

NOVAC

THE NEWSLETTER OF THE NORTHERN VIRGINIA ASTRONOMY CLUB

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Inside this issue:

Editor's Note - Page 1
Highlights of General Meetings - Page 2
Minutes of 1994 Annual Meeting - Page 3
President's Column - Page 4
Sky Sweep: March / April - Page 4
Sky Calendar: March / April - Page 5
Lunar Phases March / April - Page 5
The Recreational Astronomer - Page 6
Second NOVAC Observing Site - Page 7
The Perseid Meteors of 1993 - Page 8
Astro-Imaging - Page 9
More Miscellaneous Musings - Page 10
NOVAC Notices - Page 10
Images - Page 12

Editor's Note

by Thomas S. Parry

The last three months have brought some of the toughest cold weather and ice I have seen in this part of the country in the nearly nine years I've lived here. Besides disrupting our daily lives, the seemingly endless ice storms have posed serious challenges to all of us doing even the simplest observational astronomy. I'm sure we've all been wondering whether or not winter will ever end. Skies have been overcast for so long I'm thinking seriously about buying a cloud filter! I'm encouraged today, however, as I write this. Outside temperatures are breaking the 50-degree barrier, skies are clear and I was able to take a walk early this morning! Yes, folks. Spring is coming and along with it a cure to photon deprivation!

Blessed relief from winter came to me in February when I went on a business trip to Honduras for ten days. The trip was only supposed to be five days in length but due to the nature of the work I was doing, was able to extend my visit and had the unexpected opportunity to travel to the ancient ruins of the Mayan city of Copan. Located on the Honduras/Guatemala border, Copan is an exciting six-hour automobile journey from Tegucigalpa through rugged mountain terrain and enchanting villages. Besides visiting the ruins, I had two nights of observing the southern skies under superb dark sky conditions including magnificent views of Alpha and Beta Centauri and the Southern Cross. I will report on my observations from the *Land of the Ancient Maya* in an upcoming issue of the newsletter.

Those of you contemplating a Messier Marathon this month will find Kevin Jones' *Sky Sweep* helpful. In his continuing series on the Messier objects,

Kevin takes us on a tour of those objects visible in late winter and early spring skies. Also, to help you get the most out of observing those Messier objects with your binoculars, Jon Stewart-Taylor gives us a complete overview on binocular astronomy in *The Recreational Astronomer*.

It seems every time you pick up a copy of *Astronomy* or *Sky and Telescope* these days you can't help but see an article about or reference to CCD imaging. The CCD revolution is taking amateur astronomy by storm and NOVAC is right in the thick of it. Former NOVAC President Myron Wasiuta has become deeply involved in CCD imaging over the past year and is obtaining excellent results. Beginning with this issue of the newsletter, Myron will contribute a series of articles on CCD imaging along with his own images in a regular column called *Astro-Imaging*. Readers should also note that Willmann Bell Publishing Company of Richmond is coming out with a book (authored by Richard Berry) on how to build your own inexpensive CCD imaging system. I've already ordered my copy and am looking forward to starting a project of my own later this year.

Finally, U.S. Naval Observatory Astronomer and NOVAC member Brent Archinal treats us to his impressions of the great, awesome, tremendous and spectacular Perseid meteor storm of 1993 while Al Schumann has more *Miscellaneous Musings* for us to think about. Let's hope that winter soon relinquishes its grip on us and goes out like a lamb. Think about warm evenings under dark clear skies. If you vision it, it will happen!

March and April General Membership Meetings

The March General Membership Meeting

will feature Kathleen and Jon Stewart-Taylor who will give a presentation on how to do astronomy with children. This program should be particularly helpful to those of us who have children and may be wondering about how we can stimulate their interest in the wonders of the night sky.

Paul Geittiner, COSTAR Instrument Manager at the Goddard Space Flight Center, NASA, will be our guest speaker at the April meeting. He will address the subject of the Hubble Space Telescope (HST) repair mission, what was done to correct the spherical aberration in the HST

primary, and what the fixes mean for future scientific research.

We hope all NOVAC members will be able to attend these programs. **The monthly General Membership Meetings of the Northern Virginia Astronomy Club are held the third Wednesday of every month at 7:30 P.M. at the Arlington County Planetarium, 1426 N. Quincy Street, Arlington, VA.** Admission is free and open to the public. Call the NOVAC hotline (703) 256-8359 for upcoming events, special announcements or to leave a message for additional information.

Highlights of January and February General Membership Meetings by Marta Krause, Secretary

General Meeting January 19, 1994

Bob L'Hommedieu called the meeting to order at 7:30 pm. Fifteen members and guests attended at the Arlington County Planetarium.

Old Business

1. A coordinator is needed for the Virginia Association of Astronomical Societies (VAAS) annual meeting of astronomy clubs. This year, it is NOVAC's turn to host the meeting. If no one from the NOVAC membership volunteers to coordinate the event, NOVAC will cancel as host. Contact a club officer if interested.

2. It has been suggested that a committee be formed to look for a new observing site. All interested persons should contact Bob L'Hommedieu at 978-0946.

New Business

1. NOVAC will hold a public observing session at Crockett Park on Astronomy Day, April 16, 1994. All members are urged to come and to bring their telescopes. Observing will begin at dusk.

2. Several members suggested that NOVAC hold a picnic for members and their families as a social event and observing session. Officers would like to know how much interest there is among the membership for holding such an event.

3. NASA's Goddard Space Flight Center will hold its annual open house the week of January 24-31.

4. There are unconfirmed reports of a 10th magnitude Supernova in M66.

Fred Holmes gave the monthly observing report. The program was given by Bob Bunge, Bill Burton, and Brent Archinal. Brent showed slides and discussed the annual Stellafane meeting. Bob showed slides and discussed the annual Astrofest meeting. Bill showed photographs illustrating before- and after-images of the recent Hubble Space Telescope repair missions.

General Meeting February 16, 1994

Bob L'Hommedieu called the meeting to order at 7:30 pm. Twenty-two members and guests attended at the Arlington County Planetarium.

Old Business

1. The NOVAC library now occupies a bookshelf in the back hall of Arlington Planetarium. Library volumes are available to members for checkout. See NOVAC Librarian Linda Thomas for information and to check out books. A volunteer to serve as second librarian is still needed.

2. Jeff Stetekluh will be giving the monthly observing reports beginning in March. NOVAC expresses thanks to Fred Holmes for providing observing reports during the past year.

3. Officer's reports:

a) Volunteers are needed to help a troop of Tiger Cubs in Springfield earn Stargazing badges with an evening of stargazing sometime before the end of May. Also, the Fairfax County School-Age Child Care (SACC) program has chosen *Space* as its summer theme and has requested help and ideas from NOVAC with children's astronomy programs. All interested persons should contact Marta Krause at 281-9049.

b) New and renewing members that have paid dues recently will receive observing passes in the mail very soon. Anyone with questions should contact Brenda Jones at 527-7963.

4. Astronomy Day is scheduled for April 16. That evening, NOVAC is sponsoring an observing night at C.M. Crockett Park that will be open to the public. All club members are encouraged to attend and bring their telescopes.

