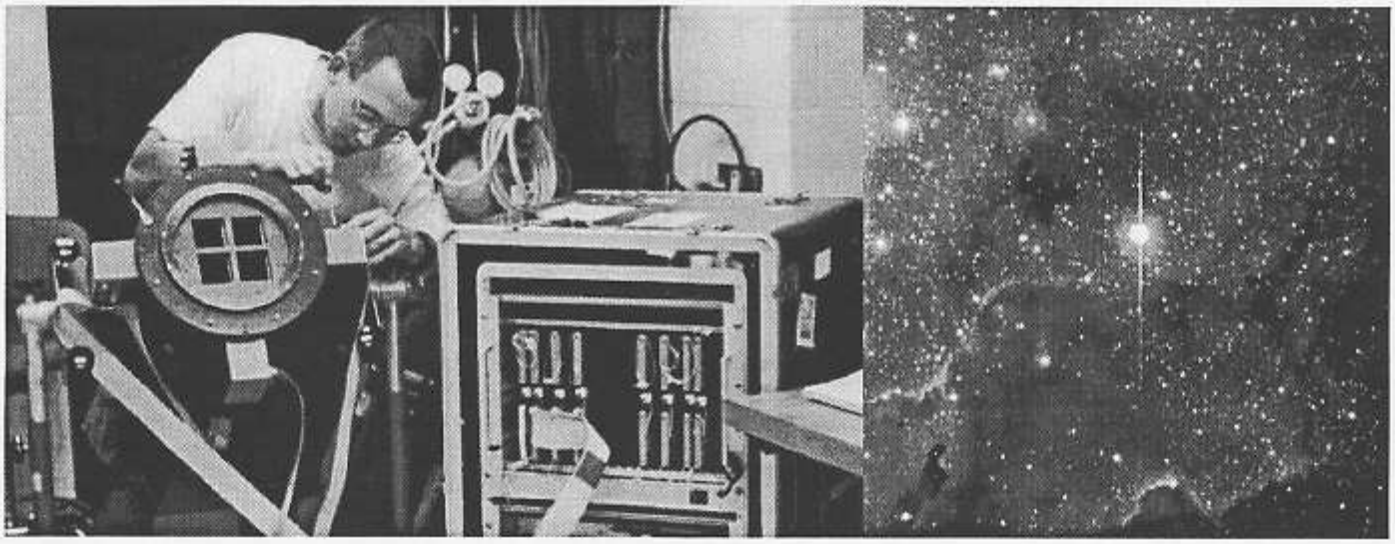
Reflections

of the University Lowbrow Astronomers

October 1996



The Big Throughput Camera (BTC) collects light faster than any other astronomical instrument. The BTC contains 4 CCD detectors (the black squares visible in the photo above), each of which is an array of 2048x2048 pixels. The camera was constructed by G. M. Bernstein and D. R. Smith of the University of Michigan Astronomy Department and J. A. Tyson of Bell Labs, Lucent Technologies.

Left: The BTC during its construction, being worked on by Deano Smith. Right: A portion of the Lagoon Nebula as seen by one of the BTC's four CCD chips, taken with a 4-meter telescope in Chile.

The University Lowbrow Astronomers

is a club of Astronomy enthusiasts which meets on the third Friday of each month in the University of Michigan's Physics and Astronomy building (Dennison Hall, room 807). Meetings begin at 7:30 PM and are open to the public. Public star parties are held twice each month, weather permitting, at the University's Peach Mountain Observatory on North Territorial Road (1.1 miles west of Dexter-Pinckney Road; see page 7 for more directions) on the Saturdays before and after the new Moon. For more information call (313) 480-4514, or see our web page at http://www.astro.lsa.umich.edu/lowbrows.html

Important Dates

This Month:

Oct 5 - **Public Open House** at Peach Mountain Observatory

Oct 12 - **Public Open House** at Peach Mountain Observatory

Oct 18 - **Meeting** at 807 Dennison: Bill Durant of the Lowbrows will talk about "ALSEP – 30 years on"

Oct 19 - **Island lake Star Party** sponsored by the Ford Amateur Astronomy Club, at the Spring Mill Pond in Island Lake State Recreational Area, Brighton MI. For more information, call the FAAC hotline at (313)390-5456

Next Month and Beyond:

Nov 9 - **Public Open House** at Peach Mountain Observatory

Nov 15 - **Meeting** at 807 Dennison: speaker and topic TBA

Nov 16 - **Public Open House** at Peach Mountain Observatory

Dec 7 - **Public Open House** at Peach Mountain Observatory

Dec 14 - **Public Open House** at Peach Mountain Observatory

Dec 20 - **Meeting** at 807 Dennison

Origins of the Heliocentric Model

Lyndee Atkins <lj@crowbar.com>

Q. How did the great scientists Copernicus and Kepler figure out that the Sun was at the center of the solar system and determine that planetary orbits are elliptical? I am curious how, just observing the positions of the stars and planets in the sky, they could come to these conclusions.

