

August 1993

M57 (the Ring) imaged by Roger Tanner at Peach Mountain on July 16, 1993 with an ST-4 CCD camera at prime focus on a 17.5" f/4.5 telescope (600 second exposure). The image on the right was processed with *NIH image* to enhance detail in the nebula.

**Kurt Hillig**  
Editor

## Of the University Lowbrow Astronomers

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 Detroit Observatory at the corner of Observatory and Ann Streets in Ann Arbor. Meetings begin at 7:30 PM and are open to the public. Public star parties are also held twice a month, at the University's Peach Mountain Observatory on North Territorial Road (1.1 miles west of Dexter-Pinkney Road; map on page 7) on the Saturdays before and after the new moon; the star party is cancelled if it's cloudy at sunset. For further information, call Stuart Cohen at 665-0131.

### This Month:

**August 14 - Public Open House** at the **Peach Mountain Observatory**. Maybe we'll see a few Perseid stragglers....

**August 20 ☆ PICNIC** at the **Peach Mountain Observatory!** Gates will open at 6:00. Bring some food for yourself and something to share; pop and chips will be provided. Training on the 24" will be available. If it's cloudy it's still on, but in case of rain, we'll commiserate at 7:30 PM at the Detroit Observatory (and then the Brown Jug) in Ann Arbor.

**August 21 - Public Open House** at the **Peach Mountain Observatory**. Saturn's at opposition, and if nobody shows up we can all play with the new optics Mark Cray's made for astrophotography through the 24". Don't let that stop you, though, 'cause eyeballs have higher priority than cameras tonight!

### Cheaper than Truth!

Hands so shaky from too much coffee that your old 7x50's make you think you're on Guam when it hits 8.1 on the Richter scale? Too cheap to shell out 15 bucks for a tripod adapter? Well, friends, it's easy to do it on a grad student's budget - if your binocs (like mine) have a 1/4-20 threaded hole in the hinge. First, stop by your favorite hardware store and pick up a 2"x5/8" angle bracket (a 4" strip of steel bent in an "L") and a short 1/4-20 thumbscrew and some nuts to match. Drill a #7 (or 13/64") hole in one leg of the bracket and thread it with a 1/4-20 tap - this is to attach the bracket to your tripod. Thread one or two nuts on the thumbscrew, stick it through one of the pre-punched holes in the other leg (drill a 1/4" hole if needed), screw it into the binoc's hinge, and viola! Add nuts, washers etc. as needed for spacers.

### Next Month and Beyond:

**September 1 - Computer Subgroup Meeting** at **Bernard Friberg's** house (a Wednesday). On the agenda: an introduction to the NGC-Max and other fun toys and software. Call Bernard at 761-1875 for directions.

**September 11 - Public Open House** at the **Peach Mountain Observatory**. If you're not at AstroFest, then you'd better be here! Start the fall observing season with a bang!

**September 17 - Meeting** at the **Detroit Observatory**. Speaker/topic TBA. (Is this our annual A/M slide show? Fred's out of town, so I can't ask him, and the other VP's don't remember....)

**September 18 - Public Open House** at **Peach Mountain**. We're not quite ready for the long johns yet, but with luck we'll have a nice cool evening without mosquitos. What better reason for a star party? New fall fashions will be on display.

**September 18 - Island Lake Star Party** at the **Island Lake State Recreation Area**. Sponsored by City Camera of Dearborn, it should be a big gathering with lots of local clubs in attendance.

**October 1 - Computer Subgroup Meeting**

### AstroFest '93 is coming up!

AstroFest '93 will be held this year on the weekend of Sept. 10-12 at Camp Shaw-Waw-Nas-See near Kankakee IL. Registration is \$25 per person (\$22 for spouse, \$7 for kids 6-12), \$7/adult discount if you register before Aug. 28. \$15 camping fee. \$20 for 3 meals Saturday plus Sunday breakfast. Contact Doug Nelle at 996-8784 for more info!

# Putting WF/PC-2 in place may require the hands of a surgeon

By Diane Ainsworth

From the "JPL Universe", July 16, 1993

What will it take to slide a 280-kilogram (620-pound), wedge-shaped camera into the side of NASA's orbiting Hubble Space Telescope without so much as bumping an edge of the instrument?