5. George Uhl reported that the Roanoke Valley Astronomy Club has volunteered to sponsor the Virginia Association of Astronomical Societies (VAAS) annual meeting this Spring. The date is yet to be determined.

6. Member interest in a club picnic is sufficient to plan such an event for Spring or Summer, possibly on a regular observing night. A date and details will follow.

New Business

1. Individuals concerned about potential light pollution from the proposed Disney Company facility in Haymarket, VA are meeting on Saturday, February 19, at 3 p.m. at the Arlington County Planetarium. The National Capitol Astronomers, Hopewell Observatory, Dr. John Wallin of George Mason University, and others will discuss a strategy for approaching Disney to encourage the design of astronomer-friendly lighting at the proposed facility. Bob Bunge and Brent Archinal have volunteered to represent NOVAC at the Feb. 19 meeting.

There was no observing report this month. Members offering brief informational reports included Jeff Stetekluh, who explained how to construct an inclinometer using an inverted protractor, a lamp pull weight, and braided silk suture. Brenda Jones recommended *A Concise Dictionary of Astronomy* (available to NOVAC members through Sky & Telescope at a 10% discount) to amateur astronomers who need help with astronomical terms. Al Boldt recommended using silk gloves for warmth without loss of dexterity on cold observing nights and also recommended a single-piece magnifier and scale for use with sky atlases. Any interested persons should contact these members for details of their reports. In addition, Linda Thomas showed her slides of the November 1993 lunar eclipse and Russ Duke recommended *ATM Journal*, a new publication for amateur telescope makers replacing the now defunct *Telescope Making Magazine*.

Bob Sandy gave the program for the evening and provided a survey of the astrophotography field including techniques, equipment, film, and exposure guidelines. He showed a portfolio of his work taken over many years.

Minutes of NOVAC Annual Meeting

January 11, 1994

by *Marta Krause, Secretary*

NOVAC President Bob L'Hommedieu called the meeting to order at 7:30 P.M. Ten trustees and members attended at the home of Brenda Jones in Arlington.

1. New president Bob L'Hommedieu articulated his goals for NOVAC meetings for the coming year. Efforts will be made to ensure a variety of speakers with an even mix of presenters from within and outside the club. Emphasis will be placed on holding programs from which members and guests can learn and that integrate both amateur and advanced points of view on specific topics. In addition, five-minute presentations from members on a practical topic, such as eyepiece covers or care of specific equipment, will be encouraged. The observing report was discussed, with the conclusion that it will be retained as a simple, 5-minute presentation highlighting currently visible objects and unusual activity. Fred Holmes expressed interest in sharing responsibility for the observing report with someone else or with special interest committees. Meetings will begin as close to 7:30 pm as possible, and programs will run from 8 to 9 pm. Any unscheduled presentations from members or guests can be made after scheduled programs for those who wish to remain after 9 pm.

NOVAC officers will report on matters falling within their areas of responsibility during the business portion of the general meeting. A suggestion was approved to use name tags at meetings to help club members and guests meet and get better acquainted.

Formation of special interest groups or committees within the club was discussed, with the ideas that these groups would meet members' interest in specific topics and also be a source of presentations or programs for club meetings. Offering classes on particular topics before meetings was also mentioned. Changing the meeting night was briefly discussed, with the conclusion that such a change would not be beneficial currently.

2. The current observing sight at C.M. Crockett park was discussed. Seeing conditions at Crockett Park are deteriorating and the site may not be useful in 2 to 5 years. A chairperson is needed for a committee or task force to find a new observing site. Requests for a volunteer to chair such a committee will be made at the January general membership meeting. Fred Holmes and Brent Archinal expressed interest in serving on such a committee when a chairperson is found.

Concerns about Crockett Park included restrictions on its use, its occasional lack of availability, the presence of security lights, and lack of toilet facilities. Bob L'Hommedieu will contact the park regarding use of the toilet in a particular park building; he will also contact the owner of the adjacent property regarding the security light. It was mentioned that Jim Schaeffer previously spoke with the owner about the security light.

3. Appreciation was expressed to Tom Parry for the high quality of the newsletter he produces. Tom expressed interest in obtaining a scanner for use in producing newsletter graphics and illustrations. He will investigate available equipment and cost.

4. After discussion, September 10 was chosen as the date of the Northern Virginia Telescope Meet (NVTM) for 1994. Bob L'Hommedieu's research indicated that weather conditions are more likely to be cooperative in September than in other months. In addition, on this date there will be a first-quarter moon and all naked-eye planets will be visible.

There will be no rain date this year. The Meet will be planned as an evening event at Crockett Park without speakers and with limited

concessions. Doug Mistler toured and evaluated Camp High Roads in Aldie, VA near Middleburg as a potential site for NVTM. Its name will be retained as a possible location for future gatherings.

Brenda Jones will contact Gary Kwolek at Crockett Park to ensure that the park facilities are available on September 10. Parking, safety concerns, and recruitment of volunteers for the meet were raised as issues to be addressed in NVTM planning sessions.

5. Bob L'Hommedieu suggested that NOVAC conduct a survey of club members to help officers in planning club activities, both short and long term. To maximize the response rate, the anonymous survey will be distributed at a meeting, and the importance of the survey results to the club's future activities will be emphasized.

6. The Virginia Association of Astronomical Societies (VAAS) asked NOVAC to host the annual meeting of astronomy clubs in Virginia. Activities usually include afternoon presentations and evening observing. A volunteer is needed to coordinate this event. If no one volunteers, NOVAC will decline to host the event. Bob L'Hommedieu will ask for volunteers at the January general membership meeting.

7. Blaine Korcel, who maintains and operates the NOVAC Bulletin Board System (BBS), has asked NOVAC to sign an agreement regarding financial support for the NOVAC BBS. Bulletin Board expenses and NOVAC's responsibility for those expenses were discussed. The need to observe IRS filing requirements if payments to Korcel exceed \$600 annually was raised. The agreement is being reviewed; payments for 1993 do not exceed \$600.

8. Other club activities were discussed. A club picnic was suggested. The Planetary Society is holding a *Jupiter Watch* at the U.S. Naval Observatory on July 21, the predicted date of the collision of Comet Shoemaker-Levy 9 with Jupiter. NOVAC tentatively plans some activities in conjunction with that event. Brenda Jones reported that Sandy Sanders, a club member, is interested in organizing activities surrounding the annular solar eclipse May 10, 1994 and would also like to see more activism regarding light pollution.

9. The suggestion was made that NOVAC join with other astronomy clubs in the area to try to influence lighting arrangements at the proposed Disney development in Haymarket.

10. Astronomy Day is scheduled for April 16. NOVAC will hold a public observing session at Crockett Park that night. Brenda Jones will contact Gary Kwolek at Crockett Park to ensure availability of the park on that date.

11. The budget for 1994 was reviewed and explained. Revenues are expected to be \$3,594 and expenses \$3,419 for the year. The checking account balance at December 31 was \$3,734.

12. Volunteers are needed for the following positions:

- ALCOR – the liaison to the Astronomical League.
- Second librarian, now that NOVAC's library collection is being housed at the planetarium.
- Corporate agent; a new agent is needed by April; must be a trustee or lawyer. Companies that serve as corporate agents will be investigated.
- Observing reporter – to help Fred Holmes.

