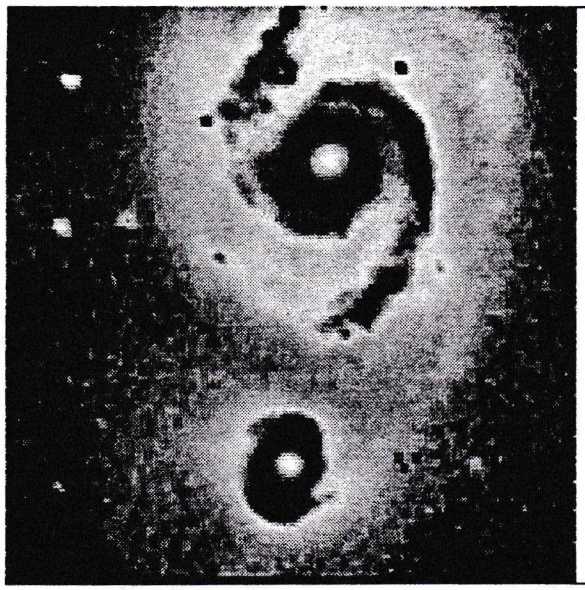
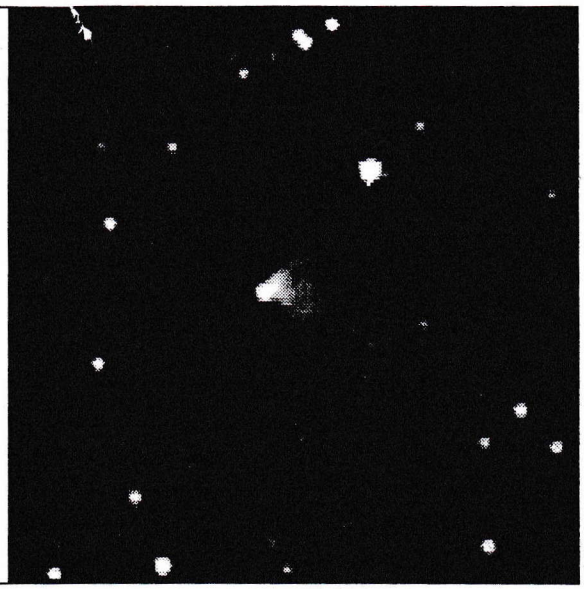
REFLECTIONS





REFLECTIONS

May 1993

M51 (left) and Hubble's Varable Nebula (NGC 2261). 200 second CCD exposures taken by Roger Tanner using an ST-4 CCD camera on his 17.5" f/4.5 telescope with a 0.5 focal compressor. Image processing by R. Tanner and K. Hillig.

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, located at the corner of Observatory and Ann Streets in Ann Arbor. Meetings begin at 7:30 PM and are open to the public. Public open houses are held at the University's Peach Mountain Observatory in the Stinchfield Woods on North Territorial Road (1.1 miles west of Dexter-Pinkney Road; map on p. 7) on the Saturdays before and after each New Moon; the star parties are cancelled if it's cloudy at sunset. For more information, call Stuart Cohen at 665-0131.

This Month:

May 15 - Public Open House at the **Peach Mountain Observatory**. Mars is in the Beehive, Jupiter's Red Spot is acting up and it's belts are tightening, Saturn's coming down the road....

May 21 - Meeting at the **Detroit Observatory** in **Ann Arbor**. Come hear Tom Ryan and Doug Nelle, on "Crazy Eights: A Tale of Two Telescopes". Also, some business to attend to – whether to spend some club funds to add setting circles to the 24" scope.

May 22 - Public Open House at the **Peach Mountain Observatory**. By now the mosquitos should be in full bloom, but Pluto's just past opposition, and you'll be so busy with oohs and aahs you'l never notice 'em!

Next Month and Beyond:

June 1 - Computer Subgroup Meeting location to be decided at the May 21 club meeting – call Tom Ryan at 662-4188 if you need more info. We're just about ready tostart installing encoders on the 24" scope (see story inside). Also, more CCD images (hopefully lots by Roger from the Texas Stap Party).

June 12 - Public Open House at the **Peach Mountain Observatory**. Summer is a cumin in – how do you spell "Alberio"?

June 18 - Meeting at the **Detroit Observatory**. Topic TBA...

June 19 - Public Open House at **Peach Mountain.**

July 1 - Computer Subgroup Meeting

Stranger than Truth? Cheaper than Truth!