A. Copernicus realized that a heliocentric model enabled him to determine which planets are closer to the Sun than the Earth is and which are farther away. Because Mercury and Venus are always observed fairly near the Sun in the sky, Copernicus concluded that their orbits must be smaller than the Earth's. Because the other visible planets – Mars, Jupiter, and Saturn – can be seen in the middle of the night, when the Sun is far below the horizon, Copernicus realized that the Earth had to be between the Sun and these planets. He therefore concluded that the orbits of Mars, Jupiter, and Saturn must be larger than the Earth's orbit. Three additional planets were discovered after the telescope was invented, also having orbits larger than the Earth's. Copernicus realized that although it is easy to follow a planet as it moves from one configuration to another, these observations alone did not tell of the details of a planet's actual orbit around the Sun. The Earth is also moving.

So, Copernicus was careful to distinguish between two characteristic periods, the synodic period (the time that elapses between two successive identical configurations as seen from the Earth) and the sidereal period (the true orbital period of a planet, the time it takes the planet to complete one full orbit of the Sun relative to the stars.

Kepler discovered that the motions of the planets are not circular, as Copernicus had stated, but rather elliptical. Kepler had observed from an early astronomer, Tycho Brahe, that the planets closer to the sun moved faster than those farther away, and that a single planet moved faster when it was closer to the sun than when it was farther away. Kepler proposed that the sun was the cause of the planets motion and that the sun's influence might decrease with increasing distance from it. With these ideas as guidelines and detailed observations of Brahe as his raw material, Kepler constructed a model of the solar system that used both ideas. Kepler came up with his three laws of planetary motion:

1. The orbit of a planet is an ellipse and the sun is at the focus.

2. An imaginary line from the sun to a moving plane sweeps out equal areas in equal intervals of time.

3. The squares of the sidereal periods of the planets are proportional to the cubes of their semimajor axes. $p^2 = a^3$

Kepler's laws are obeyed not only by planets circling the Sun but also by satellites orbiting the Earth, by double-star systems, by stars in their orbits within galaxies, and even by galaxies in their orbits about each other.

Copernicus and Kepler each wrote a book about their discovery. Kepler's is *New Astronomy* and Copernicus's is *The Revolution of the Heavenly Orbs* (actually, they both wrote in Latin, I thought you'd prefer the translation). Galileo and Newton take it from here, and the rest is history.

The AstroFest Mirror-In-A-Day Project

Val Germann

Central Missouri Astronomical Association

This turned out to be about as much of a success as one could desire – and a lot of fun, too!

The group of us from Columbia all got to AstroFest around 2 or 3 in the afternoon, after leaving around 7 that morning. The weather was just a little hot but that went with mostly clear skies – at least at that time!

As is now usual, the efficient organizers had us through their checkpoint in minutes and the field was in great condition, if a little hard. It's the world's largest backyard campout! I heard that more than 825 had sent in their pre-registration money.

Within an hour we were about set up and I was passing around our handouts, of which I had made 150 copies. By 5 o'clock that afternoon nearly all of our 20 original grinding and polishing slots had been subscribed, many to young people, now more to be seen than ever on site!

At 6:30 we silvered the mirror I had sort of finished last week and spontaneous applause broke out among the thirty or so spectators as the silvered surface came out of the bath and was held up by Mark. This mirror was immediately put into our wooden, hexagonal tube assembly and many, many people looked through it, most saying that, well, for a first mirror and with no testing at all, it didn't look too bad. I guess that was a compliment!

The next morning we started at 8:40 with Mark putting the two disks into proper contact, and at 9:00 the first victim arrived to begin fine-grinding with 220. (Our method starts with diamond-generated surfaces that are already in good contact and fairly smooth.)

I passed out more copies of the handout and soon all of our slots were subscribed. Later we added three more, two of them for quite young people who wanted to participate. And it didn't hurt when they found out they might win the thing in the process!

All morning the fine-grinding went very, very well, only one of our signees not showing up. . .and he was just late, though we grabbed someone out of the spectator group to take his place and he lost his spot in the drawing. We were pressed for time and things had to keep moving.

The blank and tool were both plate glass and the series 220, 320, 17.5 micron, 9.5 micron, went right along – we were ready to polish by 1 pm with a quite uniform surface. I am going to experiment some more with plate glass!

The lap was made in about 7 minutes and just a few minutes later our first polisher was at work. On we went through the afternoon, all going smoothly except for one guy who told us he was an expert and then proceeded to use about 100 pounds per square inch of pressure! We had to terminate him when he would not follow directions.

Our two kids finished up the polishing at 5 PM and we rested until about 6 before getting ready for silvering. All during the day people stopped by to look – many could not believe that anything optical could be made so fast. Well, we were going to show them!

