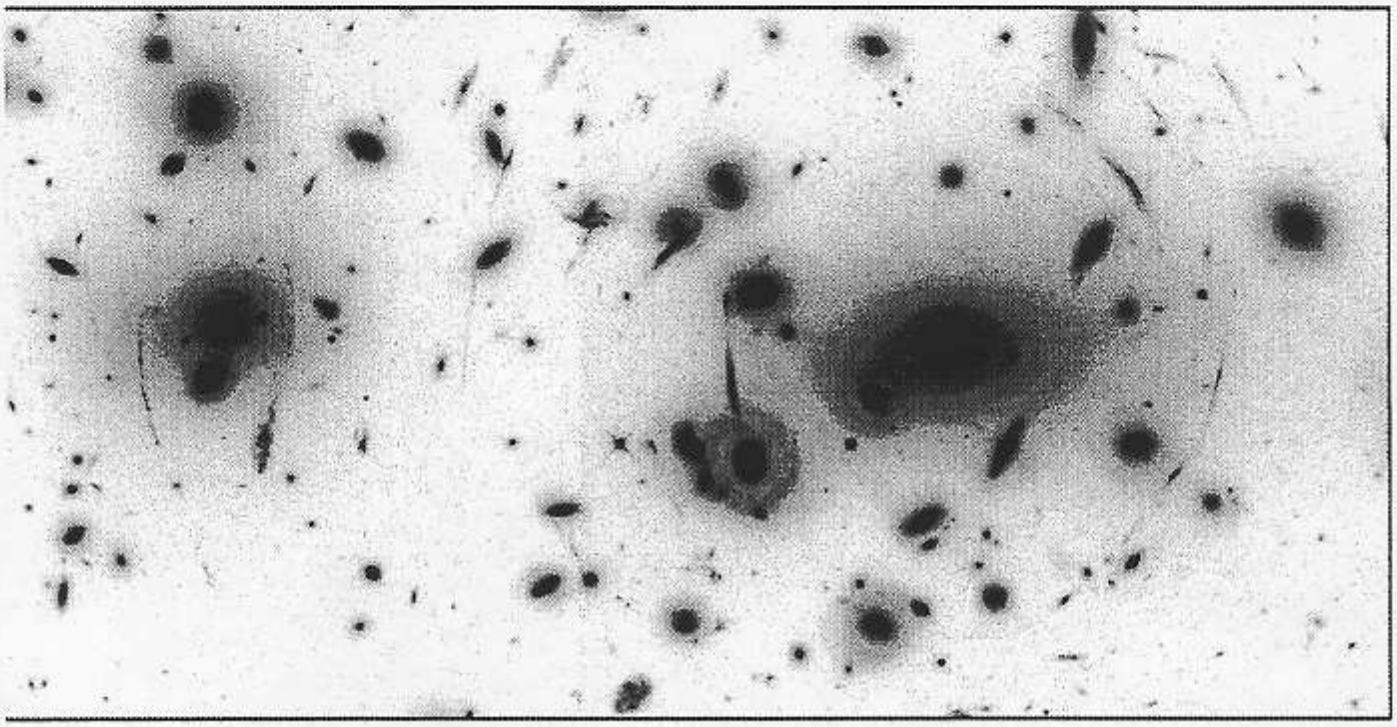
Reflections

of the University Lowbrow Astronomers

September 1996



Gravitational lensing forms distorted images of distant galaxies and quasars when the light path is bent by the mass of large objects that lie closer to us. This HST image from April 1995 [shown inverted to bring out the details - Ed.] shows numerous arcs of light from distant objects, lensed by the galaxies and dark matter in the cluster *Abell 2218*.

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 inside for more directions) on the Saturdays before and after the new Moon. For more information call (313) 480-4514.

Important Dates

This Month:

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

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

Sep 20 - **Meeting** at 807 Dennison: Kurt Hillig on "A Pilgramage to Mauna Kea", and Fred Schebor's famous "Artsy, Meaningless Slide Show"

Sep 28 - **Peach Mountain Moonwalk** with the Friends of Stinchfield Woods

Next Month and beyond:

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

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

Oct 18 - **Meeting** at 807 Dennison: speaker and topic TBA

Oct 19 - **Public Open House** at Peach Mountain Observatory

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

Where Did That Martian Meteorite Come From?