The meeting adjourned at approximately 9:45 pm. In attendance:

Trustees:

Fred Holmes
Doug Mistler
Tom Parry
Bob Ridgely

Members:

Brent Archinal
Kevin Jones

Officers:

Bob L'Hommedieu, *President*
Ron Ferris, *Vice President*
Brenda Jones, *Treasurer*
Marta Krause, *Secretary*

It is hard to believe there will ever be clear skies and warm nights again. It is time, however, to start planning our events for the rest of the year. NOVAC will sponsor three main events in 1994.

Astronomy Day, slated for April 16 this year, falls on a regularly scheduled observing night at Crockett Park. NOVAC plans to invite the public out to observe with us. This event should be fun and involve very little work. Please note the detailed announcement in this issue of the Newsletter.

The annual Northern Virginia Telescope Meet (NVTM) is scheduled for September 10. NVTM will be scaled back somewhat from previous years. It will be a one-day event with no rain date and will start one hour before dark. There will be no speakers, concessions, or daytime activities. Because we had fewer volunteers to help with the event last year, it may be that NVTM grew into a bigger event than the club could support. This year, the emphasis will be sharing the night sky with the public. This is what our members do best!

There has also been expressed interest in having a club social event.

President's Column

by Bob L'Hommedieu

This would be something new for NOVAC and a picnic has been suggested. Preliminary plans call for a picnic with spouses and

families at Crockett Park on an observing night. If you are interested in this kind of event and/or are willing to help make it happen, please let me know.

In an effort to help everyone get to know one another, we now have name tags at the monthly membership meetings. Please take a minute at the next meeting to put one on. Hopefully, we can all start putting names and faces together with the voices we know in the dark. Another change at monthly meetings is "Show and Tell." If you have a gizmo, gadget, book, invention, or piece of equipment that you really like, bring it to a meeting and show us. Al Schumann and Al Boldt have been doing this informally for years but I would like to see us do it at every meeting.

NOVAC, National Capital Astronomers, Hopewell Observatory, George Mason University, and the Arlington Outdoor Lab are discussing ways to work together in order to influence the new Disney Park to design astronomy-friendly outdoor lighting. As things progress, I will keep you informed.

In this issue's column I will continue to focus on the Messier objects currently visible in the evening sky, to assist those who are working

toward a Messier Certificate or Binocular Messier Certificate. These certificates can be earned by observing any 70 or 50 of the 110 Messier objects respectively. For the Binocular Messier Certificate, the objects must be observed with binoculars. Once you have located the required number of objects, send a copy of your descriptive observing notes to the Astronomical League's Observing Awards Coordinator as detailed in the Astronomical League's newsletter, the Reflector (Messier Certificate Observing Guides are available through NOVAC. See Brenda Jones for more info. -Ed.).

In the late winter and early spring, the winter Milky Way and its attendant star clusters are starting to set in the west as darkness falls. The January/February issue examined seven of the Messier open star clusters located near the winter Milky Way. The open clusters M46, M47, and M93 in Puppis and M48 in Hydra were omitted as they are all located on the eastern fringes of the winter Milky Way and remain readily visible in the evening sky into March and April.

The cluster M93 is found about 10 degrees east of Canis Major's hindquarters. M93 shines at 6th magnitude and is almost half a degree in angular diameter. The cluster contains about five dozen visible stars and is visibly quite rich. M93 is categorized as *class g* on Shapley's open cluster concentration scale, which ranges from *class c* for loose and star poor aggregates to *class g* for rich and concentrated clusters. This

Sky Sweep: March/April 1994

The Messier Objects of the Late Winter and Early Spring Sky

by Kevin Jones

contrasts well with the larger, brighter, much more famous cluster M44 found farther north. M67 is a rich, compact cluster, containing

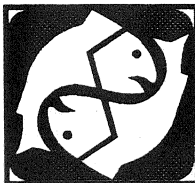
several hundred stars within an area of sky a quarter of a degree across. M44, also called "Praesepe" or "The Beehive," is over a degree and a half in angular diameter and shines brightly at 4th magnitude. The Beehive can be seen without optical aid even under moderately light-polluted conditions. M44 is a relatively sparse, star-poor cluster, containing only a few dozen bright members. Its large angular size makes M44 an excellent target for binoculars. These six clusters are all fairly easy targets for a small pair of binoculars and are excellent targets for those pursuing Binocular Messier Certificates.

Leo the Lion is located immediately east of Cancer along the ecliptic and contains five Messier galaxies. The first three of these galaxies are located below the lion's midquarters, just south of a line joining Regulus and Theta Leonis. M95, M96, and M105 are all bright and fairly easy targets for small telescopes. At 9th magnitude, M96 is the brightest member of the triplet. It is a nearly round *Sa-type* galaxy five arcminutes across. M95 is a 10th magnitude barred spiral located three-quarters of a degree west of M96. M95 is about the same angular size as M96, but is slightly more elongated. M105, the third galaxy in this tight grouping, is located three-fourths of a degree north-northeast of M96. M105 is a 9th magnitude *E1-type* galaxy, two arcminutes in diameter. It is flanked on the east by two faint companion elliptical galaxies. These

cluster is thought to be located about 3,000 light-years from the Solar System. At this distance, its angular size corresponds to an actual diameter of 20 light-years or so. The pair of clusters M46 and M47 are northeast of Canis Major, due south of Procyon by roughly 20 degrees. Through small telescopes or binoculars, 5th magnitude M47 is obviously quite loose and coarse. It contains about 25 stars within its diameter of a third of a degree, and is a *class d* cluster. Its companion, M46, is only two degrees away to the east. At half a degree in diameter and glowing at 8th magnitude, M46 is larger and fainter than M47. M46 is a rich *class f* cluster, containing roughly 8 times as many stars as M47. The brighter M47 is also the closer of the two, about 2,000 light-years distant, while M46 is at least twice as far from the Solar System.

To find M48, another open cluster, imagine a line connecting the two bright stars that make up the constellation Canis Minor, and extend this line southeast roughly three times the distance between the two stars. This cluster is similar in richness and angular size to M46 in Puppis, being *class f* and half a degree in diameter. But at 6th magnitude, M48 is considerably brighter because it is located only about 2,000 light-years away—less than half the distance to M46. North of M48 are two Messier open clusters in Cancer, located well away from the main stream of the Milky Way. The small, 6th magnitude M67, located just west of Alpha Cancri,

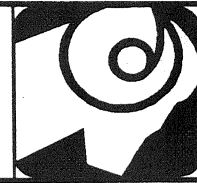
(Continued on lower left column of page 5)



Sky Calendar for March/April 1994

Compiled by Thomas S. Parry

(Times and Dates are Eastern Time. Observations begin at dusk)



March (Standard Time)