NASA thinks it may take the hands of a surgeon.

So Story Musgrave, a surgeon by training and payload commander on STS-61 – the first Hubble telescope servicing mission – has been practicing, along with four other crew members, in a 12-meter-deep (40-foot-deep) water tank at Marshall Space Flight Center in Huntsville, Ala. The tank simulates the weightlessness of space.

"Working in the water tank, and in the Weightless Environment Training Facility at Johnson Space Center, we are learning things like reach and visibility," Musgrave told members of the press at a recent Hubble Space Telescope News Writers Workshop in Baltimore. "We are learning the right kinds of positions we will use in the work sites on orbit, how to work in spacesuits and how to restrain objects in zero G."

Musgrave and his colleagues were halfway through a three-week water training session at Marshall Space Flight Center when he took time out to give the press an astronaut's perspective on the upcoming December 1993 Hubble Space Telescope servicing mission via remote satellite link from Huntsville.

The 57-year-old veteran of four space flights, who had recently suffered frostbite on several fingertips during a training session, didn't flinch when the inevitable question – would the crew be able to fix everything – came up.

"It's a bunch of hard work, but I think we're going to get the whole thing done," he declared enthusiastically. "People should remember that during the lunar program, we were working on the moon eight hours a day, three days in a row," he said. "During this mission, we will be working (out in space) six hours every other day."

The Space Shuttle Endeavour is scheduled to rendezvous with and capture the Hubble Space Telescope during STS-61, tentatively set for launch at 4:30 a.m. Eastern Standard Time on Dec. 2. Astronauts will retrieve the 13.1-meter-long (43-foot-long) orbiting telescope on the third day of the mission.

Once the telescope has been captured by the shuttle's 15-meter (50-foot) mechanical arm, it will be secured upright in the cargo bay for servicing. One-hundred-and-seventy-one tools, ranging from simple tote bags to sophisticated, battery-operated power tools, have been prepared to assist the astronauts in the repair mission.

Working in pairs on alternating days, four of the seven crew members – Musgrave and mission specialists Jeffery Hoffman, Thomas Akers and Kathryn Thornton – will be spacewalking a record five days of the mission and, perhaps, as many as seven days. Each spacewalk will last from five to eight hours, depending on how long the oxygen supplies last.

Three priorities on STS-61 have been identified as crucial to the success of the mission: replacing the telescope's two 12-meter (39-foot) solar panels; replacing the Wide-Field/Planetary Camera; and installing the Corrective Optics Space Telescope Axial Replacement, known as COSTAR.

Musgrave said the crew has been working with a full-scale

training version of the camera to learn how to delicately remove the cover of the pickoff mirror, which points out from the tip of the camera, before the instrument is guided like a giant drawer into the side of the telescope.

"You are about this far away from the mirror," he said, extending his arm about 30 centimeters (12 inches) in front of his face, "and you've got the optics of an incredibly important instrument, probably one of the most important instruments ever flown. It has to be protected, it cannot be touched at all, and you have to give it the most tender loving care of all until it is inserted into the telescope."

The astronauts have learned from water training that the Wide-Field/Planetary Camera will have to be handed off to one astronaut, who will be holding onto the side of the telescope from his or her partner, who will be standing on the shuttle's robot arm.

"We discovered that the person on the arm will not have the visibility to slide the camera into the side of the telescope," Musgrave said. "Keep in mind that we are wearing big helmets and visors that limit our sight, how much we can turn our heads and where we can put our eyeballs."

Two extra days have been built into the 11-day mission to give the astronauts a day off and to allow for contingencies – anything that might go awry or require research from the ground.

"If we find that we're running behind in some task or running ahead of schedule, we will be able to move on to other tasks," Musgrave said. "We are being trained to accommodate surprises, changes in the flight plan, things that may interrupt or delay our activities."

The crew will begin its daily spacewalks on the day following telescope capture, Dec. 5, said Milt Heflin, flight director for the first servicing mission.

The first extravehicular activity (EVA) will involve replacing three backup gyros that are used to point and track the telescope and preparing the solar arrays for deployment, Heflin said.

