

May 1994

The above image is of the Tycho Crater on the moon taken by the Clementine space craft. Altitude 425 km, @ 13:17:00 28 Feb 1994

Keith Bozin  
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 Physics and Astronomy building (Dennison Hall, Room 807). 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 Saturdays before and after the new moon; the star party is cancelled if it's cloudy or below 10°F at sunset. For further information, call

### This Month:

May 7 - Open House at the Peach Mountain Observatory. Last month the aurora borealis gave us a grand show. Jupiter is just past opposition. Maybe we'll get lucky again.  
 May 10 - Annular Solar Eclipse. Remember don't look directly at the sun, watch our uplink with Toledo on public access. In Ann Arbor, first contact is at 11:31 AM, annularity is visible from 1:10 to 1:15 PM, and fourth contact is at 2:59.  
 May 14 - Open House at the Peach Mountain Observatory. It's spring, it's warm, leave the muclucs at home.  
 May 20 - Meeting at 807 Dennison Hall.  
 May 21 - Astroganza '94 at the Abrams Panetarium, MSU. Call Kurt Melvin at 313-229-4391 for info. Also, The Great Comet Crash lecture by David Levy at the Cranbrook Institute. Call 810-645-3230 for reservations. See last month for more.

### From the Editor

I thank Kurt Hillig for handing down this job to me. I also must ask you all to be patient for the next month or two while I straighten out some of the software problems I am having.

### Next Month:

June 4 - Open House at the Peach Mountain Observatory.  
 June 11 - Open House at the Peach Mountain Observatory. It's spring, it's warm, leave the muclucs at home.  
 May 20 - Meeting at 807 Dennison Hall.

Presently I am in the process of looking for a desktop publishing program and waiting for an upgrade to Wordperfect 6.0 for Windows. This should fix some of the problems I am having.

### Cheaper than Truth!

How to find a large piece of glass that has already been rough ground and only needs properfiguring.

Find your local chemistry professor, take his class, and become one of his favorite pupils. Casually inform him of your astromy hobby. Then ask if there are any old spectroscope or monochrometer mirrors about the lab. If you're lucky he'll have one. And if favor smiles upon you that day the price will be free.



## Astronomers trip to eclipse

SANDUSKY, Ohio (AP) -- One day a few months back, astronomer George Kaplan was sitting at his desk at the U.S. Naval Observatory in Washington when he had a vision. Why not have a dozen or so of the nation's finest astronomers put on Hawaiian shirts and straw hats, get on a plane and fly to Cleveland for the last major solar eclipse in the United States this millennium?

On Tuesday, Kaplan's audacious -- some might say poetic -- vision was fulfilled, more or less. True, not everyone wore Hawaiian shirts -- there was at least one green plaid shirt under rainbow suspenders. But there they were, a dozen astronomers plus four assorted hangers-on, deplaning in Cleveland, hopping into rental cars and trekking to East Harbor State Park near Sandusky just in time for a little "eclipse fishing," as one of them put it. Or, as Kerry Kingham, a radio astronomer at the Naval Observatory, said as he watched his colleagues eat junk food and stare heavenward behind pink Mylar sunglasses, "This has got to be one of the most under-utilized group of astronomical experts ever." No matter. The trip -- which, the astronomers stressed, was NOT an official research mission of the Naval Observatory -- was purely for fun. And like hundreds of thousands of other Americans who fell within the band of eclipse Tuesday, they oohed and aahed and lolled on their backs as the moon slid across the sun like a nickel overlapping a quarter.

An annular eclipse is distinguished from a total solar eclipse by the blinding band of sun -- the annulus -- that surrounds the moon at the peak of convergence. The moon doesn't fully cover the sun because it is relatively far from Earth in its elliptical orbit.