- 2 Waning gibbous Moon passes 2 degrees south of Jupiter (11:00 A.M.)
- 3 Pluto stationary. Visible in late evening at approx. mag 14.
- 4 Mercury stationary (7:00 A.M.)
Last Quarter Moon (Evening)
Observing at C.M. Crockett Park
Observing at Parsells Field
- 5 **Observing at C.M. Crockett Park**
- 7 Neptune 4 degrees S. of crescent Moon
Uranus 5 degree S. of crescent Moon
(Both occur in broad daylight hours)
- 10 Mercury close to crescent Moon (A.M.)
Mars close to Moon and Mercury (A.M.)
- 11 Saturn 7 degrees S. of Moon (A.M.)
Observing at C.M. Crockett Park
- 12 New Moon at 2 A.M. Look for very young Moon in west at sunset
Observing at C.M. Crockett Park
- 13 Venus 5 degrees S. of crescent Moon (P.M.)
- 14 Mars 0.4 degrees N. of Saturn (A.M.)
- 15 Moon at apogee 252,208 miles from Earth
- 17 Waxing crescent Moon 5 degrees S. of Pleiades
- 18 Mercury reaches greatest western elongation (28 degrees - poor morning appearance)
Observing at Parsells Field
- 20 First Quarter Moon
Vernal Equinox 3:28 P.M. (Spring Begins)
- 24 Mercury 0.3 degrees S. of Saturn (A.M.)
- 27 Closest Full Moon of 1994
- 28 Moon at Perigee 222,423 miles from Earth
- 29 Jupiter 2 degrees N. of waning gibbous Moon (A.M.)

April (Daylight Time)

- 1 **Observing at Parsells Field**
- 3 Daylight Saving Time begins (Advance clocks one hour)
Neptune 4 degrees S. of Last Quarter Moon
Last Quarter Moon
- 4 Mercury 1.5 degrees S. of Mars (A.M.)
Uranus 5 degrees S. of Last Quarter Moon
Saturn 7 degrees S. of waning crescent Moon
- 7 **Observing at C.M. Crockett Park**
- 8 Mars 6 degrees S. of waning crescent Moon (A.M.)
Mercury 7 degrees S. of crescent Moon (A.M.)
Observing at C.M. Crockett Park
- 9 New Moon
- 10 Moon at apogee 252,568 miles from Earth
Look for young Moon in western sky
- 12 Venus 1 degree S. of crescent Moon (Evening)
- 13 Waxing crescent Moon 5 degrees S. of Pleiades
- 15 **Observing at C.M. Crockett Park**
- 16 Astronomy Day
Public Observing at C.M. Crockett Park
- 18 First Quarter Moon
- 22 Lyrid Meteor Shower peaks
Lyrid Observing at Parsells Field
- 24 Moon 0.6 degrees S. of Spica (10:00 P.M.)
Venus 4 degrees S. of Pleiades
- 25 Neptune stationary
Moon at Perigee 221,785 miles from Earth
Full Moon
- 26 Jupiter 3 degrees N. of Moon
- 29 **Observing at Parsells Field**
- 30 Jupiter at opposition
Mercury at superior conjunction

(Sky Sweep continued from page 4)

companions, NGC 3384 and NGC 3389, are both 12th magnitude and about three arcminutes in angular size. They are located eight arcminutes from M105.

M65 and M66, the remaining Messier galaxies in Leo, are located farther east, underneath Leo's hindquarters and directly between Theta and Iota Leonis. These galaxies make a tighter pair than the M95, M96, M105 group; M65 and M66 are separated by only a third of a degree, and glow brightly at 9th and 8th magnitudes respectively. A striking feature of these galaxies is their extensive elongation. M65 and M66 are both roughly eight by two arcminutes, elongated north-south. Half a degree north of this pair is another extremely elongated galaxy, NGC 3628. This 11th magnitude smudge of light is 12 by two arcminutes in angular size, elongated east-west. All three galaxies are spirals. All of these galaxies in Leo may be gravitationally bound and constitute the core of the Leo Group of galaxies. They are thought to be about 30 million light-years distant.

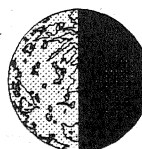
Clear skies, and have fun observing these 10 Messier objects!

Lunar Phases for March and April 1994

Last Quarter

March 4

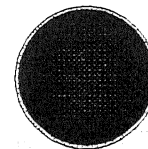
April 3



New Moon

March 12

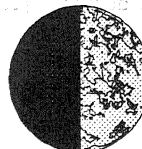
April 10



First Quarter

March 20

April 18



Full Moon

March 27

April 25



Welcome to the Recreational Astronomer. This time we'll discuss what may be the best possible introduction to amateur astronomy. It is easy, rewarding, and inexpensive, but will also give you the skills you'll need to get the most out of a telescope. In this column we'll describe the *whys*, *whats*, and *hows* of observing with binoculars.

Why Binoculars?

Binoculars are among the best instruments with which to start out for many reasons. They're easy to use, give an upright image, and have a wide field of view making it easy to find your way around the sky. They're easy to carry around, so you can use them often, and take them with you when you go places. Almost no setup is required so you can start observing as soon as you arrive at a site.

Binoculars are inexpensive and readily available. Many people already have a pair, and even if they're not designed for astronomy, they will provide good views of the heavens. Binoculars take you about half way between unaided eyes and most amateur telescopes. Modern binoculars are better instruments than were used to discover the phases of Venus, the moons of Jupiter, and many star clusters, galaxies, and nebulae.

What Kind of Binoculars?

What kind should you use? If you already own binoculars, the answer is easy: use what you've got. Unless they're damaged, they're sure to be good enough to start with. If you don't have any binoculars, or you want to get some specifically for astronomy, you can learn a lot from the Orion Telescope catalog. It's free, contains quite a few different sizes and brands of binoculars, and has a lot of information about the various parameters that help determine whether a pair of binoculars is right for you. Here's a quick summary of what you need to know.

The two most important aspects of binoculars are their magnifying power and their objective size. These are normally written together as *power X size* (e.g. 10x50 binoculars have a magnification of 10 and 50 mm objective lenses). Larger objectives mean more light gathered, so larger sizes are generally better. Power is generally less important than objective size, but additional magnification can make small objects easier to see. For beginners, binoculars in the range of 5x35 to 10x50 are the best.

Another factor influences how bright objects appear through binoculars. Every time light passes through glass, its intensity is diminished by reflection off the surfaces. Binoculars contain many lenses and prisms and light loss

can be as much as 50%. Special coatings can be put on the surfaces to prevent the reflection and, if applied to all surfaces, can reduce the light lost to just a few percent. Manufacturers have a jargon describing how many surfaces are

show stars to about 8th magnitude under suburban conditions, and to around 9th under good conditions. Since galaxies, nebulae, and clusters are diffuse objects, they are harder to see, particularly in light-polluted skies.

Experience will teach you the magnitude limit for your location, binoculars and eyes. Objects at 8th magnitude or brighter should readily be visible. The Binocular Messier program of the Astronomical League classifies the Messier objects into three levels of difficulty for both average and large binoculars.

These categories range from "easy" to "challenge," and will give you an idea of how challenging the different objects will be for you to observe. There are a number of books available on the subject of binocular astronomy that will aid you in choosing and observing a wide variety of deep sky objects.

