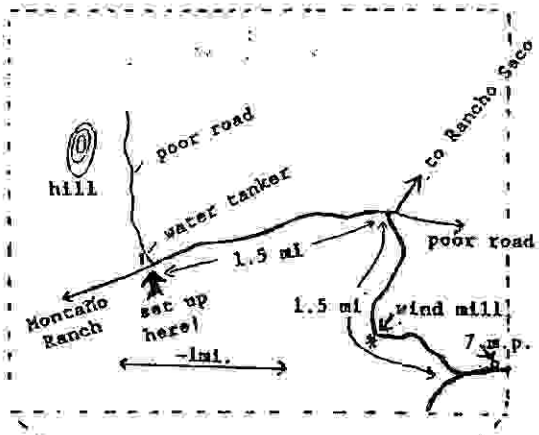
Thursday, September 3rd

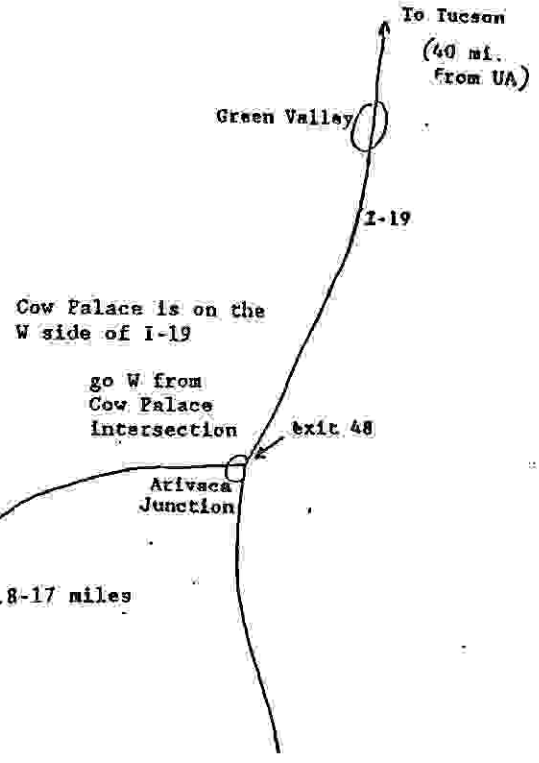
A star party for the earth sciences classes at Santa Rita High School has been scheduled for Thursday, September 3rd. We will be meeting Mike Terenzoni at Santa Rita High School at 7:00pm and the observing will run from 7:30pm to 9:00pm. There is a chance that we will actually set up at Lincoln Park, just down the street from Santa Rita High (the park being a much nicer area to observe from). Our ever enthusiastic member Mike Terenzoni is student teaching at Santa Rita High this year, so come on out and see how well Mike has taught these students. Call Mike at 577-6857 about the actual location we will be observing from.

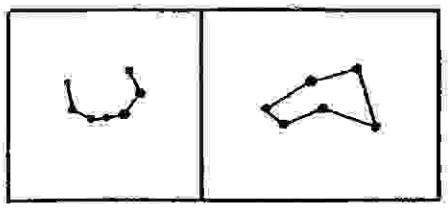




Star Party at Arivaca



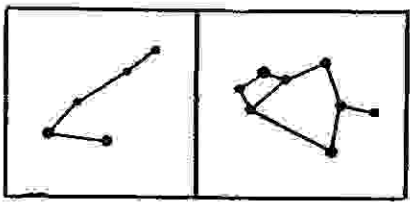




A DARK HORSE CANDIDATE

by

Rik Hill



The monsoon is still going strong. But soon, when they wind down and the night skies again clear we will return to our telescopes to find our summer constellations are being replaced by those of fall. Among these newcomers is one containing no stars as bright as mag. 3.5 and no deep sky objects of note. Even so, Equuleus has something you should see.