Tuesday's annular eclipse, the last in this country until 2012, reached maximum coverage in a 140-mile-wide swath that ran from El Paso, Texas, to Portland, Maine. "Absolutely exciting," was how El Paso Planetarium administrator John Peterson described it. "There is definitely something magic about an annular eclipse," he said. "That ring of fire up there is spectacular." In New York City, which was far enough off the path to see only a partial eclipse, several hundred people joined actor Dick Van Dyke on the edge of Central Park to watch the event, such as it was. "I never could understand why these are so rare," Van Dyke said. "You've got the sun, the moon, and the Earth all out there. Why doesn't this happen more often?" The Naval Observatory group might have explained it to him (there's a lot of space out there, Dick), but they were several hundreds of miles away in northern Ohio. They chose their location strategically, and for the purest of scientific motives: It was cheap.

A few months ago, Kaplan noticed that Southwest Airlines was offering introductory rates for its new Baltimore-Cleveland service that were astronomically low: \$44 round-trip. "So I just sent E-mail around and I got a dozen responses immediately. ... We figured, for \$44, even if the eclipse is a total bust and it's pouring down rain, we can find something to do in Cleveland for a couple of hours." As it turned out, Tuesday was a glorious day -- just perfect for watching an eclipse. So the astronomers set up their tripods and picnic blankets on a lawn

next to Lake Erie, and waited. "Shall we put the flag up?" asked Merri Sue Carter, a radio astronomer and self-proclaimed cheerleader of the expedition. Up went the flag -- which shows an observatory under a full sky of stars -- on the wall of a restroom. "Well," observed John Bangert, another of the astronomers, "we've secured the restroom. This is beginning to remind me of the invasion of Grenada."

Amazingly, most of the astronomers said an annular eclipse is not particularly interesting from a scientific point of view. But they figured it was worth it anyway to take the day off from work and pay their own expenses, such as they were. "I guess if you're a veterinarian, you still like to go to the park and look at dogs," Carter said. "I guess for us, we're all lucky because our hobby has become our career."

Like schoolkids across the country, the astronomers stared at the eclipse through silly-looking sunglasses. Some of them also used pieces of exposed film -- something, they conceded, that they wouldn't advise the general public to do. And when the eclipse achieved annularity, or whatever it does at its peak, they went orbital.

"Oh man, look at that! That's so incredible." "It's closing!" "There it is!" "Do it!" "Come on!" "Oh!" "Here we are -- annularity!" "Whoo!" "Does anybody know what time it is?" "Does anybody care?" With that, the moon slowly slipped away from the sun, heads returned to Earth and somebody began softly singing. "The party's over. ..." "I think the sky's getting too bright, guys," someone complained. "It's getting back to normal." "It happens."



## Bravo Zulu !!!!

### Doug Nelle

The uplink of eclipse with Toledo and Ann Arbor went well. But like NASA lately we had many hitches. The Herculean efforts of Doug need to be thanked. He fought through the read tape and obstacles provided by the schools and cable companies to produce this event. The Ann Arbor cable station received numerous calls saying how much they enjoyed the program. I only wish I was able to see this broadcast. On behalf of all that watched this program and the Lowbrows thanks Doug.

## Clementine Crippled

WASHINGTON (AP) -- The satellite Clementine suffered a malfunction on Saturday that will prevent the craft from completing a mission to fly by and photograph the asteroid Geographos, the Pentagon said on Monday.

The satellite's on-board computer mistakenly activated several thrusters, burning up much of its fuel supply, a statement said. Clementine cannot be sent in the direction of the asteroid, but will continue to perform a military mission that will test 23 "advanced technologies," the statement said.

"The Clementine engineering team is examining several mission options which would continue to yield useful data," the statement said.

Since Jan. 25, the satellite has recorded over 1.5 million



images, including many high-quality topographical pictures of the moon. The craft is a landmark for space projects, since it demonstrates that small, highly capable satellites can be built and launched for under \$100 million and in less than two years.

### Super Nova Discovered by Teens

OIL CITY, Pa. (AP) -- The astronomy world is starry-eyed over a couple of high school students who accidentally captured a rare photograph of a supernova, or an exploding star. Heather Tartara and Melody Spence, 17-year-old juniors at Oil City High School, wanted to get a sharp, clear photograph of a whirlpool galaxy for a science class assignment. They picked a cluster of stars about 13 million light years away and sent the information to an observatory.

"We liked it because it had a black hole and two suns, and it had a whole bunch of stars around it," Tartara said. "It just seemed interesting."