Ever wondered how to replace those missing or crooked crosshairs in your finderscope? Tired of having to pay top dollar for a fancy etched glass reticle? Tired of trying to find a small enough diameter wire or fishing line or of pulling out your hair? Then just go to your nearest drug store and get a roll of unwaxed dental floss and some superglue! Untwist a short section and you've got some very fine strands that make perfect crosshairs. Just glue them in place with the superglue and viola! It's quick, it's easy, and above all, it's CHEAP! You probably have some in your bathroom - and a 100 yard roll is enough for thousands of finders. You may even want to keep some with your observing gear in case you need a quick field repair at one in the morning up on Peach Mountain. Besides, it comes in handy when that mystery pseudo-meat/tofu/cereal filling in your midnight snack Stop-N-Rob burrito gets stuck between your teeth! – Doug Scobel

It's Membership Renewal Time!

LBA Club membership for most of us needs to be renewed every April. (Those of you who upset our schedule by joining in mid-year aren't exempt – you're just deferred for a while.) Check your mailing label – if it says "Exp 4/93" (or even "Exp 5/93") then your number's up! The treasurer's address is on page 7.

How do you like our new look?

As Grand Exalted Editor-in-Chief, I decided I was tired of trying to read that tiny sans-serif font where you can't tell an "l" from an "I" from a "1". Did you feel the same way? Do I care? What difference does it make – I've changed things anyway!

Seriously, the intention is to make *Reflections* a little bit easier to read – please let me know what you think! (Now if I could just get a few more articles from you folks...) – Kurt Hillig

Eclipses in the Rest of the Solar System

by Paul Schlyter (pausch@saaf.se)
Swedish Amateur Astronomer's Society (SAAF)
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Are there any other planets in the solar system which have Earth-Moon style eclipses? That is, are there any others which have the satellite blocking the photosphere etc. of the Sun but leaving the corona (and only the corona) visible? It turns out there are several that come close.

Using data from the recently published "Explanatory Supplement of the Astronomical Almanac", I computed the data below. For each planet I calculated the maximum and minimum apparent diameter of the Sun (in degrees), taking the eccentricity of each planet's orbit into account. Then I computed the maximum and minimum apparent diameter of each satellite (also in degrees), as seen from its primary planet, taking into account the eccentricity of each satellite's orbit, the irregularity of some satellites, and the non-negligible radius of the primary planet. The minimum satellite diameter is computed as the minimum physical diameter of the satellite, as seen from a distance of its maximum orbital radius. The maximum satellite diameter is computed as the maximum physical diameter of the satellite as seen from a distance of its mimimum orbital radius minus the equatorial radius of its primary planet. Finally, the maximum solar eclipse is computed as the maximum satellite apparemt diameter divided by the minimum solar apparent diameter, and vice versa for the minimum eclipse. An eclipse value above one means a total solar eclipse; below one means an annular eclipse.

This is not a rigorous computation, of course, but I believe it will give a correct general picture of what types of solar eclipses is produced by the different satellites.

There are a few satellites where the maximum eclipse is larger than one, while the minimum eclipse is smaller than one:

Earth	Moon	1.063	0.906
Jupiter	Amalthea	1.450	0.440
Saturn	Epimetheus	1.680	0.635
Saturn	Prometheus	1.924	0.555
Saturn	Pandora	1.470	0.477

Our moon always produces central solar eclipses with sizes close to one. But the other moons cause solar eclipses with a greater variation, mostly because their orbits are much smaller compared to the sizes of their primary planets. In addition, the other four satellites above are all irregular satellites: Amalthea 135x83x75 km, Epimetheus 70x60x50 km, Prometheus 70x50x40 km, and Pandora 55x45x35 km. This makes it quite unlikely that any of these satellites can ever nicely hide the Sun's photosphere, while leaving almost all of the corona visible.

The three satellites below always produce total solar eclipses, but at minimum solar eclipse they hide very little except the photosphere of the Sun:

Saturn	Janus	2.633	1.017
Uranus	Cordelia	2.321	1.029
Uranus	Ophelia	2.296	1.099

However, Janus is another irregular satellite (110x100x80 km), and Cordelia and Ophelia are both very small satellites close to Uranus, whose diameters and exact shapes are not known. Therefore, our Moon is truly unique in the solar system: no other satellite ever produce such total solar eclipses, where all of the Sun's photosphere is hidden while all of the corona is visible.

All satellites of Uranus, Neptune and Pluto produce total eclipses only, except Nereid, which at maximum solar eclipse produces a good-sized annular eclipse:

Neptune	Nereid	0.813	0.113

There remains another possibility: a satellite producing a nice, "moon-like", total eclipse as seen from another satellite of the same primary planet. For instance Callisto will probably be able to produce such an eclipse occasionally as seen from Ganymede (but not the other way around - Ganymede is too large! On the other hand, Europa may be able to produce such eclipses as seen from Ganymede). Also, Tethys, Dione and Rhea may be able to produce such eclipses as seen from Titan or Hyperion, and perhaps even Triton can produce such an eclipse as seen from Nereid. Such eclipses will be rare, though.