About one degree south and five west of Alph Equulei is the 5th mag. star Epsilon. Unimpressive to the naked eye this star is a spectacular telescopic object. Our "candidate" star is best found midway and a bit south of a line between Epsilon Peg. and Theta Aql. At low power as it is a neat double with nearly a two mag. difference between the stars. Once found it's time to crank up the magnification, something safely done in double star astronomy if your optics are good. Sidgwick recommends a minimum of 50 times your aperture in inches to exploit the full potential of your telescope. I have gone higher on stars at the limit of resolution to examine the diffraction pattern. Recently, I used 282x on my C5 and found it a good magnification for the very close doubles. At such a magnification with a telescope of at least 4.5 inches aperture you will see the brighter member of this double is again double. These two stars are 5.9 and 6.2 mag. aligned SW-NE with the third star of mag. 7.1 farther out to the ENE. In the C5 I could not clearly separate the closer pair but saw them as a "figure-8" diffraction pattern. With slightly more magnification I may have been able to see a thread of darkness between them. On 1985.749 I measured the separations at 0.91 seconds for the close pair and 9.96 seconds for the more distant member, This was an average of six measures for each using a C8 and micrometer. The orbital period for the close A/B pair is only 101 years and viewed only 3 degrees from edge on. What this means is that at its distance of 200 l.y., the separation varies from 0.1 to 1.1 seconds. If you make careful sketches noting relative positions of all three stars, you can detect that orbital motion in only a couple years!

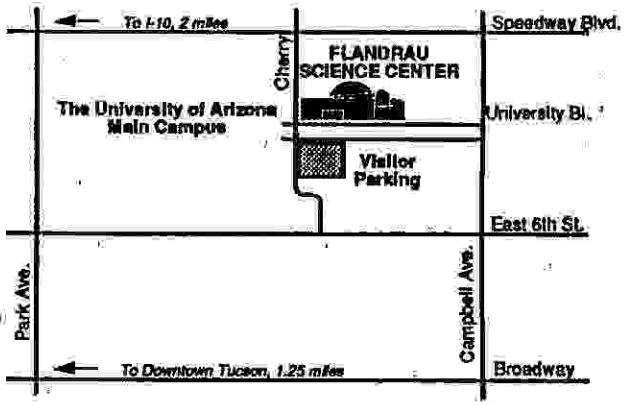
All three stars are subgiant F stars, bluer, hotter and bigger than the sun. At the sun's distance they would be -29.9, -29.4, and -28.5 magnitudes compared to the sun's -26.8 mag. At the distance of Sirius, 8.6 l.y.,the whole system would shine at mag. -2. But this is decieving since the third star would be separated from the A/B pair by 4 arc minutes and be visible to the naked eye as a zero mag. star! Unfortunately, this will not happen since Epsilon Equ. is moving away from us at about 11 miles per second, or about the distance to the sun, 1 Astronomical Unit, every ten days.

But let's not stop at 8.6 l.y. What would it be like to be on a planet orbiting in this system? The closer two stars are only 40 AU's apart, about the distance from the sun to Pluto. Since they are so much brighter and hotter than the sun, we would have to be orbiting some 16-17 AU away from either one. These two factors mean that there is no possible stable, regular orbit. That leaves us with the third, more distant member. Our orbit there would be at 3.7 AU or about 340 million miles average distance making our "year" 7.1 earth years and the orbital period of the A/B pair only 14.2 of those years! The C member, or our sun in this exercise, would be about the same angular size as the sun at this increased distance and the same magnitude. Assuming a pre-Keplerian, perfect circular orbit, there would still be seasons though not like we now know them. The two close members, some 60 billion miles distant, would form a pair of extremely bright stars of magnitudes -15.4 and 15.9. (It is unlikely that their surfaces would be visible to the naked eye.) Because of their presence, for more than half of our year, there would be no night! But because of the orbital motion of the A/B pair, our 'nights' would sometimes be illuminated by one star (when they are aligned) and sometimes two. Combined the A/B pair would shine at over four magnitudes brighter than the full moon (mag.-12.7) though the could have a maximum separation of 3.5 degrees. There would probably be some heating due to their presence in the sky. So during the 101 year cycle the normal seasons would be impressed on a longer cycle that would cause warmer than average summers and cooler than average winters. A very different solar system and world that we presently are used to!!

FLANDRAU

THE FLANDRAU STAR THEATER

PROGRAM INFORMATION : 621-STAR
PLANETARIUM OFFICES : 621-4515
ASTRONOMY NEWSLINE : 621-4310



PLANETARIUM PARKING-Free evening parking is available directly North of the building. Additional parking is available in the visitor parking lot, south of the building, across University Blvd. ✦

This unique facility provides entertaining, educational programs in our Star Theater for over 100,000 visitors annually. In addition, science exhibits provide challenging and memorable experiences on such subjects as meteorites, the Milky Way, moon rocks, the sun and telescopes.