Ron Baalke (NASA/JPL)

Two possible source craters for the Martian meteorite ALH84001 have been identified through an extensive search of impact craters on Mars. The 1.9-kg (4.2 lb) meteorite, recently identified as showing possible evidence of past martian life, was formed about 4.5 billion years ago and was blasted off of Mars during a meteorite impact about 16 million years ago. Dr. Nadine Barlow, a planetary scientist at the University of Central Florida, identified the two likely source craters through a search of a crater catalog she compiled while doing her graduate work at the University of Arizona in the mid-1980's.

A number of characteristics of the meteorite helped Dr. Barlow narrow the search for possible source craters. The 4.5 billion year old age of the meteorite indicated it must have come from the most ancient terrain on Mars, while the 16 million year old ejection age indicates that the crater from which the meteorite was ejected should still show very young features. Evidence of pre-ejection shock events indicates that one or more large, old craters should be found near the meteorite ejection site, and the presence of carbonates in the meteorite suggests that evidence of water should be present. Previous work by other researchers indicate that martian meteorites can only be ejected either by a very large impact (100-km diameter or larger) if the impact is near-vertical, or by smaller impacts if they strike at an angle close to the horizon. The low angle impacts will create a distinctive elliptical-shaped crater.

Dr. Barlow's crater catalog, which contains information on 42,283 martian impact craters, was used to search for fresh, elliptical impact craters larger than 10-km-diameter and for fresh, circular craters larger than 100-km-diameter on ancient terrain. The search produced 23 possible craters. Dr,. Barlow then used images of the martian surface taken by the Viking Orbiter spacecraft in the mid-1970's to eliminate those craters which showed evidence of being older than 16-million years. "16 million years may sound like a long time to humans, but for geologic processes it is a very short time period, particularly for a planet like Mars which has apparently experienced little geologic activity over the past billion years" said Dr. Barlow.

The two craters which survived the analysis are both of the smaller, elliptical crater type. Both are located in the heavily cratered southern highlands of Mars. The first crater, located in the Sinus Sabaeus region of Mars south of the Schiaparelli impact basin, is 23 x 14.5 km in diameter, displays a pristine ejecta blanket and sharp crater rim, and is superposed on the rim of a much older highly degraded 50-km-diameter crater. Several small channels which formed early in the planet's history are located nearby, including one called Evros Vallis. The second possible source crater for ALH84001 is located east of the Hesperia Planitia region, is 11 x 9 km in diameter, and also displays a pristine ejecta blanket and sharp crater rim. It is located less than 10 km from an older 25-km diameter crater in an area which also shows some possible evidence of ancient fluvial activity.

The identification of possible source craters for ALH84001 will allow NASA to focus its efforts on these areas with future lander missions to Mars.

Dr. Barlow's findings are being prepared for submission to the Journal of Geophysical Research. She also plans to report on these results at the October meeting of the Division for Planetary Sciences of the American Astronomical Society meeting to be held in Tucson, Arizona.

How Do We Know That ALH84001 Is From Mars?

Ron Baalke (NASA/JPL)

[There have been a number of objections raised to the idea that rocks from Mars can be found on Earth. I have extracted from the discussions in the Usenet news group *sci.astro* a number of these, with responses by Ron Baalke, a JPL scientist with an active presence on the net. - Ed.]

Q: I am not convinced that this rock is a Martian rock. I may have to concede at some point, because the evidence is too strong in favor of it being a Martian rock. However, from the science magazines that are carrying this news report, they have not supplied "believeable" evidence that the rock is a Mars rock and not a Comet rock or Asteroid belt rock.

A: Perhaps a check of the scientific journals will convince. The idea the meteorites may have come from Mars has been around for almost 20 years. An excellent walkthrough of the past research done on this is available at the URL:

http://www.gps.caltech.edu/~eww/astro/snode24.html

Q: I need more than words to the effect of "chemical composition like Mars" because the chemical composition of the universe and solar system are so very uniform.

A: We do know that the composition of different objects in the solar are not so uniform. A simple comparison of lunar rocks retrieved from the Apollo missions with terrestrial rocks bears this out.

Q: Here are some probabilities: Most meteorites are from the Comets or Asteroids, simply because they are abundant and are not in any planetary bound state. Thus, it is reasonable to assume every meteorite comes from the Comets or Asteroids.

A: We know with 100% certainty that meteorites can come from the Moon; we have Apollo samples to prove this. To assume that 100 %of all meteorites come from comets or asteroids simply is not a valid assumption. To assume 99% of all meteorites *is* valid, and is in fact the case with most meteorites studied today.