The Leuschner Observatory at the University of California at Berkeley, which works with high school students in a program called Hands on Universe, used a 30-inch telescope to take two photographs of an area in the M51 galaxy using the coordinates plotted by the teen-agers.

The pictures were taken March 29 and March 31. On April 2, two amateur astronomers identified Supernova 1994I in the same galaxy. Observatory scientists soon discovered that the students' photographs contained early, precious images of the supernova. "These are some of the earliest pictures of a supernova ever taken. I think it's extraordinary that they have it in their data," said Carl Pennypacker, an astrophysicist at the observatory.

The photographs, which show a faint image of a starlike object, "tell us a lot about what happens during the explosion, such as what the transfer of energy through the star and what the speed of the explosion is," Pennypacker said.

A supernova is believed to occur when a star runs out of fuel, collapses and explodes, tearing itself to pieces. As it dies, it becomes much brighter. Because the star is many light years away, it takes millions of years for the event to become visible to people on Earth. Tartara said she's looking at the night sky in a whole new way. "You think, 'What am I going to find this time?'" she said.

### The Sky Was Ablaze

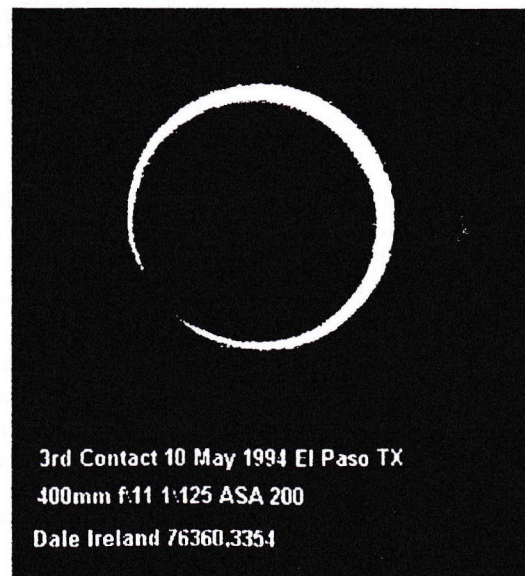
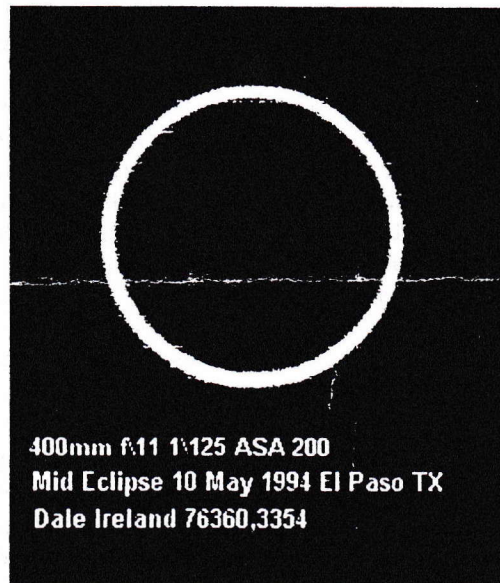
Those of us that stuck it out at the April 15th open house were treated to a visual wonder. At about 11:30 we noticed what appeared to be city glow on the northern horizon. "But wait its growing and starting to dance." Within fifteen minutes the whole northern quarter of the sky was filled with the bright display of a fantastic auroral display. Mark Cray was the first to notice that the glow was so bright that it was casting shadows. We watched this dynamic spectacle for over three hours. Some of the rays extended past the zenith. Bright flashes traveled along these rays like the spark between two wires in a Frankenstein movie. At one point an oval curtain formed. The Auroa had an overall faint yellow-green color.

Along the rippling edges hints of red, blue, green and violet were seen. Throughout the small gathering the grumble of, "Should have brought my camera and some film." was heard. As we left my cousin from Texas was glad I dragged him out into the Michigan cold. Living in Houston all his life he has never seen the northern lights.

### why certain galaxies are alled "narrow line" galaxies?

Article 53894 of sci.astro: Subject: Narrow Line Galaxies Primer perhaps & in Alabama wants to provide a more technical explanation, since I have always had trouble believing in orientation and marbelology.