The data for all known satellites in the solar system is given in the table on the next page.

The Returns are In!

Elections were held at the Lowbrows meeting on April 16. Voter turnout was light, but the campaining was spirited. Our incumbent president (Stu Cohen, though if you don't know that by now you should consider taking up a hobby that doesn't keep you up so late at night) began his soapbox oratory with a lengthy list of everything he hadn't accomplished during his term of office. This inspired us all so much that we immediately reinstated him in office! It also cowed the candidates for the other offices sufficiently that we weren't subjected to any other speeches – in itself a praiseworthy accomplishment.

After all votes were cast and the dust had settled, we found that there were few changes in the administration. Despite the tremendous fiscal responsibility demonstrated by Ron Avers (we're actually in the black – to the tune of ca. $1600 if I remember right), he was defeated in the race for Treasurer by Doug Scobel; and a new position was created – Open House Coordinator – and filled by Keith Bozin, a recent member of the Lowbrows.

Finally, despite heavy campaining, liberal bribes (or at least attempted bribes - we're all more honest than that!), and a flurry of last-minute ballot-box stuffing, Percival Lowell was again defeated in the race for the position of

Lord High Director of the Observatory

by an upstart young whippersnapper – D. C. Moons.

Apparent Sizes of Solar Eclipses as seen from the Other Planets

		Apparent Size					
		Sun		Satellite		Eclipse	
Planet	Satellite	max	min	max	min	max	min
Earth	Moon	0.5422	0.5244	0.5575	0.4911	1.063	0.906
Mars	Phobos	0.3860	0.3200	0.2626	0.1132	0.821	0.293
Mars	Deimos	0.3860	0.3200	0.0429	0.0269	0.134	0.070
Jupiter	Io	0.1077	0.0977	0.5958	0.4909	6.096	4.558
Jupiter	Europa	0.1077	0.0977	0.3026	0.2656	3.096	2.466
Jupiter	Ganymedes	0.1077	0.0977	0.3025	0.2812	3.096	2.611
Jupiter	Callisto	0.1077	0.0977	0.1529	0.1450	1.564	1.347
Jupiter	Amalthea	0.1077	0.0977	0.1417	0.0473	1.450	0.440
Jupiter	Himalia	0.1077	0.0977	0.0011	0.0008	0.011	0.007
Jupiter	Elara	0.1077	0.0977	0.0005	0.0003	0.005	0.003
Jupiter	Pasiphae	0.1077	0.0977	0.0002	0.0001	0.002	0.001
Jupiter	Sinope	0.1077	0.0977	0.0001	0.0001	0.001	0.001
Jupiter	Lysithea	0.1077	0.0977	0.0002	0.0002	0.002	0.001
Jupiter	Carme	0.1077	0.0977	0.0001	0.0001	0.001	0.001
Jupiter	Ananke	0.1077	0.0977	0.0001	0.0001	0.001	0.001
Jupiter	Leda	0.1077	0.0977	0.0001	0.0001	0.001	0.001
Jupiter	Thebe	0.1077	0.0977	0.0425	0.0229	0.435	0.212
Jupiter	Adrastea	0.1077	0.0977	0.0249	0.0067	0.255	0.062
Jupiter	Metis	0.1077	0.0977	0.0406	0.0179	0.415	0.166
Saturn	Mimas	0.0591	0.0529	0.1830	0.1187	3.462	2.009
Saturn	Enceladus	0.0591	0.0529	0.1619	0.1198	3.063	2.028
Saturn	Tethys	0.0591	0.0529	0.2591	0.2061	4.902	3.489
Saturn	Dione	0.0591	0.0529	0.2028	0.1697	3.836	2.872
Saturn	Rhea	0.0591	0.0529	0.1880	0.1662	3.556	2.813
Saturn	Titan	0.0591	0.0529	0.2617	0.2347	4.950	3.972
Saturn	Hyperion	0.0591	0.0529	0.0185	0.0077	0.349	0.130
Saturn	Iapetus	0.0591	0.0529	0.0246	0.0228	0.465	0.387
Saturn	Phoebe	0.0591	0.0529	0.0012	0.0008	0.022	0.014
Saturn	Janus	0.0591	0.0529	0.1392	0.0601	2.633	1.017
Saturn	Epimetheus	0.0591	0.0529	0.0888	0.0375	1.680	0.635
Saturn	Helene	0.0591	0.0529	0.0065	0.0045	0.124	0.077
Saturn	Telesto	0.0591	0.0529	0.0083	0.0051	0.157	0.086
Saturn	Calypso	0.0591	0.0529	0.0083	0.0043	0.157	0.072
Saturn	Atlas	0.0591	0.0529	0.0296	0.0083	0.560	0.141
Saturn	Prometheus	0.0591	0.0529	0.1017	0.0328	1.924	0.555
Saturn	Pandora	0.0591	0.0529	0.0777	0.0282	1.470	0.477
Saturn	Pan	0.0591	0.0529	0.0156	0.0086	0.296	0.145