Q: If someone says that a rock comes from the Moon or Mars, the burden of proof would be for him not me. Why have none of the scientists on this Mars rock detailed a reasonable transport mechanism for a rock to escape the Mars gravity field?

A: This is in the literature, do your research! In Science, 271, 1387, 1996, Gladman, et. al. performed models of orbital dynamics. For an object ejected from Mars from an impact event, there is a 7.5% chance of it hitting Earth in 100 million years.

Q: In that Mars rock report it was mentioned that scientists now have 4 Mars rocks.

A: Actually, we have Mars material from 12 different falls. These meteorites have been grouped into 4 different subgroups, which indicate 4 separate impact events on Mars.

Q: I am not saying that it is impossible for rocks of a planet to get ejected into space and escape the planets gravity field. I am saying that such is a rare, very rare occurence. Not impossible but rare.

A: Yes, this is correct. Of the 20,000+ meteorites that have been discovered so far, only 12 are classified as Mars meteorites. Finding a Mars meteorite is a rare, very rare occurence. Not impossible but rare.

All About Barlows

Chris Szmauz
(cszmauz@opus.hpn.lkg.dec.com)

Q: Does it matter where in my telescope I put my Barlow lens – say, before or after the diagonal, or ahead of the secondary in a Newtonian?

A: Positioning does affect the magnification factor of all Barlows! The drawing below shows the basic operation of a Barlow; the equations show the relationship between its position and the magnification you get.

Q: How does a Barlow affect the performance of the scope?

A: Due to the magnification of the barlow, you are looking at a smaller, central part of the original focal/image plane. Most optical designs have better correction/less abberation and no or little coma in this central "sweet spot", so the only effects you have to worry about there are the abberations that the Barlow itself would introduce. Vignetting is not an issue in most systems since the image plane is being enlarged by the same magnifying factor (unless you are trying to use a 2" eyepiece with a barlow in a 1 1/4" tube).

Q: Do short Barlow perform less well than standard length Barlows? Short Barlows appear to be 3 element, vs 2 for standard...

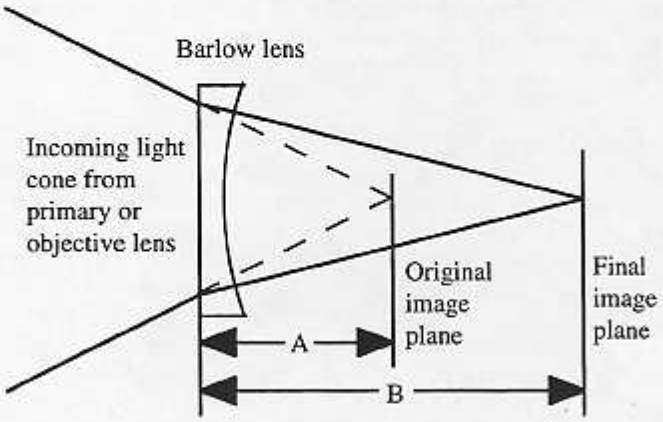
A: Hmmmm, you are asking a religious question there. The answer you get will depend on who you talk to. Personally, I only use a Barlow on my guiding eyepiece when shootin' astrophotographs: I have a set of eyepieces from 6mm to 25mm that provides all the magnification my scopes can handle.

Given the same anti-reflaction coatings, more surfaces mean a little more light is lost or scattered, possibly causing ghosting, lost contrast, etc. But if the design is well done and built properly, the third element should reduce aberrations for similar focal lengths (as an example, doublets vs. APO refractors), and a shorter focal length barlow design probably needs the third element in order to provide equal optical performance.

Here are the details on the operation of Barlow lens:

Definitions:

A = distance the Barlow lens is *inside* the primary image plane
B = distance between the Barlow and final image plane
F = focal length of Barlow lens, taken as a *positive* number
M = Magnification factor



Here are the equations:

$1/F = 1/A - 1/B$, or $F = (A \times B)/(B - A)$
$B = (F \times A)/(F - A) = A \times M = (M - 1) \times F$
$M = F/(F - A) = B/A$

You can see that if you increase A (i.e. move the Barlow further inside the focus), B increases faster than A does so M also increases. As A approaches F, M goes to infinity – this is the classic Galilean telescope design, where the Barlow becomes the eyepiece!

Home Shopping Network?