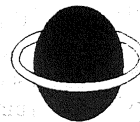
Planning Your Trip

If you're looking for bright objects you can just point your binoculars at the right area and find your target. Good charts, however, are indispensable to get where you're going. Which star charts are right for you depends on what you're hunting for and what your limiting magnitude is. Sixth-magnitude charts like Wil Tirion's *Bright Star Atlas 2000* or the *Edmund Magnitude 6* are good for moderately light-polluted areas or fairly bright targets. The charts in *Peterson's Field Guide* go to about 7th magnitude. Although small, they are good for binocular use and easy to carry. Tirion's *Sky Atlas 2000* shows stars to 8th magnitude and is good for darker sites and fainter objects.

Once you have your charts, you need to know how your binocular field of view (FOV) relates to them. A field-of-view gauge shows your instrument's FOV at the same scale as your chart. To find out what the FOV is, you can check the manufacture's specifications, or you can check it against the sky. The Big Dipper is good for this. Find a pair of stars that just fit in the FOV and your field-of-view gauge will be a circle with the same diameter as measured on the chart. You can make the gauge out of a length of wire bent into a ring of the proper diameter (don't forget to leave a handle). Some people plot field-of-view gauges onto acetate using a computer or you can draw a circle of the right diameter on plain paper with a compass then use a copy machine to put it on acetate. The wire gauge has the advantage of being able to draw around it if you want to mark your chart. Once you have your gauge, tie it to your chart with a length of strong thread so it won't be lost in the field.

OK, you have selected a target and found it on a chart. Now you need a place to start. Pick a star bright enough to be easily recognizable in

The Recreational Astronomer



by Jon Stewart-Taylor

coated. *Coated* optics means that one surface of the main objective is coated. *Fully multi-coated* means that all surfaces in the entire instrument are coated. Price is normally linked to the quality of the coatings.

Other parameters are field of view, eye relief, and exit pupil. *Field of view* is how much of the sky is visible through the binoculars (normally around 5-8 degrees). Wider fields of view make it easier to find your way around the sky and extended objects like large, loose star clusters may not fit within a narrower field of view. *Eye relief* is how far from the eyepieces you can be and still see focused images. This is most important if you wear glasses, since you need to focus the binoculars while wearing your glasses. *Exit pupil* is computed by dividing the objective size by the power (10x50 binoculars have a 5 mm exit pupil). Exit pupil is important because people's eyes dilate to different sizes depending on ambient light conditions, their age, and the health of their eyes. The "average" dilation for fully dark-adapted eyes is about 7 mm although this varies substantially between individuals. If the exit pupil is larger than your dilated eyes, light will be "wasted." If the exit pupil is smaller, the light will not reach as many rod cells, and you won't get as bright an image.

Choosing Your Target

You've got your binoculars, and now you're ready to observe. What should you look at? The moon is always a good choice. Observing it is good practice if you plan to take up telescopic planetary observing later. You can see more detail on the moon with binoculars than you can with some amateur telescopes. Venus will reveal its phases and Jupiter will present the ever-changing dance of the Galilean moons. These are all easy targets, suitable for observing with any kind of binoculars under any conditions.

If you're interested in observing stars, clusters, nebulae, or galaxies, the ability to see certain objects depends on the aperture of your binoculars and your observing conditions. Most binoculars with objectives around 40 to 50 mm

the sky but fairly close (within 15 to 20 degrees) to your target. Put your gauge on the chart so your starting point is within the circle. Move it until you find a recognizable star or pattern of stars in the general direction of your target (with the starting point still inside the circle). If you're marking your chart, draw this circle. Center the gauge around your new landmark and continue the process until you reach your target. Now you've defined a step-by-step journey from your starting point to your target.

Steady as She Goes...

It's difficult to hold binoculars steady while standing, so you'll need a binocular mount or something on which to sit or lie. A specialized binocular chair or mount is ideal for observing, but they are expensive and difficult to move and to set up. Binoculars mounted on photo tripods work well but it is difficult to observe near the zenith. An adjustable chaise lounge is an inexpensive compromise (available for as little as \$10), allowing comfortable viewing from horizon to zenith. If nothing else is available, lie on a blanket or sleeping bag to observe near the zenith.

If you don't have a binocular mount, knowing how to hold a binocular for maximum steadiness is important. Hold the binocular to your eyes. Slide your hands along the body of the instrument, toward your face, until only your pinky and ring fingers are curled around the back end of the binocular body. In this position, the binocular feels a little nose-heavy because you are supporting it behind its center of gravity. Curl each thumb up as if making a fist and flex your hands so that the second bones in your thumbs are pressed up against your cheekbones. Curl the first and middle fingers of each hand around the corresponding binocular eyepiece. Your hands are not far from where they would be if you brought them to your face to block out stray reflections while peering through a store window at night. This makes a solid connection between the body of the binocular and your face, and markedly improves how steadily you can hold the instrument.

Hop to It!

Now you're ready to go. Find the starting object in your binoculars then move around until you find the first landmark. This may take a while if you're not familiar with how the view through your binoculars compares to what you see on the charts. There's really not much anybody can do to describe it- it's just something that you learn through practice. Once you've found the landmark, center it and look for the next one following the path you've already planned out. If you get lost at any point, just go back to your last known landmark and try again.

After the last hop, when your target should be in the field, you may not see it at first. If it's

bright, it will probably stand out, but if it's dim it may fade into the background, or appear to be just another faint star. Make sure you're actually looking at the right piece of sky by comparing the brighter stars to those on the chart. Look for patterns like triangles and quadrilaterals.

Once you're sure you're looking in the right place, and you know exactly where the object should be, use averted vision and hold the binoculars as steady as possible. Keep your attention on the same spot for 4 or 5 seconds to let the image "develop." Your eyes need this time to collect all the light and make the object visible. If you still don't see it, try shifting your eyes to another spot near the object. Different parts of your retina have different sensitivity to low levels of light and you'll need to learn by trial and error which parts of your eyes are best for observing faint objects. If you still can't find it, it may be that your conditions or your binoculars just don't allow observation of such faint objects.

All that seems like hard work rather than Recreational astronomy? It's much easier to do than to describe. After you've done it for a while, it becomes second nature. As your familiarity with the sky grows, you won't need to go through all the steps. Of course nothing prevents you from just sweeping your binoculars over a likely area and seeing what you can find. Some of the most beautiful sights in astronomy are seen through binoculars while just scanning the sky.

Acknowledgments and References

The *Internet Purchasing Amateur Telescopes FAQ* (available from the NOVAC library) contains lots of information about binoculars, and contains the full description of the new, improved method for holding binoculars while observing.

Binoculars and Telescopes for Skygazers (a pamphlet available from Sky Publishing often included with new subscriptions to *Sky and Telescope* magazine) contains quite a bit about choosing and using binoculars for astronomy.

The *Orion Telescope Center Catalog* has lots of information describing the various parameters of binoculars and a wide range of products so you can compare prices and features of various manufacturers and models.

Backyard Astronomy (pamphlet from Sky Publishing). Has information on binoculars. It shows the Big Dipper with distances between stars marked in degrees (a useful field-of-view yardstick) and a section on deep-sky observing.

The Astronomical League *Observe Guide to the Messier objects* (available through NOVAC) gives locations and descriptions for all of the 100+ Messier objects and comes with the Binocular Messier Club supplement.