Can't pass up an invitation like DDM s - sorry about the & name, but I deal with news groups through another machine and never got around to properly identifying myself on that one. Though at the moment I'm not in Alabama but looking at cloud





bottoms in Flagstaff- it may actually be so cloudy that even I voluntarily close the dome. Them - narrow and broad-line galaxies. The taxonomy of active galaxies and their supposed kin is weird and wonderful, mostly because there are several classification schemes based on more or less unrelated properties. Taking a few genera: SEYFERT GALAXIES have nuclear regions that shown strong emission lines which are (1) at ionization levels telling us the gas is excited by something with higher energies than come from the young OB stars which light up star-forming regions whether in galactic disks or nuclei, and (2) are too broad to be bound into a small region by the gravity of visible stars. How broad is broad? There are two observed kinds of Seyferts, plus some hybrids - type 1, in - which those emission lines that can be produced at high densities are very broad, up to Doppler widths of  $\pm 10,000$  km/s interpreted as velocity; and type 2, with all lines at essentially the same width from 200-1000 km/s. The two types were formally distinguished by Khachikian and Weedman in about 1970, though since the two brightest represent different types the idea had been floating around at a less formal level for some time. The bandwagon explanation for both types is that the gas is photoionized by a small central source, perhaps the accretion disk around a central massive object (the politically correct way to say "giant blackhole. There is no obvious correlation between line width and orientation of the galaxy disk to our line of sight (1980 paper, modesty forbids). Long person-years were spent on the differences between types 1 and 2. A seminal discovery (Antonucci and Miller, about 1981 when I wish I'd found polarimetry more interesting) is that the prototypical type 2 (narrow-line) Seyfert galaxy NGC 1068 shows a type 1 broad-line spectrum in polarized light. This implies that NGC 1068 in fact has a type 1 nucleus that we see only via scattering; at one point electron scattering was slightly favored over dust scattering, but I may not be quite up to date. Several other objects are now known to show similar properties. The new orthodoxy, then, has (maybe) all Seyfert nuclei harboring very similar central engines and gas contents differing in whether we see them looking down the opening of a surrounding torus of dense gas and dust or whether we look through the torus and have no direct view of the core. Radio jets are often seen, when looked for hard enough, emerging along the same axis that polarimetry suggests the torus should have; far-infrared energy-budget considerations are also consistent with this scheme. In this picture, narrow-line active nuclei are (sometimes) broad-line ones seen sideways.

RADIO GALAXIES were, of course, originally defined as being strong radio sources. Most powerful radio galaxies are located in something resembling an elliptical galaxy (unless one looks too closely:-). Many (not all) show optical spectra very much like Seyfert galaxies - they come in narrow-line and broad-line varieties conveniently if unpronounceable denoted NLRG and BLRGs. A counterpart to the orientation scheme for Seyferts exists for radio galaxies and quasars, with now the orientation-dependent phenomenon being whether we are in the right place to see radio emission from a relativistic jet Doppler-boosted to much higher intensity than we would see were it at rest relative to the observer. adding to the confusion, early X-ray source

identifications sometimes tuned up galaxies with fairly strong but fairly narrow emission lines, which the authors of various papers sensibly called narrow-emission-line galaxies. These are a mixed bag, including star-forming galaxies like M82 and Seyferts, including a few seen through lots of dust (hard X-rays are the best way to find Seyferts in edge-on galaxies, for example).

The upshot is - line width is generally related to Doppler shifts, though sometimes in regions too small to resolve directly. Broad-line regions can be shown through variability time scales to have significant structure on scales of light-days. The narrow-line regions are larger and at lower density (say 1000 particles/cm<sup>3</sup>), and some are hundreds of parsecs in extent and blend into the surrounding galaxy's interstellar medium. The observed line width and profile might depend on: true velocity structure obscuration of some part of the gas nonspherical gas motions. There were reports from some interpretations of an extensive observing campaign on the type 1 Seyfert NGC 5548 that, for example, some ions in the narrow-line region come from a disk-shaped volume.