		Apparent Size					
		Sun		Satellite		Eclipse	
Planet	Satellite	max	min	max	min	max	min
Uranus	Ariel	0.0291	0.0265	0.4024	0.3462	15.176	11.901
Uranus	Umbriel	0.0291	0.0265	0.2803	0.2509	10.573	8.626
Uranus	Titania	0.0291	0.0265	0.2211	0.2072	8.339	7.124
Uranus	Oberon	0.0291	0.0265	0.1566	0.1495	5.907	5.140
Uranus	Miranda	0.0291	0.0265	0.2656	0.2120	10.017	7.288
Uranus	Cordelia	0.0291	0.0265	0.0615	0.0299	2.321	1.029
Uranus	Ophelia	0.0291	0.0265	0.0609	0.0320	2.296	1.099
Uranus	Bianca	0.0291	0.0265	0.0716	0.0407	2.700	1.398
Uranus	Cressida	0.0291	0.0265	0.0981	0.0575	3.699	1.977
Uranus	Desdemona	0.0291	0.0265	0.0833	0.0494	3.144	1.697
Uranus	Juliet	0.0291	0.0265	0.1241	0.0748	4.680	2.571
Uranus	Portia	0.0291	0.0265	0.1527	0.0936	5.758	3.219
Uranus	Rosalind	0.0291	0.0265	0.0697	0.0442	2.629	1.521
Uranus	Belinda	0.0291	0.0265	0.0761	0.0502	2.870	1.727
Uranus	Puck	0.0291	0.0265	0.1460	0.1026	5.505	3.527
Neptune	Triton	0.0179	0.0175	0.4698	0.4370	26.774	24.461
Neptune	Nereid	0.0179	0.0175	0.0143	0.0020	0.813	0.113
Neptune	Naiad	0.0179	0.0175	0.0358	0.0283	2.040	1.582
Neptune	Thalassa	0.0179	0.0175	0.0939	0.0623	5.349	3.486
Neptune	Despina	0.0179	0.0175	0.3046	0.1612	17.360	9.023
Neptune	Galatea	0.0179	0.0175	0.2431	0.1460	13.854	8.172
Neptune	Larissa	0.0179	0.0175	0.4722	0.2040	26.911	11.416
Neptune	Proteus	0.0179	0.0175	1.0659	0.4779	60.743	26.746
Pluto	Charon	0.0180	0.0108	3.6839	3.4675	341.304	193.144

The apparent sizes of the Sun and the satellites are given in degrees. The apparent size of the eclipse is the ratio of the satellite's size to that of the Sun; a value of 1.0 is an exact total eclipse, with the satellite just blocking the photosphere of the Sun without hiding any of the corona.

Computer Subgroup Report

by Roger Tanner

The May 1 meeting of the computer subgroup met at Roger Tanner's house with 6 members present. The topic centered around how to add setting circles to the 24" in the fastest manner.

Discussion began with Steve Musko offering to sell the club his slightly used NGC MAX for $600 (he paid $770 for it). This is a commercial setting circle system consisting of a small box with an LED readout, some buttons to operate it with, and two optical encoders which are attached to the axes of the scope. After the unit is setup for the scope and calibrated, the unit will give a continuous readout of position to an accuracy of 1 minute in RA (15 arc-minutes – 0.25 degree), and 0.1° in DEC. By comparison the field of the 24" scope with our 55 mm Plössl eyepiece is 8 arc-minutes or 0.13°. (The largest field any 2" eyepiece can deliver is limited to about 1.75" diameter; at a 600" focal length this is about 10' or 0.16 degrees.) The field of the new 120 mm Erfle eyepiece is 20' (0.33°). This means that with the largest eyepiece an object could be just off the edge of the field, but if it has any size at all, you can see it and center it. The eyepiece could then be changed to a higher power for the smaller objects.

The NGC MAX has 12,000 objects in its database, and it can direct you to any one by indicating which way to turn the scope in each axis and showing how far you are from the proper position. The database includes the Messier catalog, the NGC catalog, bright stars, variable stars, planets and some other interesting objects. Steve bought his mount into the meeting with the encoders and the NGT MAX and demonstrated its operation. The discussion centered on three points: the resolution is probably marginal for putting the object in the field of all but the lowest power eyepiece; this would be a significant percentage of the club's money to spend; and this would be relatively easy and quick to mount on the scope. The estimates were running 1–2 months to make the brackets to mount the encoders, make a box to hold the control unit and wire everything up the unit.