By 6:30 quite a crowd had gathered to watch the silvering, helped out by the fact that the organizers had put back the big door-prize drawings by about 20 minutes! Flashes were going off and cameras were clicking almost continuously as we went through the process again, Mark having increased the amounts of chemicals a bit, thus guaranteeing a very, very nice coat! Once more applause rang out at the end!

As dusk gathered and our audience headed for the main room for the prize drawings, we got ready to mount up the new mirror in our test scope with the hexagonal, wooden tube.

Would it work at all? What kind of shape did we have?

I was the first to spot Jupiter and get it into the scope; it looked GOOD, very good, much better than either mine or Mark's no-test spheres! As it got dark many people drifted over to look through it, several commenting on the quality of the image! We later threw a Ronchi on it (Paul Rothove had bought one of Jack Schmidling's Easy Testers!) and found that we had inadequate polish in the outer one-inch or so and a slightly under-corrected paraboloid on the rest! It was killer and with a bit larger stop (we were using a 1/4-inch stop as part of our method) it would have been GREAT!

At 10 PM we put 25 names in the silvering bowl and drew out Joe Bianco of somewhere in Illinois, the first guy who began grinding that morning. He is going to put the mirror into a scope he has been building for use by schools in his area. We were pleased though several kids were sad that they didn't win! The next morning one little guy and his mother came over and thanked us for our efforts, efforts we felt pretty good about by then!

So, the thing worked — and very well, too! And everyone had a pretty good time to boot.

Observing the Leonid meteor outburst on November 17, 1996

Peter Jenniskens <peter@max.arc.nasa.gov>

Beginning in 1994, the Leonid shower has had periods of increased activity associated with the return of parent comet P/ Tempel-Tuttle, due in February of 1998. These meteor outbursts are of relatively long duration (enhanced rates cover a period of a day) and are rich in bright meteors. Last year, the peak rate was 32 Leonids per hour on top of a normal annual activity of 12 Leonids per hour, with the best rates over Europe. This year, the shower is expected to peak over the US, where Leonids are most abundant in the early morning hours between 3 and 6 am on November 17. Rates may go up to 100 Leonids per hour.

A multistation photographic campaign is being organised in the Bay area of California. At three different sites, platforms of cameras will be operated in the night of November 16/17, from about 10:30 pm in the evening of Saturday November 16 until morning dawn of November 17.

At each site, visual observers will keep a record of the time and location of bright Leonids on star charts. This information is needed to identify the meteors on the negatives and to do the triangulation for determining the trajectory of the meteoroid in the atmosphere and its orbit in space.

If you will be in or near the Bay area (San Francisco, San Jose, Oakland, Monterey) and would like to help, contact:

Dr. Peter Jenniskens (peter@max.arc.nasa.gov)

To Dew or Not To Dew

Doug Scobel

<scobel@ann-arbor.applicon.com>

You're out at your favorite dark sky site. The night is perfect. A cold front has just gone through, leaving the air cool, clear, and wonderfully transparent. There are so many stars that you have trouble making out the constellations. "Awesome!", you say to yourself. You begin observing, and cannot believe how much you are seeing. Suddenly you blurt out "Someone give me an Old Milwaukee – it just doesn't get any better than this!". But, after a while you begin to notice that you can't seem to see much through your finder, and the images through the eyepiece start looking a little fuzzy. No, a LOT fuzzy. Something is horribly wrong. What's going on?! Oh NO!! IT'S DEEEEWWWWW!!!!!!!

Sound familiar? It does to me (ask Doug Nelle or myself about Astrofest a couple of years ago). Very few things can frustrate the dedicated observer like dew (except maybe mosquitoes, but that's another story). It can creep up on you and spoil an observing session big time. But, with a little preparation and inexpensive equipment, you can keep that nasty wet stuff away and observe all night if you wish.

Keep it Covered!

The first thing to remember is that dew only forms on surfaces that are exposed to the open air. So if you are not using it, keep it covered. Keep your eyepieces in their case while not being used. Cover your finder while you're not using it. Chris Sarnecki puts a knit cap over his Telrad while not in use and it stays nice and dry. Also, be careful that your breath does not get near the eyepiece while you're observing.

Dew Caps/Shields

Other things are in use all the time and cannot be covered. Things like SCT corrector plates, Newtonian secondary mirrors, and refractor objectives. But you can cover them sort of. Dew shields are simply an extension of the telescope's tube beyond where it normally ends. It reduces the degree to which the corrector or lens is exposed to the sky. A dew shield can be made of most anything – plastic, waterproofed cardboard or poster board, metal, or foam rubber. You could even tape on a paper bag in an emergency. The thing to remember is that the greater the insulation factor of the material the better. That makes foam rubber good; metal bad. Also, it is important that it extend AT LEAST one tube diameter's worth beyond the end of the telescope. The drawback is that dew shields usually don't work forever - they simply put off the inevitable, especially under damp conditions which are frequent in Michigan.