The second EVA will be devoted to replacing the solar arrays, followed on the next EVA day by replacement of the Wide-Field/Planetary Camera. The fourth EVA will be used to remove the 220-kilogram (487-pound), telephone booth-sized High Speed Photometer and replace it with the 272-kilogram (600-pound) COSTAR. All of the science instruments will be returned to Earth to determine how well they weathered the space environment.

NASA is considering a follow-up mission nine to 12 months after STS-61 if all of the repairs are not completed. Although Musgrave said he'd "jump at it" to be one of the returning astronauts, he also voiced his confidence that the STS-61 crew would be able to accomplish its mission regardless of the surprises or setbacks.

"In my 26 years with NASA, I have never seen such a detailed, energetic approach to trying to identify all of the surprises, to look ahead to all of the possibilities, all of the contingencies that might happen during the mission," he said.

"But this is not your local garage ... this is spaceflight, this is one of the most ambitious things we have ever attempted. It's a drama, and it's going to have to be played out."

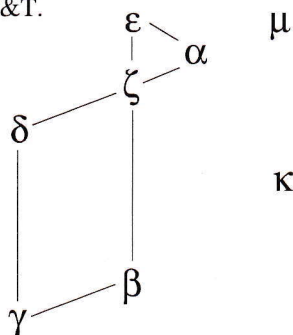
## Beta Lyrae: Watch an Evolving Binary Star

In the June 1993 issue of *Sky and Telescope* magazine, John Isles shows a light curve of Beta Lyrae derived from naked-eye observations made in 1987-88. Since this eclipsing binary system is evolving, it is important to continue observations of this star. Mr. Isles is interested in collecting visual observations of Beta for the next few months from interested observers.

If anyone would like to include their visual estimates in the follow-up report, measurements can be sent to:

John Isles  
1016 Westfield Drive  
Jackson, MI 49203-3630

Beta Lyrae is fairly bright star and is easy to find near Vega. The brightness goes through a 12.94 day cycle with two maxima and two minima. Its unusual light curve is attributed to a toroidal disk around the secondary star. For more information on this binary star and how to observe it see page 72 of the June 1993 issue of S&T.



Star	Magnitude
β (beta)	3.3 - 4.1
γ (gamma)	3.2
ζ (zeta)	4.1
κ (kappa)	4.3
μ (mu)	5.1

## T-Shirt Contest: Second Call!

At the June 18 meeting we discussed selling T-shirts as a way to raise some needed extra cash. Keith Bozin was volunteered to organize this project. It was suggested that we come up with two designs – one for ourselves and another for sale at open houses. So, in the true American competitive spirit, we're launching a contest!

The two winning designs will receive free T-shirts (and possibly some other prizes if Keith stumbles across some worthy tokens between now and Judgement day [sic]). The design may contain up to 3 colors and must be easily transferred for silk screening. Judging will take place during the 17 September meeting, so bring your designs to that meeting or arrange to have them there. If you have any questions or suggestions feel free to call Keith at 549-9525 (or on CompuServe at 72630,3402).

For those of you with a few extra bucks, your editor suggests you pick up a copy of the August *Scientific American*. David Malin's photo spread on pp. 72 – 77 is well worth the \$3.95 cover price!

## Lowbrows Anonymous: Publishing the membership list

Well, it's something we haven't done for quite a while, and it's something that you've been asking for, so we're gonna do it!

The membership list of the Lowbrows will be published in next month's issue of *Reflections*. No more excuses for leaving the Supreme Exalted Editor-in-Chief off your Christmas card list!

If you would prefer to have your name, address and/or phone number remain unpublished, please contact our membership coordinator (Steve Musko) before September 5, 1993! Steve's phone number can be found on page 7.

## Nitrogen Ice Discovered on Pluto

JPL Press Release 93-142 August 6, 1993

The distant planet Pluto is covered with surface ices that are 98 percent nitrogen, University of Hawaii, NASA and other scientists say. With such abundant nitrogen surface ice, Pluto's thin atmosphere must be primarily gaseous nitrogen, they conclude.