It would help if we knew where the motions come from. For the narrow-line gas, Mark Whittle has argued from a large sample that the line width correlates nicely with the characteristic velocity of stars in the surrounding galactic bulge, so the motions would be directly gravitational from the normal galaxy components; unless radio jets are present to interact with the gas, the central engine lights up but doesn't stir up the gas. The broad-line motions may be largely gravitational - immediately telling us that a very massive and compact object is responsible - or, somewhat less plausibly, driven by such phenomena as jets, outflows, and the like. Note with wry detachment that in looking at objects widely believed to be powered by accretion, we mostly see outward motion. The mass flow rates needed to power the cores if they do contain black holes are modest, and SS 433 in our neighborhood knows how to do this even if we don't have the details down right, but actually seeing accretion in a galactic nucleus would give lots of warm fuzzier. In radio galaxies, Steffi Baum finds a zoo of rotating and nonrotating chaotic and quiescent motions - maybe telling us whether the gas in question has an internal or external origin.

Some further details can be found in Osterbrock's book *Astrophysics of Gaseous Nebulae and Active Galactic Nuclei* and Antonucci's review in last fall's *Annual Reviews of Astronomy and Astrophysics* (I'm too far from home to find more just now).

Article 52583 of sci.astro: Subject American Indian Myth (Ursa Major) "They say that once, a long time ago, ~U was early winter. U had snowed the night before, and the first snow still lay fresh on the ground. Three young men went out to hunt at first light early in the morning. One of them took his little dog, named Hold Tight, with him. They went along the river and up into the woods, and came to a place on the side of a hill where the shrubs and bushes grew low and thick. Here, winding



among the bushes, the hunters found a trail, and they followed it. The path led them to a cave in the hillside. They found a bear's den. "Which of us shall go in and drive the bear out?" the hunters asked each other. At last the oldest said, "I will go." The oldest hunter crawled into the bear's den, and with his bow he poked the bear to drive him out. "he's coming! He's coming!" the man in the cave called to his companions. The bear broke away from his tormentor and out of the cave. The hunters followed him "Look!" the youngest hunter cried. "See how fast he's going! Away to the north, the place from whence comes the cold, mark where he's going!" The hunter ran away to the north, to turn the bear and drive him back to the others. "Look out!" shouted the middle hunter. "Here he comes! He's going to the east to the place where midday comes from." And he ran away to the east, to turn the bear and drive him back. "I see him!" cried the oldest hunter, "He's going to the west, to the place where the sun falls down. Hurry, brothers! That's the way he's going." He and his little dog ran as fast as they could to the west, to turn back the bear. As the hunters ran after the bear, the oldest one looked down. "Oh," he shouted, "there is Grandmother Earth below us. He's leading us into the sky! Brothers, let us turn back before it is too late." But it was already too late; the sky bear had led them too high. At last the hunters caught up to the bear and killed him. The men piled up maple and sumac branches, and on the pile of boughs they butchered the bear. That is why those trees turn blood-red in the fall. Then the hunters stood up. All together they lifted the bear's head, and threw it away to the east. Now, in early morning, in the winter, a group of stars in the shape of the bear's head will appear low in the horizon in the east just before daybreak. Next the hunters threw the bear's backbone away to the north. At midnight, in the middle of winter, if you look to the north you will see the bear's backbone, outlined in stars. At any time of year, if you look at the sky, you can see four bright stars in a square, and behind them three big bright stars and one tiny dim one. The square of stars is the bear, the three running behind him are the hunters, and the little one, that you can hardly see is the little dog named Hold Tight. Those eight stars move around and around the sky together all year long, they never go in to rest, like some of the other stars. Until the hunters catch up with the bear, they and the little dog can never rest. That is the end of the story." Taken from "American Indian Mythology" Alice Marriot & Carrol Rachlin 1968 Mentor