Electric Dew Chasers

If you really want to keep the dew away indefinitely (or at least all night), the best way I know of is to provide a little electric heat where you need it. You can buy such devices commercially, but you may wish to construct your own for a lot less money. All you need is a voltage source (a battery) and something to provide a little electrical resistance to in turn provide some heat.

First you need to know how much heat is enough. I have found that about one watt is more than enough for finders and eyepieces. If you have an SCT or a refractor, then you'll probably need more

for the corrector plate/objective lens. But, once you have determined your desired power, how do you figure out how much voltage and resistance you need? We'll do a little high school algebra to figure it out.

First, we'll start with Ohm's law

$$E \text{ (volts)} = I \text{ (amperes)} \times R \text{ (ohms)}$$

and the power equation

$$P \text{ (watts)} = I^2 \times R$$

Since we have two equations and two unknowns (I and R), we'll get rid of one (I) and solve for the other (R). Solving for I in each equation yields

$$I = E / R$$

and

$$I = (P / R)^{1/2}$$

Next, we'll set them equal to each other,

$$E / R = (P / R)^{1/2}$$

Square both sides,

$$E^2 / R^2 = P / R$$

then multiply by R, shuffle and deal, and viola!

$$R = E^2 / P$$

There you have it. Simply settle on a voltage and power, and you know how much resistance you need. For example, suppose you want to get two watts out of twelve volts. The equation gives

$$R = 12^2 / 2 = 72 \text{ ohms}$$

But how much power do you really need? Not much. All you want to do is keep the heated surface from falling below ambient temperature. Too much heat will distort optics and cause air currents that will deteriorate your images. I have found that using one watt on my finders is more than enough. If I forget to turn them on until after the lenses start to dew up, they'll be clear after five or ten minutes of operation. I don't really know what you'd need for say, an eight inch SCT corrector plate, but I suspect three or four watts would be plenty.

Practical Matters

I decided that on my scope, I wanted to supply one watt at twelve volts. Putting those values into the equation gives 144 ohms. Since the NiChrome wire I used was around 150 ohms per foot, all I needed was about a foot of it to provide a watt. Once around the finder objective, twice around the finder eyepiece, and a foot serpentined around my Telrad window is all it took (all wiring was done in parallel).

I used NiChrome heater rope I bought at Astrofest for a dollar a foot. It's nice because it's insulated. If you cannot find NiChrome wire, you can also use resistors. Just figure out how much resistance you need, and wire a few in series so that they are spaced evenly, and add up to the total resistance. Be sure to take the power rating into account when deciding which ones to buy. The wire/resistors can be taped, glued, or wrapped wherever needed. Naturally, be careful to insulate well any bare wire.

I use a 4 amp-hour, 12 volt, rechargeable, lead-acid gel cell to power them. All three loops together only draw about a quarter of an amp, so I can easily run it continuously all night if I need to. I use the small battery because it rides along on the scope. If you don't need an "on board" battery, a full size deep cycle lead-acid battery is ideal. Besides powering your anti-dew system, you can run fans, drives, and most anything else off of it. Another good choice would be the batteries made for those motorized "Power Wheels" cars made for kids. They are designed for physical abuse and repeated deep discharge/recharge cycles and should prove to be quite durable. You could also use a couple of six volt lantern batteries, but that may get expensive since they are not rechargeable. Keeping a couple on hand for an emergency might be a good idea, though. You might even be able to make a battery pack from a few "D" size rechargeable NiCads.

To prolong the life of any lead-acid type battery, don't discharge it all the way unless it is designed to be (i.e., unless it is a deep cycle battery). I know, because I have killed one gel cell battery already. Be sure to recharge it with a trickle charger after each use. Conversely, NiCad batteries NEED to be fully discharged before recharging.

I have also added a dew shield to the end of the main tube, as the secondary mirror would sometimes dew up. The shield is made of Kydex, and is held in place with hook and loop fasteners (Velcro®) for quick and easy set up and take down. I have never had a problem with the secondary dewing up since I began using it. It also has the added benefit of preventing ambient light entering the field lens of the eyepiece, increasing contrast. I have also seen telescopes with heaters behind their secondary mirrors to keep them dry.

To Dew or Not to Dew

So, now you know what to do to not dew. With a little bit of inexpensive equipment, dew will never again ruin your observing sessions. If only it was so easy to take care of those pesky mosquitoes! But that's another story.

(Sorry, Doug, I never did figure out how to get those square root symbols to come out right! - Ed.)