This is the first clear detection of nitrogen on Pluto and the first clear indication that the atmosphere is mostly nitrogen gas rather than methane. Carbon monoxide also was detected for the first time. "Rather than methane as previously thought, it appears that frozen nitrogen dominates the surface," said Dr. Ted Roush. Roush, employed by San Francisco State University, works at NASA's Ames Research Center, Mountain View, Calif.

Methane was detected on Pluto's surface in 1976. Extremely small amounts of methane are easy to detect because it strongly absorbs specific wavelengths of sunlight. "The small amounts (1.5 percent) of methane ice are 'dissolved,' or mixed at a molecular level, in the frozen nitrogen," Roush said. The abundant nitrogen recently found on Pluto is a poor absorber of sunlight and produces very weak features in the light reflected from the planet, so it previously had not been identified.

The observations were made in Hawaii with a new instrument on the United Kingdom Infrared Telescope in May 1992. The results are published in the current issue of *Science* magazine, along with similar observations of Neptune's moon, Triton.

Pluto resembles Triton in size and in surface and atmospheric composition. Both have nitrogen, methane and carbon monoxide ices on their surface. Because their surfaces are made of similar materials, scientists think Pluto and Triton may have formed in a similar location in the solar nebula, Roush said.

Pluto, almost 3 billion miles from Earth, is the only planet not yet explored by a spacecraft. Pluto is unusual in several respects. Although classified as a planet, it is smaller than Earth's moon. Pluto's only moon, Charon, is at least half as big as the planet itself. It also is the only planet in the solar system with an orbit highly inclined out of the plane of the solar system.

The authors, with Roush, include first author Dr. Tobias Owen, University of Hawaii; Dr. Dale Cruikshank of Ames; and Drs. J. L. Elliot and L. A. Young, Massachusetts Institute of Technology. Additional authors are C. de Bergh, Observatoire de Paris-Meudon, France; B. Schmitt, St. Martin d'Herès, France; T. R. Geballe, Joint Astronomy Center, Hilo, Hawaii; R. H. Brown, Jet Propulsion Laboratory, Pasadena; and M. J. Bartholomew, Ames.

# Review of the 7/16/93 LBA Meeting

By Bill Razgunas

Do you want a copy of the membership list? Talk to Steve Musco!

Guess what?! Renovation plans for that majestic structure on campus known as Angell Hall suggest an uncertain fate for its 10" refractor and 15 " reflector. Could it be possible for the LBA to assist in making a happy home for these instruments? Right now they abide in the loneliness of the roof. Perhaps action by Kurt Hillig, when he approaches the Dean's office, will have a significant effect? Tune in to another meeting to find out more.

Two globes were donated by Brian Close - one of the Moon, and one of Mars. What is the LBA's best use of these? Educational tools for putting on demonstrations before groups? Useful tools for giving others a "feel" that the Moon and Mars are real places? Objects for any wandering person to take home never to be seen again?

Did you know that someone is compiling an Internet resource for Physical Astronomy? My first question was: What does this mean to the LBA? It means that a list of Internet addresses is being compiled where information related to astronomy can be found! This promises to be a valuable resource! If you can help in any way, contact Elizabeth Blackey - a new member and a grad student in the School of Information and Library Science. Call Steve Musko for her address/phone number.

"The power of a waterfall is nothing but a lot of drips working together" - Anon. From one drip to another, I've collected the essence of how we need to work together when one is finished using the McMath telescope:

- 1) Turn the drive off.
- 2) Level the scope and lock it in Right Ascension and Declination.
- 3) Close the roof. **DON'T RUN THE ROOF INTO THE SCOPE!**
- 4) Cover the primary and secondary, and plug in the heater on the primary cover; put the lens caps on the finder and guide scopes; put away the eyepieces and stick a film can in the 1.25" eyepiece holders on all of the scopes (put in 2" - 1.25" adapters as needed).
- 5) Check that all lights and heaters are off. Check the correct setting of the humidistat and make sure it's working.
- 6) Double check that the roof is closed.
- 7) Leave the gate key in the drawer; **LOCK THE OBSERVATORY AND THE GATE!**

Our Supreme Exalted Observatory Director (D.C. Moons) pointed out that our waterfall needs some improvement. (Well, he didn't mention the waterfall, but his message was the same.) Thanks D.C.!