Second Novac Observing Site Now Available

Parsells Field, a Little League field in Waxpool, Loudon County, is now available to NOVAC for two observing sessions per month, plus the major meteor showers. It is not a dark site and has considerable skyglow from Sterling and Dulles to the east. The south and west are pretty good. Limiting magnitude at zenith is better than 5 on very good nights.

A major advantage of having a close-in alternative observing site is that for some NOVAC members it is much more accessible than Crockett Park. From Reston it's a twenty-minute drive to Parsells as compared to about an hour to Crockett. On Fridays when you're getting in a little late from work or the weather looks uncertain, and you don't want to make a long drive, Parsells may be the right place to get your astro-fix. It's wonderful to leave the house at 8:30, put in 2 hours of observing, and still be home by midnight. Come out to Parsells on one of our observing nights and give it a try! You should find the site to be similar to Crockett but a little brighter and definitely closer in.

Dates for regular observing sessions (Friday nights closest to first and last quarter moons)
are: Jan 21; Feb 4, 18; Mar 4, 18; Apr 1, 29; May 20, 27; Jun 3, 17; Jul 16, 30; Aug 12, 26; Sep 9, 30; Oct 7, 28; Nov 11, 25; Dec 9, 23.

Dates for 1994 meteor showers are: Apr 22 (fr), May 5 (th), Jun 9 (th), Jun 28 (tu), Jul 28 (th), Aug 12 (fr), Sep 1 (th), Oct 22 (sa), Nov 18 (fr), Dec 14 (we), Dec 23 (fr).

In order to keep cars and people separated, please park to the left near the entrance and set up to the right away from the entrance. We are asked to park and set up only in the parking area and not go onto the field itself. The usual NOVAC observing site rules apply: no loud noises, alcohol, or loose dogs, and we must pick up after ourselves. Currently there are no provisions for non-scheduled observing sessions, so please observe only on designated nights. We are guests of the Dulles Little League and could have our access and privileges at this site revoked at any time due to abuse. We are working on arrangements for drop-in sessions and we'll keep you up to date as we make progress. Please note directions in *NOVAC Notices*.

Eyepiece For Sale

Univ. Optics 24 mm Type II Konig eyepiece. Enhanced multi-coated. Estimated FOV 64 degrees. Less than one-year old in excellent condition. Price \$70.00 includes 30-day money-back guarantee. Contact Al Boldt at (703) 437-4532 (answering service).

After months if not years of hype, the Earth was about to cross the orbit of Comet Swift-Tuttle (1992t) once again. Why this is a big deal is still not clear, but predictions certainly ran wild. The comet had just passed the Earth late in 1992, so supposedly a great meteor "storm" was a pretty sure thing. The last meteor storm was the Leonids in 1966. I was only 10 years old then and had little interest in astronomy. Besides, most of the eastern U.S. was socked in by clouds. So I had never seen a meteor storm, and was taking some interest in the predictions. Besides, it was a U.S. Naval Observatory astronomer (Tuttle) who had co-discovered the comet (1862 III) the last time around, and as a current USNO astronomer, I feel more than a passing interest in his comet and the stuff it leaves behind.

Although never quite believing a truly spectacular meteor storm would occur, I figured there could be a good meteor shower--well worth a look. Most of the year I planned that no matter what, I would observe the Perseids the night of August 11, 1993. I assumed all along this might require driving several hundred miles to clear skies--well, until I realized the annual Stellafane convention at Springfield, Vermont was August 13 and 14th. For several months I had been planning to go and meet a number of people. So when I made the connection that driving several hundred miles away from Virginia on August 11 was probably not compatible with driving several hundred miles from Virginia to Vermont on August 12, my plans became less clear. The final solution was to observe the Perseids from this area, perhaps driving an hour or so if it would be useful to escape some clouds.

August 11 arrived with the three h's: heat, humidity, and haze. A normal D.C. area summer day with a few thunderstorms as well. Things definitely did not look good for the great Perseid storm now widely predicted by the media. I stayed home from work to pack for Vermont and get a little rest. After picking up my wife JoAnne from work, I arrived home to an answering machine message from a Washington Times photographer who wanted information on where NOVAC would observe the Perseids. As I reached for the phone, JoAnne reminded me what a photographer (complete with flash camera?) would do at a pitch black observing site. I hesitated, but called anyway to see if I could help. It turned out he'd heard (from the front page of the Post perhaps?) that there would be observing at Sky Meadows State Park, about 45 miles west of the Beltway. However his dispatcher thought that was too far away, and he would not get photos back to D.C. in time for the next day's paper. I told him of NOVAC's plans to observe at Crockett. I added (thinking of that flash

The Great, Awesome, Tremendous, Spectacular Perseid Meteor Storm of 1993

by Brent A. Archinal

camera) that it was just as far away as, if not farther than, Sky Meadows. He agreed and added he had already decided to try the University of Maryland. Apparently he heard a rumor that a lot of students were going to a certain hill to observe, and figured he could get photographs of "people looking up" just as well as in the middle of nowhere in Virginia. Anyway, he thanked me for the details, and I emphasized if he needed any information from us in the future to give one of us a call.

We watched the evening forecast and things weren't encouraging. Satellite photos showed the whole east coast socked in by clouds ("shades of 1966?" I thought). As I was looking at the images and debating where to drive to see the shower, the forecaster helped me decide, saying "There's no place you're going to be able to drive in just a few hours and get away from these clouds." So it was Crockett Park after all.

JoAnne and I made the trip, arriving at about 8 PM, not too long before sunset. Skies were still hazy with some scattered cirrus clouds, but it looked like brighter meteors could possibly be seen. If only the heavy clouds over other parts of Virginia would stay away.

There were already a number of cars present on the "observing field", and many people were already on lawn chairs and blankets. I recognized few of these people, and had no idea where they came from. Presumably the park or NOVAC members had let lots of people know they could observe here. Ultimately 30-40 cars were present and on the order of 100 people. Nearly as many had been at the park a few times a year for NOVAC observing, but certainly not on a night as poor as this. Anyway, by 8:45 PM or so Arcturus at least was visible, and the mosquitoes were not yet too bad. Several cars full of NOVAC members did eventually arrive.

Nine-fifteen came and went. The haze and twilight were still both strong, and no meteors had yet been seen. According to many sources, the tremendous peak of the Great Perseid Storm of 1993 was to occur at 1:15 UT (9:15 local time). Nobody was surprised that it apparently did not, but there was some disappointment. Finally the "storm" began trickling just a little. At 9:19 the first Perseid showed itself, a nice first magnitude one, streaking down from the head of Draco over 40 degrees into Ophiuchus,

brightening and then fading as it went. Perhaps we hadn't wasted the trip out here.

More obvious than meteors was the almost continuous lightning along the northern horizon. This continued throughout much of the night, but fortunately for us never moved south. A friend of mine observing not far northeast of D.C. in Laurel, MD later reported that at the "meteor party" she attended there was a terrific lightning storm- but not a single meteor.