Calling All ATMs

The Vallejo telescope is a recent design by R. D. Sigler of Lockheed's Palo Alto Research Lab. Similar to the Kutter trischiefspiegler, it is an all-spherical, three-mirror tilted-component telescope. Like other scopes of this class, it provides superb high-contrast images for planetary viewing or splitting close doubles. Tom Ryan and Kurt Hillig of the Lowbrows are working with Karl Mueller – a professional optician in Ann Arbor – to put together a telescope-making class, to build a set of 6" f/16 Vallejo scopes. Fellow students will have the opportunity to learn the fine art of glass-pushing (largely motor-driven – bulging muscles aren't required) from an expert, and to make a top-of-the-line instrument.

We are especially in need of someone with skills and time to help with the woodworking for this; the goal of the class is to end up with complete telescopes, not just a set of optics. (Plus, the complete telescope fits into Karl's interferometer – we can guarantee that your scope is figured and collimated to the highest standard, but only if the scope is assembled!)

If you're interested in learning something of the fine art of ATM, would like a superlative planetary telescope, and are willing to spend about $500 on materials and some evenings or Saturdays over the next few months, call Kurt Hillig at 663-8699!

ATM History: Part 1.2

Val Germann
Central Missouri Astronomical Association

The first installment of this series left Porter and Ingalls in a New York restaurant talking mirror making. Later, Porter had the idea of "promoting the telescope-making virus" through the pages of SCIENTIFIC AMERICAN. He wrote to Ingalls that the Springfield Telescope Makers had determined, through the use of various "astrological incantations," that the evening of June 13, 1925 would be just the evening for some grinding at Stellafane.

The November number of SCIENTIFIC AMERICAN published the results of this soiree and Ingalls says that he and Porter thought that half-a-dozen people might respond. Instead, the magazine got 368 requests for information! Response was so great that early in 1926 the magazine began a series of articles by Porter, articles that soon led to the creation of ATM-1.

Spring, 1926, saw "all known telescope makers in North America" get an invitation to a meeting at Stellafane scheduled for July 3, 1926, and 17 people came to Breezy Hill. This was the first of 17 straight meetings, World War II putting a temporary stop to them.

Ingalls says that the invitations to the second Stellafane meeting read, "No formal program but a chance to talk over your problems." The avocation was well-launched, gaining even more momentum in 1928, when SCIENTIFIC AMERICAN began Ingalls' series of columns, THE AMATEUR ASTRONOMER. And it didn't hurt very much when it was learned that Clyde Tombaugh had began his astronomical education by, you guessed it, making a telescope.

Ingalls says that by 1950 about ** 50,000 ** people had begun a telescope-making project and that during the War former amateurs had turned out more than 60,000 roof prisms for the U.S. military!

Web Sites I have Known and Loved

Kurt Hillig

I'm afraid we're short on space this month; so the list will be brief, but there are plenty more out there, and I'll keep printing them as long as I keep finding them. Thanks this month to Laura Meluch, who provided these. (Remember to add the "http://" prefix to these if your web browser requires it.) Happy web-crawling!

www.starhustler.com/ – STAR HUSTLER
www.pa.msu.edu/abrams/home.html – Abrams Planetarium
www.seds.org/billa/ – Bill Arnett
www.en.com/users/cygnus/ – Astra's Star Gate
mtwilson.edu/Services/StarMap/ – OnlineStargazer Map
www.arc.nasa.gov/ – NASA Ames Research Center
www.jpl.nasa.gov/ – NASA Jet PropulsionLaboratory
shuttle.nasa.gov/ – The NASA Shuttle WebArchives
www.skypub.com/ – SKY Online - Sky Publishing Corporation
stdatu.stsci.edu/cgi-bin/dss_form – The Digitized Sky Survey
www.astro.lsa.umich.edu/ – U of M Astronomy Department
antwrp.gsfc.nasa.gov/apod/archivepix.html – Astronomy Picture of the Day Archive
www.mcs.net/~bstevens/al/astrnote/astnotes.html – Astro Notes — Astronomical Vignettes

The Third Annual Nebraska Star Party

David Knisely <dk84538@ltec.net>

Once again, the 3rd annual Nebraska Star Party lived up to its reputation as both a family and dark-sky observing event, bringing together about 250 people from as far away as southern Florida, California, Texas, and Ontario, to experience the wonders of the late summer skies. Held August 10-17 near Merritt Reservoir high in the Sandhill region of northwest Nebraska, this event once again featured a unique combination of daytime recreational and social activities for all ages, along with viewing under a pristine night sky which has to be seen to be believed.