This idea was constantly compared to the computer project the members of the subgroup have underway. The status of which is: the donated computer needs a monitor and a few other odds and ends to run, Tom Ryan has some encoder kits which need shafts, housings, and mounts designed and built to be functional, software has to be written, and an heated/ventilated enclosure for the computer must be built. All this has to be wired up and debugged! (I.e. don't hold your breath!) This is a project of the magnitude of the electronics which run the telescope, which took over a year to build and debug. The final product is envisioned to be a more user friendly, capable, and accurate system than the NGC MAX, but realistically would be at least a year before it worked. The group agreed that the NGC MAX would be a useful interim system. The accuracy would certainly get the object into the field of the 5.5" refractor, and if the object is too faint to see in the refractor, you only would have to look at most one field away in the 24" to find it. This would probably make the scope much more useful for the club members. The NGC MAX also has an RS232 port to communicate to a computer and is set up to work with the sky chart program *The Sky*. We could have an intermediate step in the computer project using the NGC MAX to deliver encoder positions to the computer and the computer could have the more user friendly interface, either our own or *The Sky*.

The NGC MAX also reports encoder counts to the computer which means that (providing the encoders have the required resolution) higher accuracy is possible with only the computer and NGC MAX system working. Steve's encoders are 1000 counts per revolution, if they are connected to the 24" with a 4:1 ratio, we would have 4000 counts per revolution which gives us about .1 degree or 6 arc minute resolution. If we use a 6:1 ratio, this would give us 4 arc minute resolution. The real problem is at resolutions approaching 1-2 minutes, to actually get that accuracy you need to take in account an ever increasing number of errors, such as the perpendicularity of the optical axis to the DEC axis, the refraction by the atmosphere (1' at an altitude of 45°, 2' at 27°), wobble of the mirror in its cell, etc. The picture is not as bleak as it sounds, since if you really want to find something, you can calibrate the scope on a star a few degrees away – most of these things don't change over a few degrees.

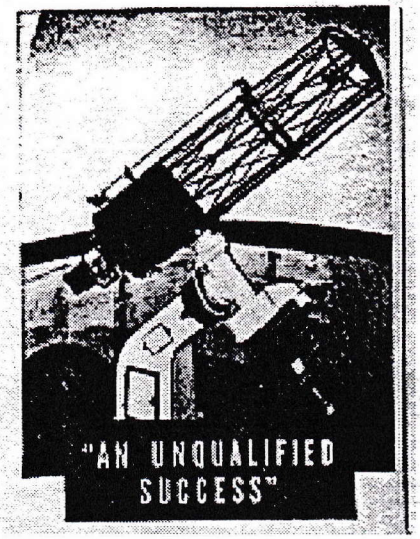
There are other units available such as the unit sold by Lumicon and Orion, but they are just a relabeled version of the NGC MAX with more or less objects in the database and without the serial port. Another alternative which is an intermediate solution is the Micro-Guider designed by David Lane – an amateur in Canada. Tom has got the PC board and schematics for this unit, which is similar to the NGC MAX. Tom estimates the whole system including encoders would cost $200 to build. This would take an intermediate time to build and get running, probably 6 months. This unit has a better display and keyboard and has some additional features but probably has similar accuracy.

The consensus of the members was to recommend that the NGC MAX be considered for purchase and that the matter be considered by the officers for a discussion and vote by the members at a future club meeting. The additional capabilities of The Sky need to be researched also. (continued on next page)

A Blast from the Past

Sky and Telescope Vol. II No. 7, May 1943

From Volume VIII, No. 6, Publications of the Observatory of the University of Michigan describing the Francis C. McMath Memorial 24-inch Reflecting Telescope, now in operation at the McMath-Hulbert Observatory of the University of Michigan.



"The mirrors were entrusted to The Perkin-Elmer Corporation. Our specifications were exacting, as no part of any surface could depart from the theoretical surface by more than one-tenth of a standard wavelength....Perkin-Elmer Corporation completed the primary mirror by conventional methods....It was then tested, pronounced well within the specifications, and found to have an unusually fine surface. The two high magnification secondaries, however, presented real difficulties. McCarthy, of Perkin-Elmer, felt that conventional methods of testing were inadequate and proposed a new method, which he has recently described. The Perkin-Elmer Corporation mad up the necessary auxiliary optical equipment, and our two secondaries were figured by the new method, which eliminates the combined testing of primary and secondary. These two mirrors have been an unqualified success, both focal lengths being well within specifications, while the figuring is superb. Exposures for the disk of Jupiter are shorter by a factor of at least twelve when compared with our old $10^1/_2$-inch telescope."