The written procedures for how to use the telescope are in the process of being edited. Since it's important to get this done so that the document is really useful, your patience is requested. (Following the meeting, Roger Tanner and I had a great conversation about this. Roger proposed that the LBA set up a regular training night. This night could be a time for anyone who wants training to show up whether the skies are cloudy or not. Roger will kickoff this idea at the next meeting.)

Guess what! The LBA's reputation is changing! What reputation? You know the joke: "How many astronomers does it

take to screw in a light bulb? Three: one to hold the light bulb and two to turn the chair!" The digital setting circles are installed and working. This is going to be an item in the future edition of 'The Razgunas Book of LBA Records'. Thanks to the efficient decision-making of the group and Tom Ryan's aggressive implementation, the LBA has made a very fast move from decision to completion.

What do the digital setting circles do? Where are the instructions on how to use the equipment? As I understand it, the digital setting circles are useful to identify 'NGC' and 'M' objects that you may want to see. The instructions on how to use this new feature will be the topic of another meeting.

Another topic which came up in the context of the digital setting circles is the possible acquisition of a computer. This topic was just lightly touched upon. Roger Tanner later explained to me that this would make a sky map readily accessible on the computer's display. What is the primary advantage? The one that was mentioned was that of being able to click on an object shown on the computer display. Following that, the program could aid in directing which way to move the scope. Maybe someday we'll be able to hook up a CCD and do some imaging as well.

The first original designs for the Dry T-Shirt contest were passed around for early inspection. Glad to see the contest is picking up some momentum.

There was a request that the club consider meeting in another location. Parking can be difficult. How about the Physics and Astronomy building? Paul Etzler will check out this possibility with the University.

Brian Close gave an enthusiastic description for where to get assistance with rough grinding a mirror blank. He recommended contacting Karl Mueller, a master optician in town who has some equipment which can greatly accelerate this process. Karl's phone number is 663-9011. Tom Ryan recommended a couple of things: Remember that Karl works for a living - his primary source of income does not come from astronomy enthusiasts. Also, call Karl with the expectation to learn something from him.

Tom Ryan gave a fine presentation about stepper motors and their application to telescope drives. Tom promised to send a photocopy of how to build your own stepper motor controller to anyone who asks for it. Take Tom's reassurance to heart: "Even an electrically dysfunctional person can build this."

LBA trivia question: How many Lowbrows does it take to lift one half of each of the McMath's counterweights?