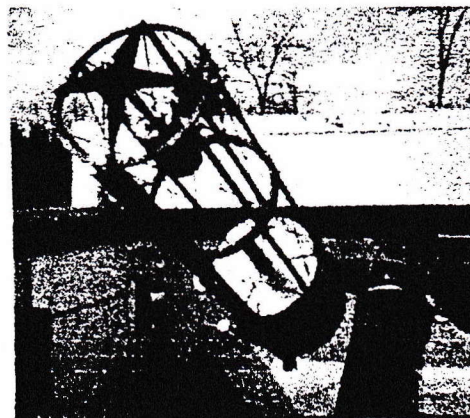
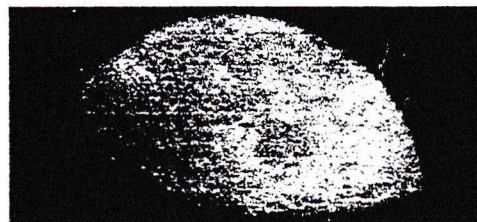
### From The Editor

Well this is my first issue. Many problems were overcome to bring you this publication including a cat that enjoyed hitting the delete key. Thank goodness for printed copies and OCR scanners to recover lost work. I found an easy to use decent publishing program, Microsoft Publisher V-2, so the next issue should come out better. Kurt thanks for the turn over and the articles.

### Wanted!!!!

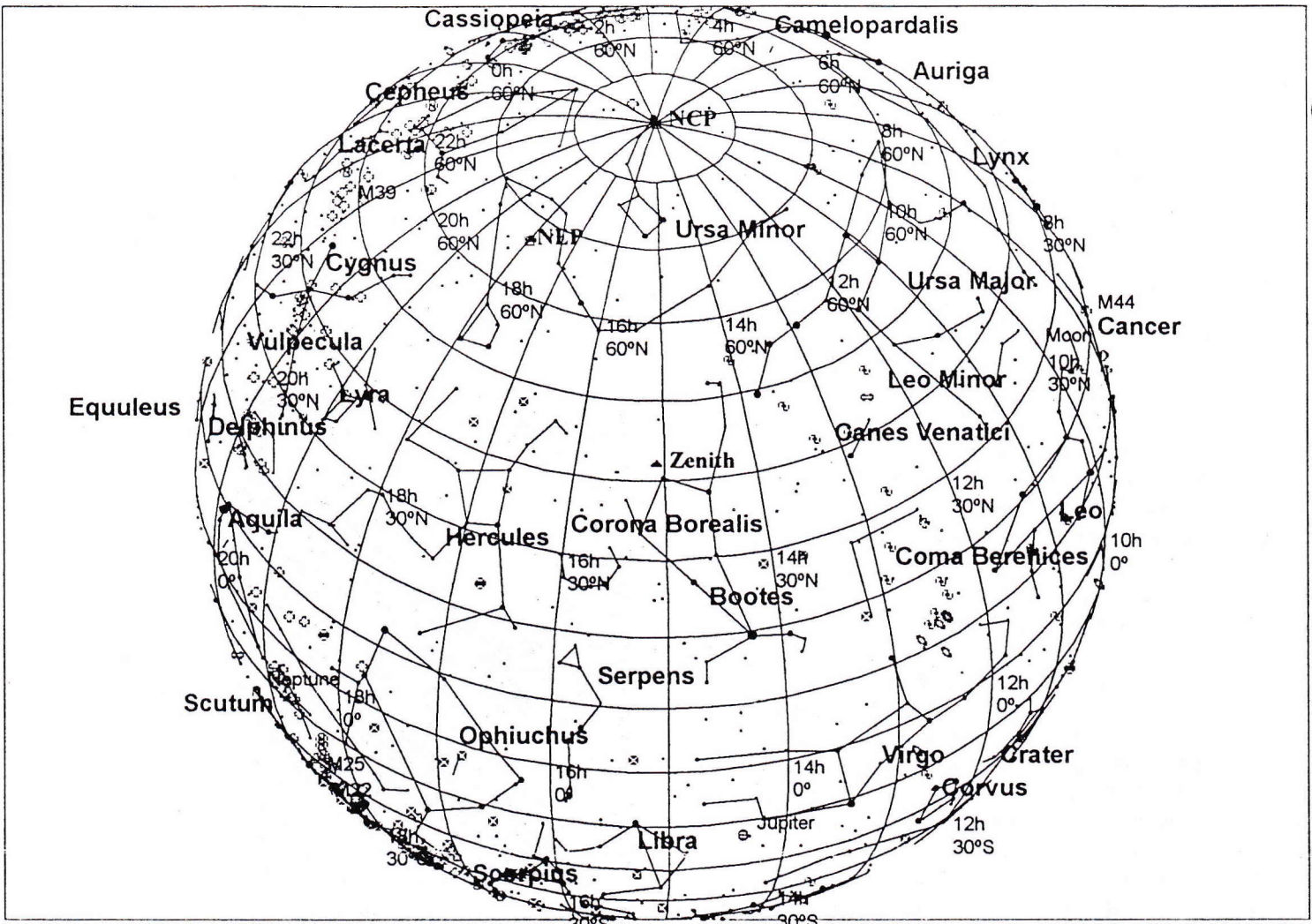
Articles and pictures to add to Reflections. I need as much help as possible collecting articles and images. They can be sent a number of ways. My computer is equipped with a fax modem and a hand held scanner so any typed or printed text and images are easily importable. I am also on CompuServe at 72630.3402.