A few people arrived early on Saturday the 10th, and spent much of the day sight-seeing or resting up from their travels. That evening, about 100 of the "early birds" gathered with 26 telescopes at the observing fields on the high dunes south of the Snake campground to begin their week of viewing. The sky gave these amateurs the wonderful experience of both crystal-clear darkness and rock-steady seeing. Many observers saw stars down to magnitude 7.5 with the unaided eye, and the views through the telescopes were equally stunning. Tom Miller's 30" Obsession revealed the majestic dark pillars in M16 in a way few people had ever seen. The Veil Nebula looked better than most photographs, and faint galaxies became easy to pick out. Telescopes were rapidly swinging all over the sky, as awe-struck amateurs ran from instrument to instrument to take in the view. The Milky Way again stole the show, casting weak shadows and revealing extensive dark detail well outside the normal confines of its band of light. Many people commented on how they could see even dim stars just "pop" up on the horizon. Some star party attendees concentrated on just sitting back and taking in the fantastic star fields with the naked eye, while they watched the Perseid Meteor shower put on its annual display of fireworks. NSP chairman Dave Scherping put his 20" Dobsonian on Saturn while it was only five degrees above the horizon, and revealed Cassini's division and a number of moons! Sunday morning twilight came all too soon!

Sunday brought on the start of NSP registration, as the bulk of those who would spend the week arrived. At dusk, a public star party was held at the Merritt Resort behind the cabins, so campers and interested individuals from Valentine Nebraska could view the more prominent celestial objects. After that, most attendees went to the observing area to watch the Perseids or view through the large number of telescopes present. Several people reported about 60 meteors per hour, with many being quite bright and leaving trains.

Monday, daytime activities were in full swing, with many families taking advantage of Merritt Reservoir's white sand beaches and warm water. The weather was warm and dry, with temperatures in the upper 80's. Tom Miller took several families and other attendees out on the lake in the "Party Barge", a 24 foot pontoon boat, to fish, swim, or just relax and take in the scenery. The evening brought partly cloudy skies which tended to frustrate some observers, but people still had a chance to chat for long hours into the night. Tuesday afternoon at the Merritt Resort, Dr. Jim Swinehart, a geologist from the University of Nebraska, gave an interesting talk about the origin and history of the Sandhill dune field. This was followed by a hamburger barbecue behind the cabins. Tuesday night was mostly cloudy, which spawned a round of Laser Wars and Photon Torpedo exchanges at the observing site.

Wednesday afternoon brought on the swap meet, which was followed later by a wonderful night of observing with dozens of large telescopes under a crystal- clear dark sky. Mark Dahmke demonstrated the ST-8 CCD system on his 8" Meade LX-200, imaging a large number of deep-sky objects from the NSP observing field in as little as 10 seconds. Comet Hale-Bopp was also fairly easy to see with the naked eye, showing both a curving coma and a broad faint tail which was nearly two degrees in length.

On Thursday morning, the Great NSP Canoe/Tubing trip in the Niobrara Canyon was a "splashing" success. It was a cool morning, but that didn't prevent some vigorous water antics from many of the kids (not to mention the water cannon battle between Tom Miller and Texan Alan Scruggs). Other people just floated down the river, resting from the previous night's observing, or admiring the rugged canyon topography. A chicken Barbecue was held at Merritt Resort that evening, but thunderstorms cut off observing.

On Friday, the formal programs were held in the Valentine High School auditorium. Martin Tippman of the Genesis Factor started things off with a talk on meteorites. Vic Winter of the Astronomical Society of Kansas City did a presentation on observing high in Bolivia at the Southern Skies Star Party. Bruce Twarog gave a talk on the search for metals in the Galaxy, which was followed by a presentation on H-alpha Observing by David Knisely of the Prairie Astronomy Club. Brenda Culbertson of NEKAAL gave a talk on Archeoastronomy, which was followed by Joel McCleary and Sean O'Corrain who spoke on the Nebraska Math-Science Initiative and Science Odyssey. Dave Nash won the difficult "Name that Object" contest. The Key-note speaker was Richard Pirko, who gave the presentation "Echoes of the Space Race". The group then moved to the Peppermill Restaurant for the prime rib banquet, where the grand door prize, a Meade ETX Maksutov was awarded.

Friday night was another observing winner, with dark and clear skies lasting until twilight on Saturday morning. Mark Dahmke again fired up his CCD system, taking even more stunning images for placement on the NSP web page. Telescopes were spread out over a huge area running from the upper observing field all the way down to the campground near the lake.

Many attendees had to leave on Saturday, but a number stuck it out for one more clear (but cold) night under the dark Sandhill skies. A waxing crescent moon low in the west signaled the final wonderful night of the 3rd Nebraska Star Party.

THE FOURTH ANNUAL NEBRASKA STAR PARTY IS SCHEDULED FOR AUGUST 2 - 9, 1997 at Merritt Reservoir, 26 miles southwest of Valentine Nebraska. For more information, check out our web site at: http://www.4w.com/nsp or the Prairie Astronomy Club Web page: http://www.infoanalytic.com/pac/

From the Observatory

Bernard Friberg

Many thanks to those that participated in the moon walk and made it a success! The weather was cloudy at first, then it rained, but it finally cleared up though it got rather chilly. The attendance was nominal, maybe 150 – 200, a number that we could easily accommodate.