At 9:27, my second Perseid showed up, this time magnitude 2 or 3, and 30 to 40 degrees in length, angling off from the Milky Way (now barely visible) below Cygnus. We now had an hourly rate of 7 to 8 meteors! Although we were happy to see two or three meteors, signs of boredom were already evident in some, as observing switched to satellites going by. However, while the first of these was being observed, at 9:28 the trip started to become really worthwhile. A -3 magnitude orange Perseid bolide streaked 50 degrees from the middle of the Little Dipper over the Big Dipper and into Canes Venatici. Then at 9:32 another bolide, this time magnitude -2, ran 15 degrees above the eastern horizon, covering a path of about the same length, this time from below Deneb to below Aquila. It even ended with a bang: pieces falling off and a terminal burst.

Soon we realized the pattern had been set. There was going to be no "storm" of Perseid meteors this year. Nonetheless we were going to see several. During the first hour half of those seen were bright bolides, mostly orange, in the -2 to -3 magnitude range. These seemed the only clear effect of the recent passage of Comet Swift Tuttle - other than the media coverage and large number of people now lying in a field.

The skies cooperated reasonably for another hour- at times stars down to magnitude 5.5 could be seen near the zenith. However starting at 10:38 and continuing until we left around 12:30 AM, clouds were constantly interfering, and at times covered the sky. On one occasion JoAnne and I took a "cloud break" taking orders and making the quick round trip to a McDonald's 4 miles away. The main response from the employees was "Oh, is this the night of the meteor shower?" There were no discounts on the McLean Deluxe sandwiches or Hot Apple Pies for reminding them.

We continued to observe for the next hour and saw occasional meteors, but still no trace of any storm. We were about to call it quits for the night after 15 minutes of no meteors when a magnitude -4 bolide was seen slowly crossing the area above Sagittarius. It finally ended with a beautiful white terminal burst behind the clouds and a 10 degree diameter white corona flashing its appearance. With clouds increasing again, we figured that was the swan song of the "Great Perseid Storm of 1993" for us and left

for home. The only storm we ended up seeing was the heavy thunderstorm and sheeting rain that greeted us on the way home a half hour later.

The final statistics: from 1:10 UT until 2:10 UT under hazy but clear skies I saw 10 Perseids, five of which were bolides. Two sporadic meteors and three bright satellites also kept things interesting. From 2:24 to 2:44 two more Perseids showed up in skies partially covered by clouds. Finally, from 3:31 until 4:20, seven Perseids made their appearance including two more bolides. The final summary of 23 meteors in just over two hours sounds terrible, but is quite impressive given the haze and clouds. More important, the seven bolides and fun of observing the shower with dozens of people made it more than worthwhile.

Oh yes, we did manage to make the trip to Stellafane. We had two

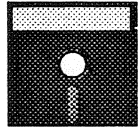

nights of observing with wonderfully clear skies, and saw dozens more Perseids. The boulders and stone walls in front of the famous pink Stellafane "clubhouse" replaced lawn chairs at Crockett park as observing tools. There was no careful counting of meteors, but instead just gazing at the sky, getting a quick look through a few telescopes, and conversing with friends old and new. For parts of both nights dozens of nearby telescopes toured the skies, and CCD cameras clicked.

There were images of galaxies, and even images of the clubhouse beside us engraved with the clearly appropriate words "The Heavens Declare the Glory of God." By the morning hours there were surprisingly few people left on the hill, and almost all the telescopes were closed down. Here were peace, friendship, and quiet. Here was the glorious Summer Milky Way. Here was a night full of stars. Here was the realization that although we missed the storm, at least we had a good gentle rain.

Astro-Imaging

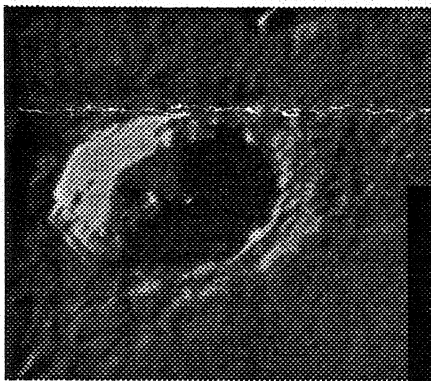
The Opportunities, Thrills, and Challenges of CCD Imaging

by Myron E. Wasiuta

Everyone remembers their first view through a telescope. Perhaps they saw the majestic rings of Saturn or rugged lunar craters. Although the telescope may have been small, astronomy was thrilling because every observation was a first! Everything was new. You probably did not

know what to expect when you placed your eye to a telescope aimed at the great Orion Nebula for the first time, but you were struck by the beauty of the delicate filamentary structure. As time passed, however, you gained more experience. Through greater experience, the novelty of viewing such objects might have worn off a bit. You developed preconceived ideas about



Lunar Crater Copernicus

what an object should look like before you would see it. You challenged yourself by searching out fainter objects as you pushed the little telescope to its limits. Going for even more challenging objects, you gained deep satisfaction from your acquired ability to navigate and operate a telescope.

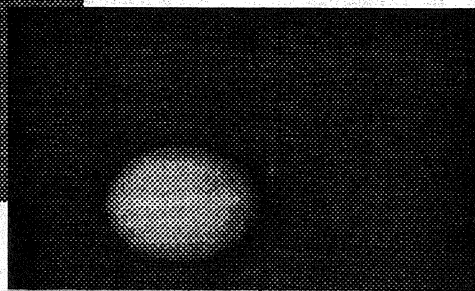
Then one night it happened! Somewhere deep inside your frontal cortex, a thought awakened. You wondered what this faint spot of light would look like with a "larger" telescope, or from a darker sky. At the time you probably did not realize it, but you were after that astronomical rush of adrenaline that caused your heart to pound on those nights long ago with that small scope. You longed to see all your favorite objects in a new light, or should I say, MORE light! For people struck with such "aperture fever," the only cure is to get a larger scope. In my case, however, it was a camera. A charge-coupled device (CCD) imaging camera that is, given to me as a wedding gift from my wife Terry. This camera has taken me

back to those thrilling nights when I first gazed at the heavens with a telescope. With this device I can display images of worlds in detail that rivals anything I have been able to see visually with the same telescope. I have entered the world of CCD astronomy!

There are two reasons why CCDs can produce such amazing results. First, they are very efficient detectors of light. Their peak quantum efficiency is around 50-70%, which means 50-70% of the photons striking the detector are "seen." By contrast, conventional photographic film ranges from just one to a few percent. The sensitivity of CCDs allows for very short exposure times. With a 10-inch telescope at $f/16$, for example, Jupiter can be imaged in 80 milliseconds, Saturn in 150 milliseconds, and lunar terrain in 20-60 milliseconds. This is fast enough to eliminate most (but not all) of the effects of bad seeing.

A single three-second exposure with the same 10-inch telescope reveals 12th magnitude Enceladus, one of Saturn's fainter moons. I read in one of my journals that a 16-inch telescope equipped with a CCD camera is able to image objects with the same exposure time and image scale as a 100-inch telescope with

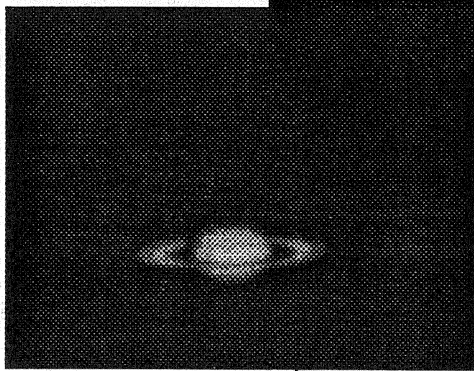
Jupiter



conventional film! The second reason CCDs are so powerful is that they output digital data. Images are nothing but files containing thousands of numbers. Because computers love numbers, they can do all sorts of neat tricks. Hence, a variety of "image processing" procedures can be performed to bring out hidden detail, sharpen images, and display large

intensity gradients at one time (much as the eye does). As a result, some CCD images of the planets and deep sky objects look very similar to their visual appearance under the best of conditions.