THE PERKIN-ELMER CORPORATION
Glenbrook, Connecticut
Manufacturers of Precision Lenses, Prisms and Mirrors
Optical Design and Consultation

The rest of the meeting was spent looking at *The Earth Centered Universe*, a shareware Windows planetarium program written by David Lane. Several members examined the program and it appears interesting. We will look at it some more at a future subgroup meeting and compare it to other shareware planetarium programs such as *Skyglobe*. Bernard Freiberg brought over a detailed moon map and was enticing the group to go outside and look for some of the interesting and lesser known features on the moon, but the discussion over the setting circles was hot and heavy, and it was a little hazy outside...

A location for the next meeting was not determined – come to the club meeting on May 21 to find out! If the club decides to buy the NGC MAX, we might meet at Peach Mountain and start installing the encoders!

R Coronae Borealis

R Coronae Borealis was discovered in 1795. It is normally of magnitude 6 with small fluctuations, but it occaisionally drops to magnitude 14. Recall that the bigger the magnitude, the dimmer the star, and that magnitude is a logarithmic scale, with 5 magnitudes corresponding to a factor of 100. So R Coronae Borealis is occaisionally getting dimmer by a factor of 1600 or so!

As of 1982 there were only 32 R CBr stars known, so this is a very small class of stars.

R CBr stars are type G (yellow) supergiants with absolute magnitude -6 or so. The sun's absolute magnitude is about 5 so these are about 25,000 times brighter than the sun. One of the observed ones is in the Large Magellanic Cloud (outside our galaxy). Their spectra show lots of carbon and relatively little hydrogen. When they are dim, there are emission lines of neutral sodim, ionized calcium, titanium, and iron. Also, the radial velocity varies little (as can be checked by Doppler shifts) so it seems that matter is not being ejected.

How to explain these rascals?

Petit says that "the interpretation of all these observations runs into difficulties. The stars are unusually rich in carbon and it is thought that this element plays a similar role in the star's atmosphere to that of water vapor in the atmosphere of the Earth, condensing to form clouds that obscure the sky unless they disappear in the form of rain. The carbon circulating in the star's atmosphere condenses in the upper regions in the form of fine grains of graphite. During their fall towards the surface under the influence of gravity, these `clouds of soot' become denser, and end up forming a thick envelope that obscures the star and cuts out a large part of its radiation. However, when the clouds get nearer still to the surface, their temperature rises and the carbon again becomes gaseous by sublimation. The atmosphere is clear once more and everything is in order... until the next cycle starts."

This is a very charming image but it's far from clear that it explains the observed data. Why the metallic spectral lines? Why doesn't the soot build up slowly and cause a slow dimming, rather than an occaisional drastic dimming?

An alternate explaination is that R CBr stars have an extended outer envelope that is slowly expanding. Because they are carbon rich the carbon is supersaturated and will condense to form very small carbon grains as the expanding envelope cools. When the gas density is sufficiently high the grains are dragged along with the gas. When the gas density falls the dust grains will become decoupled from the gas and will move under the influence of radiation pressure which exceeds the gravitational force.

The dust forms very quickly and as a consequence there is a sudden increase in the optical thickness, as the dust shell expands the optical thickness falls.

Some Thoughts I Think our President was Thinking

an Editorial by Kurt Hillig

At last months meeting, Stu Cohen mentioned a number of things he'd hoped to have accomplished during his first year in office. Since none of them had been finished, he was a bit reluctant to take on the leadership for another year without some commitment from the rest of the Lowbrows to work on these with him.

What were these things? Stu listed the following:

1) Run a joint "freezeout"/swap meet with at least the EMU astronomy club, and perhaps other nearby clubs as well. Aside from the fun factor – and a chance to trade all of your old junk for someone else's old junk – this would be a vehicle for us to form closer ties with other amateurs in the area, and to raise our visibility a little bit.

2) Get the digital setting circles project (one of the Computer subgroup's action items for the past year) to do something! (And as a fairly regular computer group member I have to admit that there's been a lot of talk.)

3) Develop a real liason with UM's Astronomy department. We don't really know how they feel about the optical observatory at Peach Mountain, and they don't know much about our hopes and dreams for it.

4) Raise some funds. One chronic problem is that member dues cover the cost of publishing the newsletter but don't leave much left over. A lot of potential activities – such as the digital setting circles, a club CCD camera for the 24" scope, color pictures in Reflections once or twice a year, or just installing better lighting in the observatory – don't get done for lack of money.