Astromart is an e-mail list for buying, selling and trading telescopes and related equipment, astro books, old issues of S&T,etc. Anyone with an e-mail service can subscribe to it, or post ads to it. There's a "regular" list (members get a copy of every posted ad) and a "digest" list (ads come in groups of ten or so per message). Here's what you need to do to sign up:

To subscribe send a message to **Majordomo@best.com** – in the body of the message, type **subscribe astromart** (for the regular list) or **subscribe astromart-digest** (for the digest list). To unsubscribe from either list, do the same but substitute **unsubscribe** for **subscribe**.

To post an ad, send it via e-mail to **Astromart@best.com**

General guidelines: The list is still limited to non-commercial ads of reasonable length, it will remain moderated and is not a discussion list. Please respond to the advertiser rather than the list. If your ad is going to be real long, just post post stating that you'll provide more information on request. It is good form to put an indication of the content in the subject line. For example:

FS Celestron C8+
WTB 20mm Nagler
TRADE LX6 + accys for LX200

Historically, ads with a price get a better response.

Archives of astromart mail (say you want to look up recent selling prioces for used C-8's) can be found via ftp and on the Web:

ftp://ftp.best.com/pub/robertf/ASTROMART/
http://www.astromart.com/

If you have questions, comments or suggestions, feel free to contact Robert Fields via E-mail at: **Robertf@best.com**

Burning Down The House

Val Germann
Central Missouri Astronomical Association

In 1989 I took a 12.5-inch, f/6 mirror outside to clean it, sitting face up on a card table I had set up on the patio a few feet from the house. It was a beautiful sunny morning, the phone rang, I went inside to get it and talked for about fifteen minutes. Then I came back out and cleaned the mirror.

The next day I noticed this charred area on the overhang right above the garage door. The image of the sun had been focussed on the painted wood there, charring the wood at least a quarter of an inch deep! Let that be a lesson to all — ATM can be dangerous!!

ATM History: Part 1.1

Val Germann
Central Missouri Astronomical Association

The September, 1950 issue of SCIENTIFIC AMERICAN was entitled "The Age Of Science, 1900-1950," and in the "The Amateur Astronomer" column "Unk" Ingalls gave a brief history of amateur telescope making in the United States. Ingalls says that Russell Porter had discovered mirror-making in 1911 from an issue of POPULAR ASTRONOMY sent to him by a friend. The issue in question contained a letter from Leo Holcomb of, get this, Decatur, Illinois (near the home of AstroFest!) who had gotten into mirror making after reading an article in POPULAR MECHANICS written by John Mellish.

Porter wrote to Holcomb and after getting some information from him did some research on his own and began making mirrors himself. By 1925 he had made ten mirrors and submitted an article to the aforementioned POPULAR ASTRONOMY, which magazine published the article, where Ingalls saw it, quite by accident, at the circulation desk of the New York Public Library! Ingalls soon bought some glass and started work on a mirror himself. And he contacted Porter who was then living in Springfield, Vermont.

A little later, Ingalls says, he and Porter sat down to two, two-inch mutton chops at Brown's Chop House on Broadway in New York — and there talked six straight hours about making mirrors and telescopes. Porter would get up from his seat and give Ingalls demonstrations of the strokes, to the sometimes discomfort of the other diners, a few of whom, Ingalls says, "wondered what kind of emergency vehicle should be summoned."

The rest, as they say, is history, and will be continued.

Calling All ATMs

If you're an amateur telescope maker, and if you have an e-mail address, then the ATM mailing list is for you! Amateurs of all levels are invited to participate. The purpose of the group is to provide a forum to share experiences, ideas and resources related to Amateur Telescope Making. Typical topics include glass pushing, mount making, and home observatories. [I just picked up several nice pieces of Zerodur, and sold an old Pyrex blank that I had lying around, all thanks to the ATM list! - Ed.]

To subscribe, send an e-mail message to majordomo@shore.net and in the body of the message put the two words "subscribe atm"; to remove yourself from this mailing list, send the message "unsubscribe" by e-mail to atm-request@shore.net. And to post a question to the list, simply e-mail it to "atm@shore.net"!

An archive is kept of all traffic on the ATM list, and is accessable on the World-Wide Web at

http://www.system.missouri.edu/atm/

If you have questions about, or problems with, the archives, please send them to Andy Steere (andy@www.system.missouri.edu) and not to the list!