Keith Bozin  
3245 Parker Dr  
Royal Oak MI 48073-6918 (810) 435-8964



More photos ala Mark Cray  
Orion Nebula through 24" McMath 4min exp f7.5 1600 ISO  
20 min arc  
moon low in haze f6 1/1000 sec 400 ISO  
24" McMath the scope we all use and enjoy and that took the above photos.





<u>Projection</u>	Horizon View			
<u>Time</u>	Local	May 16, 1994AD, 10:00pm (Night)		
	Universal	May 17, 1994AD, 5:00am	Julian date 2449489.7083	
	Siderial	15:06.4		
<u>Epoch</u>	Universal	Apr 19, 1994AD, 6:00pm	Julian date 2449489.7083	
<u>Location</u>	Earth		<u>Centered on</u>	
	Lon.	83°05'00"W	RA	15h06m21s
	Lat.	42°23'00"N	Dec.	42°23'00"
	Altitude	0.000 km	Azm.	180°00'00"
	Time zone	-7.00	Alt.	90°00'00"
<u>Zoom Factor</u>	0.354	<u>Field of View</u>	180°00' * 166°18'	

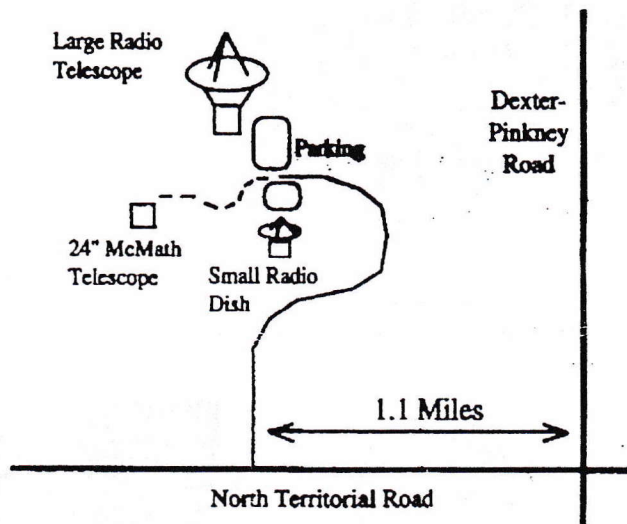
<u>Solar System Objects</u>		<u>Stars</u>	<u>Galaxies</u>	<u>Nebulae</u>	<u>Star clusters</u>	<u>Quasars</u>
♁ Mercury	♆ Neptune	● -1.6	☐ Elliptical	☉ Reflection	◇ Open	≡ Quasars
♀ Venus	♇ Pluto	● -1.0	☉ Spiral	☉ Planetary	⊙ Globular	♁ BL Lacertae
♁ Earth	☾ Moon	● 0.0	☉ Spiral bar	☉ Bright	☉ Associated with nebulosities	
♂ Mars	☼ Sun	● 1.0	☉ Irregular	◇ Dark		
♃ Jupiter	♁ Asteroid	● 2.0	♁ Peculiar	☉ Hill region		
♄ Saturn	☄ Comet	● 3.0	☉ Undefined	✕ Other regions		
♅ Uranus		● 4.0				
		● 5.0				