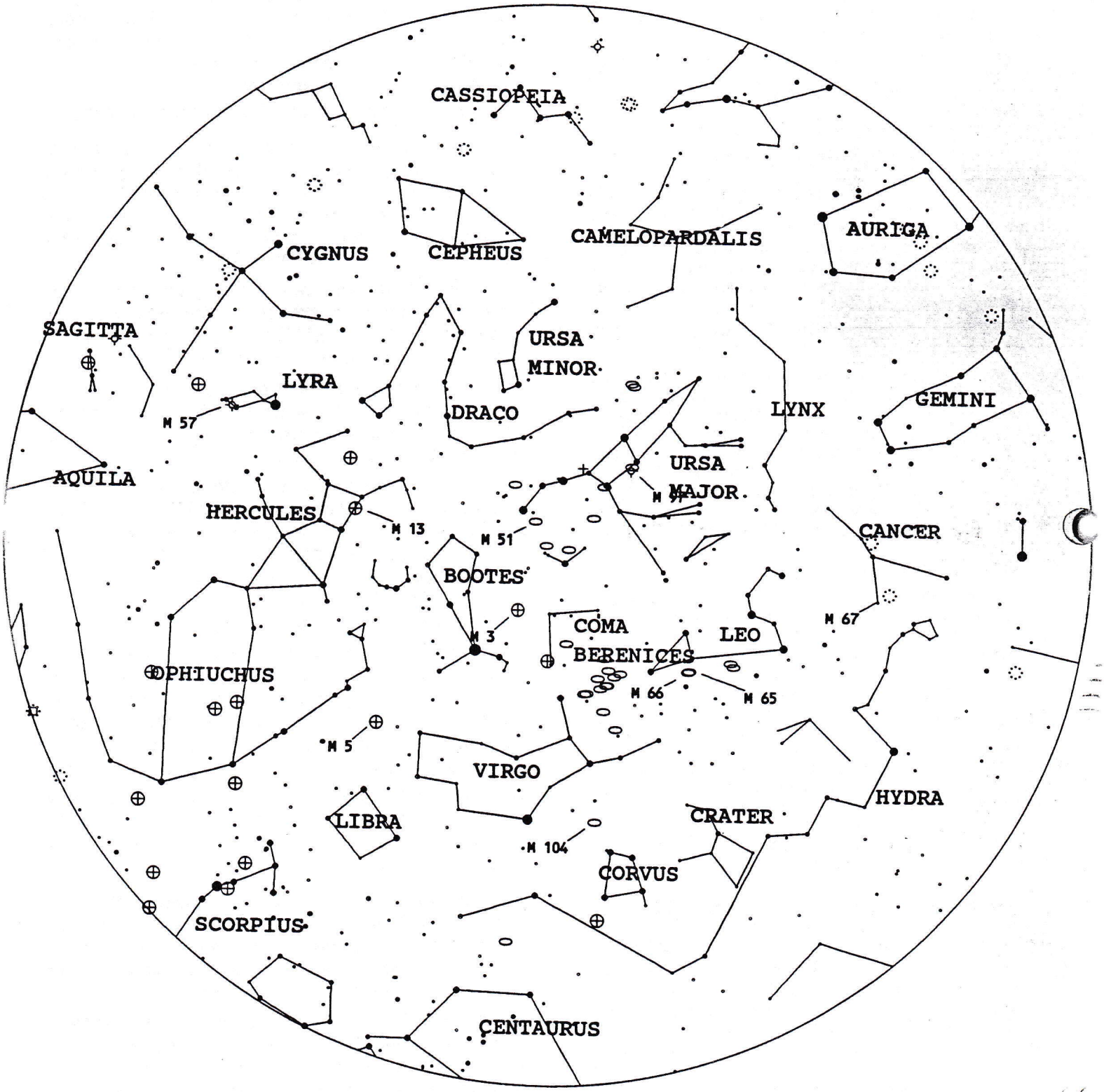
5) Publicize. We had some flyers printed up, but they never got distributed. We need to advertise on campus (how about setting up some scopes on the Diag this summer?), but also get more information in the Ann Arbor *News* and *Observer*, papers in Dexter, Chelsea, etc.

6) Fight City Hall! If astronomy is going to survive in southeast Michigan, we need to start now talking to city planners, zoning boards, developers, Kiwanis, Boy Scouts, etc. about dark skies and their value to our increasingly urbanized society.

Unfettered idealism? Unrealistic dreaming? Stu didn't think so, and I think he convinced many of us that it's time for the club to start taking the long view, to make sure we don't get isolated by looking only at todays problems – or by thinking we don't have any problems.

And Stu did get a response - people spoke up and said they'd take responsibility for some of these projects: John Lafitte – the freezeout / swap meet; Paul Etzler – liason, fund raising, publicity; Stu appointed Tom Ryan and Steve Musko (both in absentia!) to get the setting circles settled.

Will we accomplish in the coming year all the things we've left undone in the past one? Almost certainly not. But I think we're going to give it a damn good try. All you need to do is join in and help – as many of you do now.