On the Road Again – Off to Wallops, Boulder & White Sands with JASPR IV

Mark Vincent

After many months of working on the payload, a launch date has been set for the night of Tuesday, October 22. By the time you read this, we – Doug Warshow and I, Curt Cooper (electrical engineer), and John Clarke (Principle Investigator) – will be integrating the payload at Wallops Flight Facility on the east coast of Virgina. Integration is the process of connecting our payload to the NASA guidance and telemetry system and proving, to the best or our abilities, that it will work in flight. This takes about 3 weeks. After integration (i.e. late September) we will come back to Michigan for a week while the payload is shipped to Boulder Colorado. The University has a vacuum collimator where a quantum efficiency test can be performed for about one week. The payload will then be driven to White Sands New Mexico for another two weeks of testing before launch.

Right after launch, or just before, if there is a delay, Doug, John and I will attend the Division for Planetary Sciences meeting in Tuscon on October 23-26. I am presenting a poster (see abstract below). After all this, Doug and I will take a much needed vacation, either volunteering our services at Kitt Peak and/or visiting the Pima Air Museum. We think you will understand why we will not be attending the next two meetings in person however, will will be in email contact.

Meridional Spreading of the SL-9 Debris as Imaged in the Ultraviolet with WFPC2

M.B.Vincent, J.T.Clarke (U. Michigan),
R.A.West (JPL), H.B.Hammel (MIT)

Jupiter's UV banded structure and dark polar hoods present difficulties for tracking the long term motions and fading of the SL-9 impact debris. A technique has been developed where a simulated Jupiter image is subtracted from Wide Field Planetary Camera 2 (WFPC2) images to enhance contrast of the time-dependant variations. The simulated Jupiter is generated from a mean latitudinal banding, a third-order Minnaert law limb darkening and the system's point spread function. This technique works well with the Jovian F255W, F218W and F160W images since they show primarily low contrast bands.

A series of images, covering the two years after the impacts, is presented to display the meridional spreading and fading of the SL-9 debris. In the months following the impacts, the debris dispersed into a broad, nearly uniform band. The spreading cannot easily be determined in the F255W and F218W images from March 1995 as a result of the bands' natural contrast variations. A slight darkening at the impact latitude is present in F160W images from September 1995. Detecting the F160W darkening is easier since these bands are stable over this time.

This work is supported by NASA grants GO 6141.04 and NAGW-1766 to the University of Michigan.

Total Lunar Eclipse of September 26-27, 1996

Calculations by Milton French

All times are EDT and coordinates are in degrees; the location is Peach Mountain, but should be pretty close anywhere in Michigan.

	Time	Altitude	Azimuth
Moon enters penumbra	20:12.4	20.2	108.0
Moon enters umbra	21:12.3	30.1	119.7
Moon enters totality	22:19.3	39.8	135.8
Moon middle eclipse	22:54.4	43.9	145.9
Moon leaves totality	23:29.4	47.0	157.2
Moon leaves umbra	0:36.3	49.5	181.7
Moon leaves penumbra	1:36.4	47.3	203.5

All Hands On Deck!

Sept. 28 is the date of the Fall 1996 Moonwalk. This event is sponsored by the Lowbrows and by the Friends of Stinchfield Woods. Both the north and south gates at Peach Mountain are used for this event and will be open by 7:30 pm. Many events run concurrently throughout the evening, including: a guided moonlight nature walk; tours and talks on the radio and optical telescopes (at the respective observatories); astronomy programs for kids at 8 and 9 PM; slide shows and presentations on subjects including owls, local geology, the Mars rock (evidence for life on Mars); 'Optical Measurements of the Night Sky' (courtesy of the Space Physics Research Lab); a bonfire and marshmallow roast, etc.

All Lowbrows are needed to help with this, as we are expecting a large turnout – call Bernard, who is coordinating this, at 761-1875. Please carpool if possible, as parking is limited.

The general public can call 480-4514 for more information.

TSP '97 On-Line

Q: Can someone please post the date for the Texas Star Party for 1997? Also what part of the state is it in? Does one typically have to camp on/near the site? Is this info on any web site?

A: The TSP web page is at **http://www.metronet.com/~tsp/**

TSP '97 will be held May 3-11 held at the Prude Ranch in far west Texas, near Ft. Davis in the Davis Mts., about 100 miles east of El Paso. Primary accommodation is camping at the ranch; also, camping at nearby Davis Mountains State Park, and limited motel space in the town of Ft. Davis.