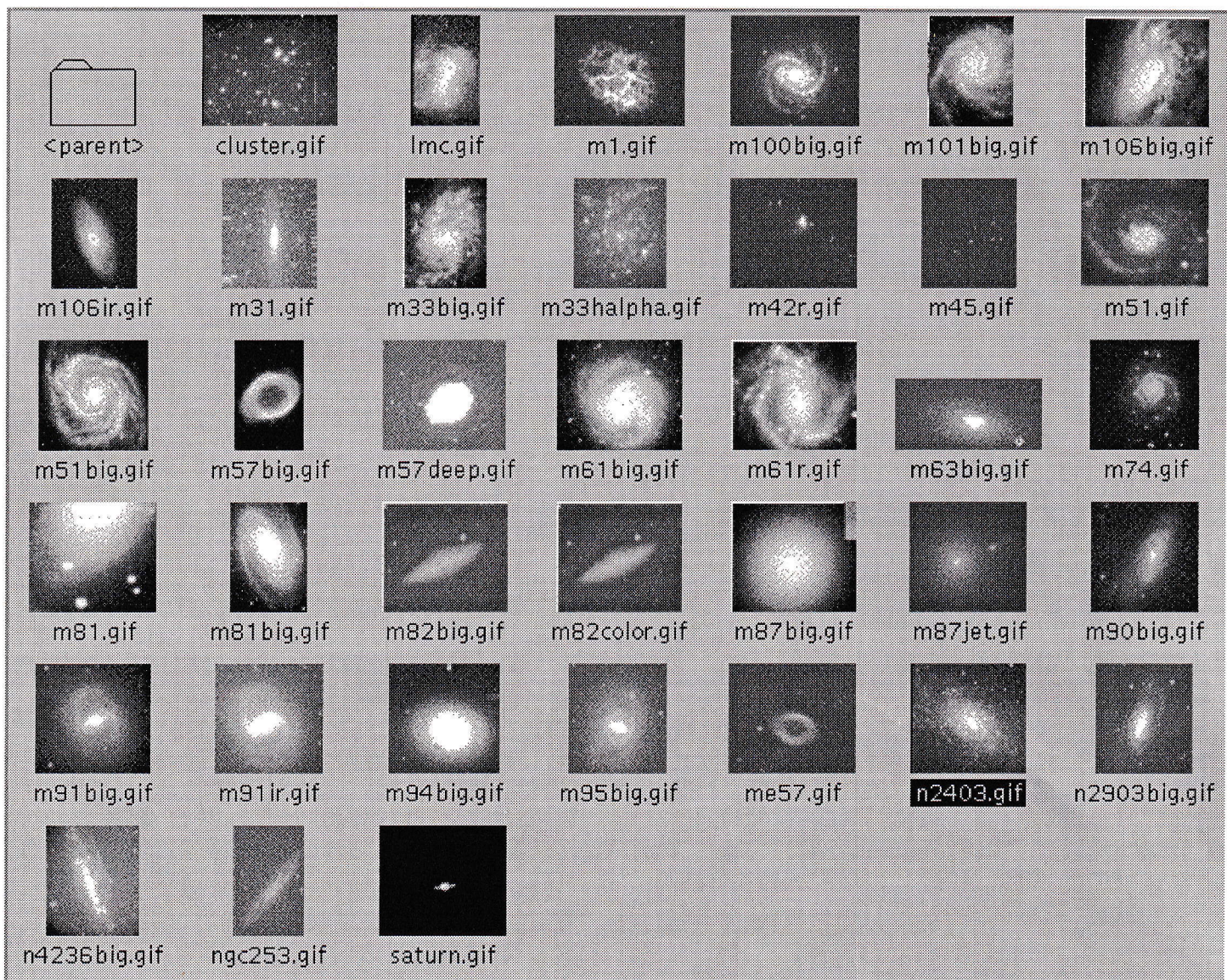
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## Computer Subgroup Report

Due to an unfortunate combination of vacation and work schedules, the Computer Subgroup report was not available in time to make it into this month's issue of *Reflections*. However, rumor has it that a good time was had by all attendees, with much of the meeting devoted to exploring Mark Vincent's gravitational solar system simulator with its 3-D stereo graphics.

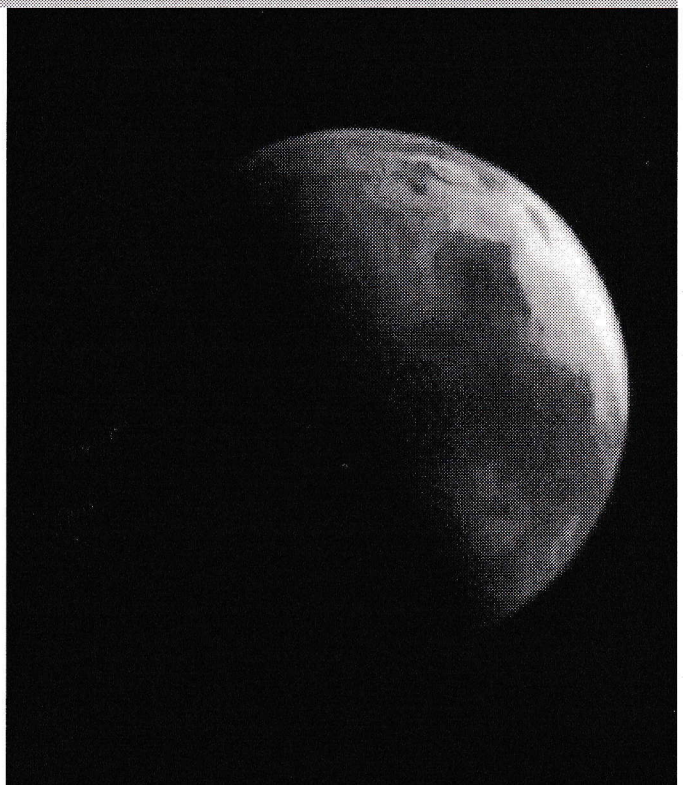
Next month's meeting will be on Wednesday, September 1 at the home of Bernard Friberg (call him at 761-1875 for directions). I can't guarantee that the report of that meeting will arrive on time either; the best way to find out what happens is to be there!