Comet Comments

Don Machholz <DonM353259@aol.com>

Two naked-eye comets are visible in our skies this month. In the evening sky Comet Hale-Bopp is doing well after dimming a bit during early September. This was followed by a substantial increase in brightness and a different appearance later in the month. This should be no surprise, as comets are expected to do the unexpected. Its tail is several degrees long. Meanwhile, Comet Tabur will be visible in both the north-western sky in the evening and the north-eastern sky in the morning for several weeks.

C/1995 O1 (Hale-Bopp)

Date (00 UT)	RA (2000)	Dec	Elev	Mag
10/14	17h31.8m	-04°20'	63°	4.8
10/19	17h33.5m	-04°04'	59°	4.7
10/24	17h35.6m	-03°47'	55°	4.6
10/29	17h38.1m	-03°29'	51°	4.5
11/03	17h41.0m	-03°09'	48°	4.4
11/08	17h44.3m	-02°47'	44°	4.3
11/13	17h48.0m	-02°26'	41°	4.6
11/18	17h52.0m	-02°00'	38°	4.5
11/23	17h56.4m	-01°31'	35°	4.4
11/28	18h01.1m	-00°58'	33°	4.2
12/03	18h06.2m	-00°22'	31°	4.1
12/08	18h11.6m	-00°18'	29°	3.9
12/13	18h17.3m	-01°03'	28°	3.7

C/1996 Q1 (Tabur)

Date (00 UT)	RA (2000)	Dec	Elev	Mag
10/14	11h38.3m	+55°50'	68°	5.5
10/19	13h14.2m	+52°31'	63°	5.7
10/24	14h11.2m	+47°18'	59°	5.9
10/29	14h44.9m	+42°20'	57°	6.2
11/03	15h06.2m	+38°03'	54°	6.4
11/08	15h20.8m	+34°22'	52°	6.7
11/13	15h31.3m	+31°11'	49°	7.0
11/18	15h39.4m	+28°22'	48°	7.3
11/23	15h45.8m	+25°52'	46°	7.6
11/28	15h51.2m	+23°37'	45°	8.0
12/03	15h55.9m	+21°36'	45°	8.3
12/08	15h59.9m	+19°47'	45°	8.6
12/13	16h03.5m	+18°09'	46°	8.9

IUE: RIP

NASA Press Release: 96-194

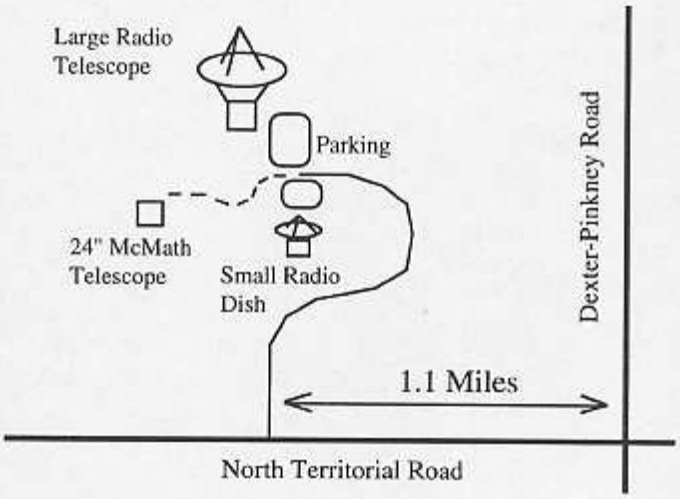
After nearly 19 years of operation, NASA's International Ultraviolet Explorer spacecraft – originally designed for a three-year life – received its final "shutdown" on Sept. 30, 1996, marking the end of one of the longest and most productive missions in the history of space science. More than 2,000 guest observers have used the observatory, and more than 500 doctoral students have used IUE results in their dissertations. Approximately 3,500 scientific articles based on IUE observations have been published – the largest number for any satellite observatory thus far. IUE's ultimate legacy will be the final data archive, which will be completed by the end of 1997; more than 100,000 astronomical observations are currently being reprocessed.

More information on IUE and other related missions is available on the Internet at http://iuewww.gsfc.nasa.gov/iue/iue_homepage.html

Places:

Dennison Hall, also known as the University of Michigan's Physics and Astronomy building, is located on Church Street in Ann Arbor one block north of South University Ave. The Lowbrow's monthly meetings are held in room 807. The UM parking structure on Church Street is nearby and is open to the public after 6 PM.

Peach Mountain Observatory is the home of the University of Michigan's 25-meter radio telescope, as well as the University's McMath 24-inch telescope which is maintained by the Lowbrows. The observatory is located northwest of Dexter; the entrance is on North Territorial Road, 1.1 miles west of Dexter-Pinckney Road. A small maize-and-blue sign marks the gate. Follow the gravel road one mile to a parking area near the radio telescopes. Walk along the path between the two fenced-in areas (about 300 feet) to reach the McMath telescope building.