The TSP is one of the premier star parties in the country, having some of the darkest skies in the continental US. A few Lowbrows have been regular attendees in the past; there's a good chance that old-timers will run into Roger Tanner there....

Web Sites I have Known and Loved

Kurt Hillig

I've been surfing the internet for a few years now; and I suspect a good number of the readers out there have started doing this as well. The World-Wide Web has started a revolution in information sharing (not to mention sensory overload, an explosion of viruses, network brownouts, etc.) and I thought I'd share with you some of the URLs I've got in my bookmark file.

For the uninitiated, a URL is a "Uniform Resource Locator" – a kind of network address that describes where to find something and what method you should use to get to it. You may have noticed other URLs in this issue of *Reflections*; e.g. "ftp://ftp.best.com/pub/robertf/ASTROMART/" in the Astromart article points to a directory accessable by the "anonymous File Transfer Protocol". The web (aka WWW) uses a method known as the "HyperText Transfer Protocol", or HTTP; and all of the URLs listed below should have **"http://"** prefixed to them ("http://www.umich.edu/" for example) – I've left them out to try to make this a bit more compact (most current web browsers assume that you mean this anyway if it isn't explicitly included).

I can't fit them all in this time; I guess I'll have to run another set next month.... (If you get tired of typing them all in, e-mail me and I'll e-mail back a copy so you can cut-and-paste 'em!)

ATM Sites:
www.webspace.com/markv/ – Welcome to Mark's Home Planet
www.polaris.net/~tas/atm.html – Amateur Telescope Making
www.polaris.net/~tas/atmsoft.html – ATM Software
www.tiac.net/users/atm/ – The ATM Page

Clubs/Amateur Sites:
weber.u.washington.edu/~quarn/ – Fred Quarnstrom's Home Page
www.freenet.victoria.bc.ca/rasc/rascvic.html – Royal Astronomical Society of Canada - Victoria Centre
www.weatherman.com/ – Todd Gross' Weather/Astronomy Page
rampages.onramp.net/~binder/ – Bendonites Home Page
www.aaa.org/ – Amateur Astronomers Association
www.eaglequest.com/~bondono/WAS/iwas.html – The Warren Astronomical Society
www-astronomy.mps.ohio-state.edu/~perkins/FAQ.index.html – Telescope FAQ
www.efn.org/~mbartels/ – Mel's Imagemap
penn.com/~greg/ – Greg Granvilles' homepage
www.ghgcorp.com/akelly/ – Al Kelly's CCD Astrophotography Page
homepages.enterprise.net/davidj/ – Dave's Astronomy Magazine
www.infoanalytic.com/pac/ – The Prairie Astronomy Club
www.polaris.net/~tas/tas.html – Tallahassee Astronomical Society
www.rcch.com/athena – Athena Community Astronomy Club
www1.tecs.com/OldScope/ – The Antique Telescope Society
www.sound.net/~vwinter/main.htm – ICSTARS ASTRONOMY
www.sound.net/~askc/ – The Astronomical Society of Kansas City
wally.uofport.edu/~strong/ – Carolyn Strong
www.astromart.com/ – ASTROMART
www.u-net.com/ph/mas/ – Manchester Astronomical Society

What, out of space already? Maybe I'd better plan on running these for two or three more months!

In the mean time, happy surfing!

An Old Classic Revisited

Jay Reynolds Freeman

I was at Fremont Peak State Park, near Salinas, California, on September 7-8, 1996. I did something I had been meaning to do for awhile, but had kept forgetting: I brought along a set of Ramsden eyepieces, one each of inch, half-inch, and quarter-inch focal length.

The Ramsden is a quite old design; it was first described in a1782 paper by its inventor, Jesse Ramsden. In simplest form, it comprises two identical plano-convex lenses, both made of any garden-variety crown glass (such as a good grade of window glass),separated by their focal length, with the convex sides facing each other. Such a simple device is inexpensive: I bought several Ramsdens new in the early 1980s, at prices of about ten dollars each. Recently I obtained some used ones at comparable cost. And when I was a kid, I even made a few, using cheap lenses from Edmund Scientific.

Ramsdens have several flaws, compared to modern designs. First, the apparent field of view is quite narrow; 35 degrees is typical. For many people, that's about two hand spans at arm's length — no porthole to the heavens, this.