Visitors are welcome with or without their computers; a selection of software is sure to be on display. Bring a disk or two if you'd like to take home some shareware.



Above: A sampler of images available for public download by "anonymous ftp" from bovine.uoregon.edu (i.e. the Pine Mountain Observatory of the University of Oregon). Images were taken with a Lynxx CCD on the PMO 32" scope. [I will try to have some of these available at the next computer group meeting - Ed.]

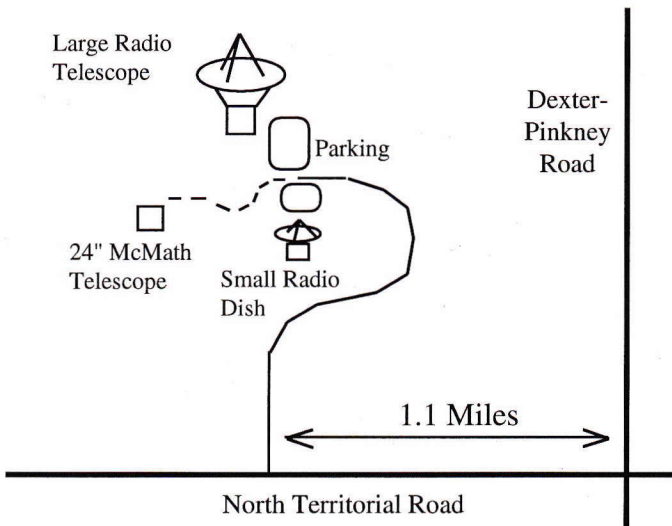
Right: Photograph of the planet Mars taken at 8:52 p.m. Pacific Daylight Time on July 26 by the high resolution, narrow-angle telescope of the Mars Observer Camera. At that time, the Mars Observer spacecraft was 5.8 million kilometers (3.6 million miles) and 28 days from its encounter with Mars; the resolution in this image is approximately 25 km (15 mi). North is to the top; the south pole is near the bottom but in shadow. At this distance from Mars, only bright and dark markings resulting from variations in the amount and thickness of dust and sand are visible. Toward the bottom of the picture is a bright, roughly circular area called Hellas, an impact basin 2,000 km (1,250 mi) across. The dark area in the center of the frame is Syrtis Major, a region of volcanic plains and dark sand dunes. At the top of the photograph is Nilosyrtis, an area of buttes, mesas and box canyons reminiscent of the deserts of the southwest United States. Launched on Sept. 25, 1992, Mars Observer will enter Mars orbit on Tuesday, Aug. 24, at about 1:30 p.m. PDT. The Mars Observer Camera was developed by and is operated under contract to Jet Propulsion Laboratory by an industry/university team led by Malin Space Science Systems, San Diego, Calif.



## ☞ Places:

The Detroit Observatory is in Ann Arbor, at the corner of Observatory and Ann Streets, (across from the old University of Michigan hospital and between the Alice Lloyd and Couzens dormitories on the UM campus). The Detroit Observatory is an historic building which houses a 19th century 12-inch refractor and a 6-inch transit telescope.

The 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 and used by the Lowbrows. The observatory is located northwest of Dexter; the entrance is on North Territorial Road, 1.1 miles west of Dexter-Pinkney 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 at the Detroit Observatory. 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 p.1 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 are cancelled if the sky is cloudy at sunset – call 426-2363 to check on their status. Many members bring their telescopes; visitors are welcome to do likewise. Peach Mountain is home to millions of hungry mosquitos – bring insect repellent, and wear warm clothes!