<u>Markers</u>		<u>Lines</u>	
NEP Northern Ecliptic Pole	NCP Celestial North Pole	— Horizon line	— Ecliptic
SEP Southern Ecliptic Pole	SCP Celestial South Pole	— Celestial equator	

## 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 or the temperature is below 10°F at sunset - call 426-2363 to check on their status. Many members bring their telescopes; visitors are welcome to do likewise. Peach Mountain gets cold at night so dress warmly - and bring mosquito repellent!

## 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 or mail at this address:

Doug Scobel  
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: \$18 / year  
Odyssey: \$16.95 / year

For more information, contact the treasurer.

## Sky Map:

The sky map in this issue of Reflections was produced by Keith Bozin using Redshift for Windows CD-ROM drawn for the end of twilight on the monthly meeting date.

## News letter Contributions:

Members (and non-members) are encouraged to write about any astronomy-related area in which they are interested. Call the editor (Keith Bozin) at (810) 435-8964, or send e-mail to 72630,3402 via compuserve to discuss length, format, etc. I have a scanner and fax capabilities. Announcements and articles are due 14 days before each monthly meeting. Contributions should be mailed to:

Keith Bozin  
3245 Parker Drive  
Royal Oak, MI 48073-6918

## Telephone Numbers:

<b>President:</b>	Bill Razganas	995-0934
<b>Vice Pres:</b>	Kurt Hillig	663-8699
	Stewart Cohen	665-0131
<b>Treasurer:</b>	Doug Scobel	429-4954
<b>Observatory:</b>	Bernard Friberg	761-1875
<b>Newsletter:</b>	Keith Bozin	(810) 435-8964
<b>Membership:</b>	Doug Scobel	429-4954

## Peach Mountain Keyholder:

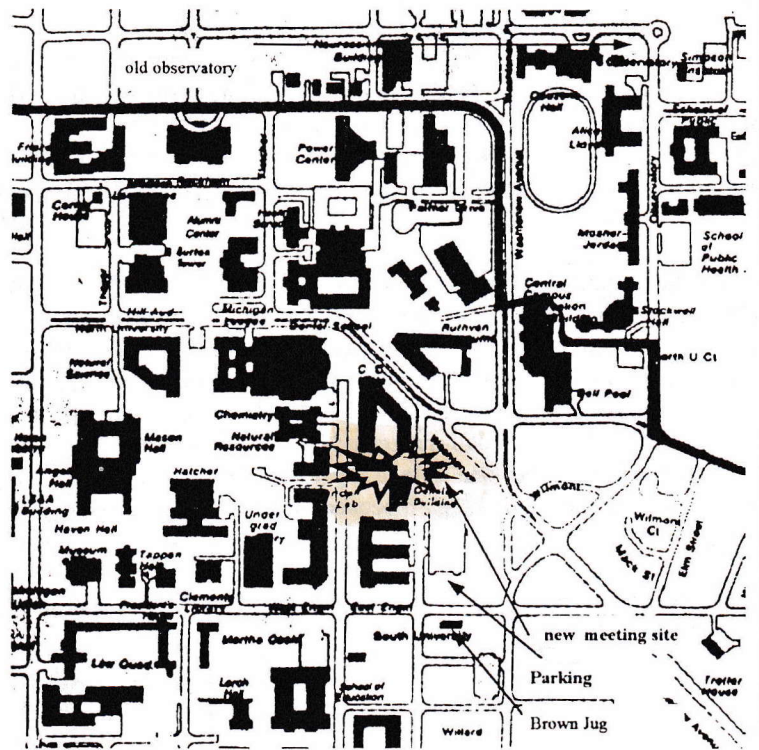
Fred Schebor 426-2363



## Monthly Meeting

Review of  
The May 10  
Eclipse uplink  
and  
Club future directions

May 20, 1994 at 7:30 PM  
At  
Room 807 Dennison Hall  
Physics and Astronomy Bldg



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

Check your membership expiration date on the mailing label!