Second, in the classic design, the front lens ("field lens") of the eyepiece is at the focal plane of the back lens ("eye lens"); thus when you look through the eyepiece, any bits of dust on either surface of the field lens will be in reasonable focus, and will be very annoying. For this reason the Ramsden was never very popular for terrestrial viewing, with brightly-lit fields, but the problem is less noticeable when most of the background is dark sky. Variations of the design, in which the two lenses have different focal lengths and are separated by half the sum of their focal lengths, reduce this problem.

Third, Ramsdens do not work well at the fast f numbers that characterize an increasing number of modern telescopes. I once did comparison testing with my set on a variety of SCTs, long-focus Newtonians, and fast Dobsons, at a star party, and confirmed this assertion. Much below about f/7, forget it!

On the other hand, the design has some often-unappreciated virtues, even beyond low cost. There are only four air/glass interfaces, and many of the Ramsdens on the market a generation ago were made from military-surplus lenses, which often had very high standards for quality of polish. Thus scattered light is often very low, even compared to the best of modern eyepieces. If such a Ramsden is coated (I have never seen or heard of one being multicoated) and its interior is well-blackened, the view is then remarkably glare-free.

Furthermore, Ramsdens have superb color correction, often much better than newer designs which use several glass types and achromatic lenses. Just how one gets superb color correction out of two identical hunks of window glass, I will leave as an exercise for the reader, whose successful solution will demonstrate that there is a good deal more to optical design than picking wild glass types out of a manufacturer's catalog. Jesse Ramsden was a smart man.

Anyhow, the proof of the pudding is in the eating, and what prompted this report was one particular test. One local observer was at the Peak with his six-inch f/9 Astro-Physics refractor. He had expressed curiosity about my Ramsden set in the past, so I asked if he would like to try one out. Seeing was okay — diffraction rings continuously visible and occasionally steady, good enough that later in the evening we successfully elongated gamma-two Andromeda in this instrument, at 560x. So we pointed the six-inch at Saturn. The owner was using his Takahashi 7.5 mm eyepiece (186x). I don't know for sure what design the Takahashi uses, but it was certainly a nice view —the Cassini division and the crepe ring were visible, as were two broad, shaded bands in the north and south temperate zones of the planet's disc.

Then I put in my quarter-inch Ramsden (6.35 mm, 220x). I was gratified to hear the owner of the six-inch make the unsolicited comment that the view through the Ramsden was excellent. I myself thought so — to me, the planet appeared at least as sharp and perhaps a tad more glare-free with the Ramsden than with the Takahashi eyepiece, but the owner knows his own equipment better than I do, and is more into planetary work than I am. (He has a lot of first-rate equipment that he uses regularly, including several refractors of the same quality as the six-inch, and a box full of eyepieces comparable to the Takahashi.)

Thus we ended up concluding that at least at f/9 and slower, a ten-dollar eyepiece made to a design two centuries old is a first-rate ocular for work that does not require a wide field of view, such as observation of planets or double stars. It is a sad testimonial to the stupidity of telescope marketers and the gullibility of us, their customers, that such eyepieces have all but vanished from catalogs. If they were still available, and properly appreciated, the market for entry-level telescopes would surely be larger, and the supply of new customers greater, for beginners on a budget would no longer believe that they had to spend more on a collection of whizzy eyepieces than on their telescope itself. They would no doubt learn about the legitimate virtues of fancy, expensive equipment later.

NEW OBJECT MOVES LIKE A COMET BUT LOOKS LIKE AN ASTEROID

from NASA/JPL Release 96-172

Scientists at NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA, have discovered a unique and baffling object that may be either an unusual asteroid or an extinct comet. The object, designated 1996 PW, was detected by astronomers using data from the Near-Earth Asteroid Tracking (NEAT) camera mounted on a U.S. Air Force telescope atop Mt. Haleakala on Maui, Hawaii. This is a misfit in the grand scheme of things," according to Eleanor Helin, a planetary astronomer at JPL and the NEAT Principal Investigator.

At first look, the object, which has a diameter of about five to ten miles, appears to be an asteroid, a chunk of rock that orbits the Sun, Helin said. However, unlike most typical asteroids, which inhabit orbits no further out than the planet Jupiter, 1996 PW has a highly elongated orbit that stretches far beyond Neptune and Pluto. Its orbit has a period currently estimated at 5,000 years.