CASSIOPEIA
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GEMINI
AQUILA
URSA
MAJOR
M 97
HERCULES
M 13
M 51
CANCER
BOOTES
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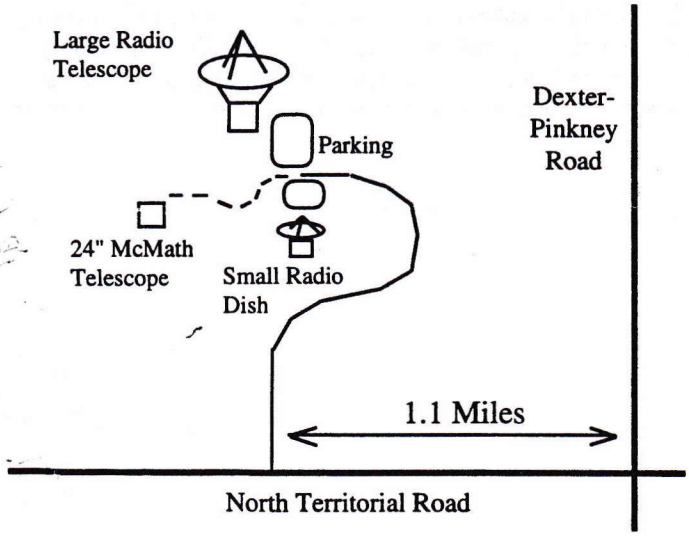
COMA
BERENICES
LEO
M 67
OPHIUCHUS
M 66
M 65
M 5
VIRGO
HYDRA
LIBRA
CRATER
M 104
CORVUS
SCORPIUS
CENTAURUS

☞ 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 binoculars or telescopes; visitors are welcome to do likewise. Peach Mountain is home for zillions of mosquitos – bring insect repellant, 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 a meeting or by mail at this address:

4653 Pitchpine W. #2D
Ypsilanti, MI 48197

☞ 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*.

✎ Newsletter Contributions:

Members (and non-members) are encouraged to write about any astronomy-related area in which they are interested. Please call the newsletter editor (Kurt Hillig, 663-8699) 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:

President:	Stuart Cohen	665-0131
Vice Pres:	Doug Nelle	996-8784
	Paul Etzler	426-1939
	Fred Schebor	426-2363
	Tom Ryan	662-4188
Treasurer:	Doug Scobel	434-2061
Observatory:	D. C. Moons	254-9439
Newsletter:	Kurt Hillig	663-8699
Membership:	Steve Musko	426-4547
Open House:	Keith Bozin	549-9529

Peach Mountain Keyholder:

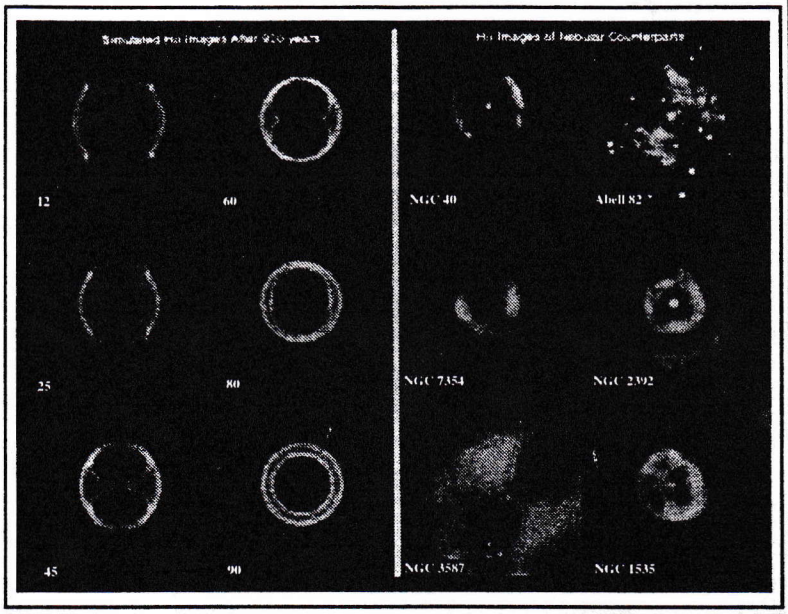
Fred Schebor 426-2363

Monthly Meeting:

Tom Ryan and Doug Nelle on "Crazy Eights: A Tale of Two Telescopes"

May. 21, 1993 at 7:30 PM

At the Detroit Observatory in Ann Arbor



A comparison of computer-simulated planetary nebulae with several observed ones. The simuations assumed a non-spherical solar wind distribution from the red giant progenitor of the nebulae. The nebular images were all taken in Hα light, except for Abell 82 which was taken with NII light. The similarity between observed and calculated structure is notable.

University Lowbrow Astronomers
840 Starwick
Ann Arbor, MI 48105