Times:

The monthly meetings of the Lowbrows are held on the third Friday of each month at 7:30 PM in 807 Dennison Hall. During the summer months, and when weather permits, a club observing session at Peach Mountain will follow the meeting.

Computer group meetings are held on the first of each month, rotating among members' houses. See the calendar on the front cover for the location of the next meeting.

Public Open House/Star Parties are held on the Saturdays before and after each new Moon, at the Peach Mountain Observatory. Star Parties may be cancelled if the sky is cloudy at sunset or the temperature is below 10°F – call 480-4514 to check on the status. Many members bring their telescopes; visitors are welcome to do likewise. Peach Mountain gets cold at night, so dress warmly – and bring insect repellant!

Membership:

Membership dues in the Lowbrow Astronomers are $20 per year for individuals or families, and $12 per year for students. This entitles you to monthly issues of *Reflections* and the use the 24" McMath telescope (after training). Dues can be paid to the club treasurer, Doug Scobel, at any meeting or by mail at this address:

1426 Wedgewood Dr.
Saline, MI 48176

Magazines:

Members of the Lowbrow Astronomers can get a discount on these magazine subscriptions:

Sky and Telescope: $27 / year
CCD Astronomy: $20 / year
Astronomy: $20 / year
Odyssey: $16.95 / year

For more information, contact the treasurer.

Newsletter Contributions:

Members (and non-members) are encouraged to write about any astronomy-related topic in which they are interested. Images, whether photographs, sketches, or in electronic form (GIF, TIFF or JPEG) are also welcome. Call the editor (Kurt Hillig) at 663-8699(h) or 647-2867(o), or send e-mail to khillig@umich.edu, to discuss length, format, etc. Announcements and articles are due 14 days before each monthly meeting. Contributions can be mailed to:

Kurt Hillig
7654 W. Ellsworth Rd.
Ann Arbor, MI 48103

Telephone Numbers:

President:	D. C. Moons	254-9439
Vice Pres:	Mark Cray	283-6311
	Tom Pettit	878-0438
	Fred Schebor	426-2363
	Mark Vincent	663-7813
Treasurer:	Doug Scobel	429-4954
Observatory Director:	Bernard Friberg	761-1875
Newsletter:	Kurt Hillig	663-8699
Publisher:	Lorna Simmons	525-5731

Peach Mountain Keyholder:
Fred Schebor 426-2363

Visit our Home Page:

http://www.astro.lsa.umich.edu/lowbrows.html

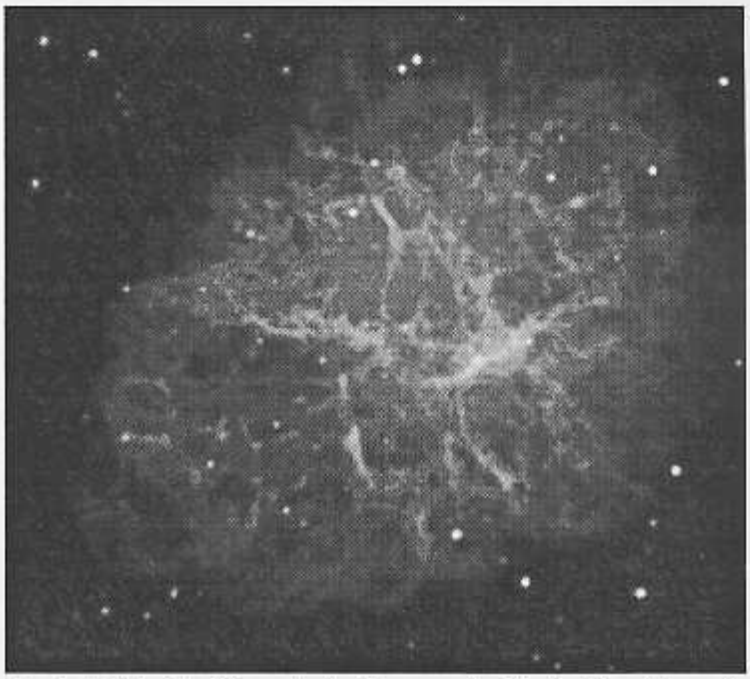
Monthly Meeting:

Bill Durrant:

30 Years On – ALSEP

Oct. 18, 1996 at 7:30 PM

Room 807 of the Dennison Building on the UM Campus



The Crab Nebula in Taurus is the first entry in Charles Messier's well-known list of objects that can be mistaken for comets if you're not careful. The remnant of a supernova seen on Earth on July 4, 1054, it contains the first pulsar discovered. This image was taken in the green emission line of doubly-ionized oxygen by Dr. Stephen Lawrence with the University of Michigan's 52-inch telescope at Kitt Peak in Arizona.

University Lowbrow Astronomers
1740 David Ct.
Ann Arbor, MI 48105

Check your membership expiration date on the mailing label!