## ☞ Dues:

Membership dues in the Lowbrow Astronomers are \$20 per year for individuals or families, and \$12 per year for students. This entitles you to use the 24" McMath telescope (after some 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: \$20 / year  
Astronomy: \$16 / year  
Odyssey: \$16.95 / year

For more information, contact the treasurer.

## ☐ Sky Map:

The sky map in this issue of *REFLECTIONS* was produced by Doug Nelle using *Deep Space 3D*, drawn for the end of twilight on the monthly meeting date.

## ☞ Newsletter Contributions:

Members (and non-members) are encouraged to write about any astronomy-related area in which they are interested. Call the editor (Kurt Hillig) at 663-8699(h) or 747-2867(o), or send e-mail to [khillig@umich.edu](mailto:khillig@umich.edu), to discuss length, format, etc. Announcements and articles are due 14 days before each monthly meeting. Contributions should be mailed to:

Kurt Hillig  
1718 Longshore Dr.  
Ann Arbor, MI 48105.

## ☞ Telephone Numbers:

<b>President:</b>	Stuart Cohen	665-0131
<b>Vice Pres:</b>	Doug Nelle	996-8784
	Paul Etzler	426-1939
	Fred Schebor	426-2363
	Tom Ryan	662-4188
<b>Treasurer:</b>	Doug Scobel	429-4954
<b>Observatory:</b>	D. C. Moons	254-9439
<b>Newsletter:</b>	Kurt Hillig	663-8699
<b>Membership:</b>	Steve Musko	426-4547
<b>Open House:</b>	Keith Bozin	549-9525

## **Peach Mountain Keyholder:**

Fred Schebor 426-2363

## Monthly Meeting:

### **Club Picnic!**

**At the Peach Mountain  
Observatory in Dexter.**

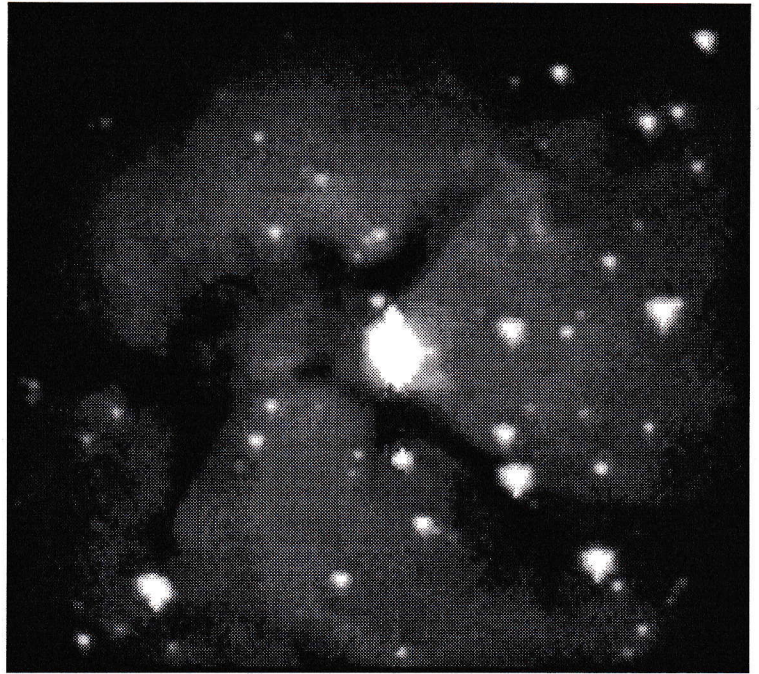
**Gate opens at 6:00.**

**Members may come  
early, but be prepared  
to walk up for the key!**

**Visitors are welcome –  
but bring some food...**

**August 20, 1993 at 6:00 PM**

Clouds won't stop us, but if it's  
raining we'll meet at the Detroit  
Observatory in Ann Arbor at 7:30



M20 – the Trifid Nebula. 200 second exposure imaged by Roger Tanner on July 16, 1993 at Peach Mountain, using an ST-4 CCD camera on a 17.5" f/4.5 scope with a 0.5 compressor and an IR-blocking filter. The image has been edited to remove streaks caused by CCD saturation by the bright stars.

University Lowbrow Astronomers  
840 Starwick  
Ann Arbor, MI 48105