Although 1996 PW is in an orbit resembling that of a long-period comet, no gaseous emissions or other normally expected comet-like activity such as a dust coma have been observed, even during its current closest approach to the Sun. Helin and other astronomers studying the object believe that this raises the possibility that it was once an active comet, but is now inert, either because its ice and gases have been stripped away or because it is covered and insulated by a crust of non-volatile materials.

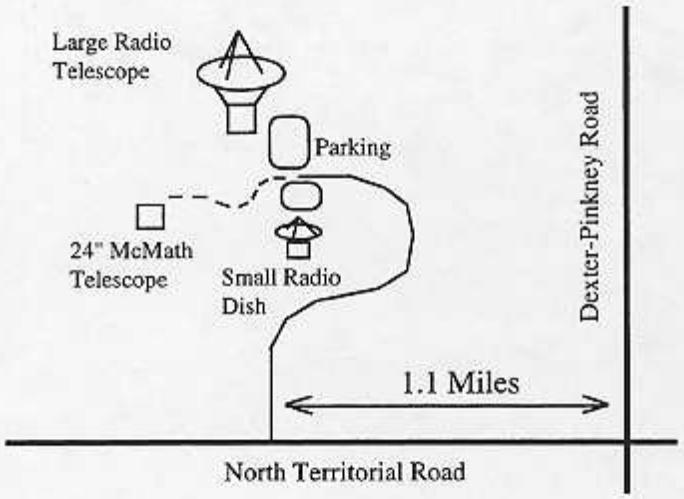
This puzzling object was discovered through a combination of high-tech telescopes, sophisticated computer software and human detective work. The NEAT program at Haleakala is the world's first fully autonomous near-Earth object imaging system. It consists of a computer controller and a highly sensitive CCD camera sensor mounted on a telescope. The system is designed to discover and track asteroids and comets as they approach Earth from deep space.

The electronic image that led to the discovery of 1996 PW is available on the NEAT program's Internet home page at:
http://huey.jpl.nasa.gov/~spravdo/neat.html

☞ Places:

Dennison Hall, also known as the University of Michigan's Physics and Astronomy building, is located on Church Street in Ann Arbor about 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 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!

☞ 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 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

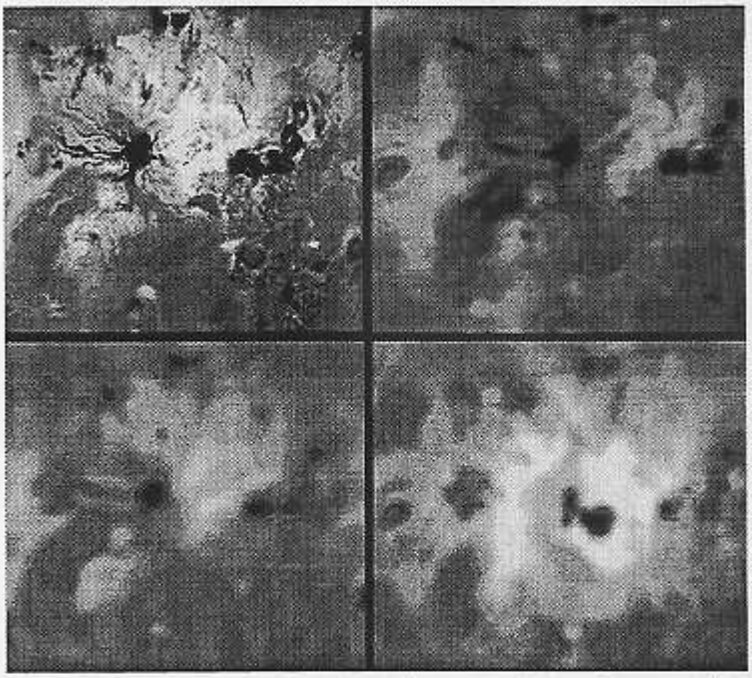
Monthly Meeting:

Kurt Hillig
A Pilgrimage
to Mauna Kea

Fred Schebor
The Return of the
Artsy Meaningless
Slide Show

Sept. 20, 1996 at 7:30 PM

Room 807 of the Dennison
Building on the UM Campus



The volcano Ra Patera on Io; clockwise from upper left are Voyager 1 high and low resolution images, a Galileo image taken on June 27, 1996, and a Voyager 2 image. Dark materials, previously confined to a summit caldera, appear to have overflowed the caldera walls to produce a small flow to the south and a larger flow to the southeast. The colors of the flows match those of sulfur plus SO_2 frost. Images are 953 km wide.

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

Check your membership expiration date on the mailing label!