On the down side, CCD imaging is not easy to do at first and getting into it can be expensive. CCD cameras may cost \$400-600 for an uncooled entry level model to many thousands of dollars for high-end units. A computer is required for camera operation and image processing. In addition, you need a well-



Saturn

mounted telescope with a clock drive. Because CCDs image such small fields, most telescopes employing CCD setups have a small refractor mounted on the main tube to serve as a medium power finder and guide scope. My finder is a 60mm Jason refractor with

an LED reticle giving 26x. Finally, unless you are willing or able to transport your computer outdoors, you have to have either an observatory to shelter your equipment, or be able to operate the telescope and camera remotely. I operate my system remotely.

Starting from scratch, it is not uncommon for a person to spend several thousand dollars to get into CCD imaging. Once you are set up and operating, however, there is nothing like imaging with a CCD. They are a revolution in amateur astronomy and are a powerful tool that amateur

astronomers can use to make meaningful contributions to science. Don't worry, there will still be plenty of room for conventional film and astrophotography.

In the next *Astro-Imaging*, I will discuss what remote imaging is all about and the challenges I have had to overcome to get my system operational. Future installments will examine what's involved in a CCD imaging session, types of CCD cameras, appropriate computer configurations and image processing.



More Miscellaneous Musings

by Al and Lynn Schumann



Brent Archinal's monograph *The "Non-Existent" Star Clusters of the RNGC* (The Webb Society, 1993) is now in print and available for purchase. Publication was announced in the Astronomy Books column in the February 1994 issue of *Astronomy* magazine. The 110 page softcover book sells for \$9.50. To get your very own copy, write a check payable to *The Webb Society* and mail it to: Ron Morales, 1440 South Marmora Avenue, Tucson, AZ 85713-1015. The price includes shipping and handling. Proceeds from sales go to the Webb society. We have our copy already and the printers did a really nice job of putting it together. Tracking down most of these clusters will be an ideal assignment when you're feeling cocky and think you own the sky. Perhaps if we plead and grovel enough, Brent will autograph our copy.

Those of you who were unable to make it to the December meeting missed an excellent and timely program. USAF Colonel Pete Worden and Dr. Mitch Nikolich treated us to a multi-media presentation involving spacecraft and delivery vehicles cobbled up by the Ballistic Missile Defense Organization (BMDO), which was once the Strategic Defense Initiative. The speakers showed videotape of a one-third scale prototype reusable space vehicle known as the Delta Clipper Experimental (DC-X) built by McDonnell Douglas Aerospace. We saw the 40-foot tall rocket lift off the launch pad, climb to a few hundred feet, stop and hover, slide sideways about the length of a football field, stop again, and then slowly descend to make a soft, tail first landing right on target. The launch crew consists of only three people. Real Buck Rogers stuff. Next, we saw slides of a spacecraft named Clementine which is scheduled to be launched this year on a lunar mapping mission followed by an imaging rendezvous with Geographos, an Apollo asteroid. Emphasis is on low cost space operations as an alternative to the more expensive shuttle missions. During his talk, Colonel Worden related an amusing anecdote about a BMDO space hardware shopping spree to Russia. They came back with a C-5 load of goodies including a huge experimental liquid-fueled rocket engine. How times have changed! Along with the engine, they brought back about 50 Russian scientists and technicians to continue working on the project. The engine is seen

as a possible propulsion plant for the aforementioned Delta Clipper. A couple of weeks after the meeting, our copy of *Astronomy* arrived, and, voila, there was a big spread on Clementine. Shortly thereafter, we plucked *Sky and Telescope* from the mailbox and it had a nice article on the DC-X! And who said NOVAC wasn't on the cutting edge?

Annular eclipse preparations are in full swing for the 10 May event. We now have a full-aperture filter from Thousand Oaks Optical for the C-8. Additionally, we received a couple bits of conjure up another rig using a #14 welder's filter mated to a camera. We used that technique durimylar "solar Screen" from Tuthill. The Mylar will be used in a five-inch, off-axis mask for the 13 inch. The Mylar is trickier to use than expected: two sheets need to be set up back to back and than sandwich between two pieces of cardboard. The process seems to give us several opportunities to screw it up. However, if all goes well, we might have enough mylar left over to make a filter for a finderscope or two. We also need to come up with some sort of shroud for the 13-inch telescope. As you recall, it is a truss-type instrument and we'll have to block lots of stray light. Chances are we'll also ng the last partial eclipse, and it worked out very well. Stay tuned.

Still more kudos to Blaine Korcel. The NOVAC BBS made it to the pages of *Sky and Telescope* (March 1994). Most of us don't fully appreciate that Blaine is the heart and soul of the bulletin board, having started the operation when bulletin boards were still a rarity. Now, after an enormous expenditure of money, time, and effort, it is one of the best there is. Way to go!

Just a note of thanks to the outgoing officers for a job well done. We wish the new officers and trustees all the best for their term. Just remember, no new taxes!

The new look for the newsletter is a refreshing change of pace. Its nice to switch the format around now and then for vitality and personality--especially if it works better with available software. We in NOVAC have been very fortunate to have had a string of such talented and dedicated editors for our journal. We'd probably still be mimeographing hand-written articles and items printed on six different typewriters had it not been for folks like Bob Ridgley, George Uhl, Tom Parry, and Jon Stewart-Taylor. Many thanks for maintaining a standard of excellence.

Sky & Telescope Discounts

As a member of NOVAC you can get a subscription to *Sky & Telescope* for \$20.00 instead of the regular \$27.00 rate. To start a new subscription or renew an established subscription, make your check out to SKY & TELESCOPE for \$20. Note on the check if this is a new subscription or a renewal. Send your check to Brenda Jones, 883 N. Kentucky St., Arlington, Va. 22205. You can also order any publication directly from Sky Publishing at a 10% discount. Just mention the *Club Discount Plan* and that you are a member of NOVAC.

Discounts on Astronomy Magazine

Your NOVAC membership entitles you to subscribe to *Astronomy Magazine* at the annual rate of \$16.00. This is a significant discount over the usual \$24.00 rate. A two-year subscription costs \$32.00. To

Notices NOVAC Notices

start a new subscription or renew an established subscription, make your check payable to KALMBACH PUBLISHING COMPANY for \$16.00 (one-year subscription) or \$32.00 (two-year subscription). Note on the check if this is a new subscription or a renewal. Send your check to Brenda Jones, 883 N. Kentucky St., Arlington, VA 22205. NOTE: There are no special 10% discounts offered on publications through Kalmbach Publishing.

Club Telescopes Available for Use

NOVAC makes available two six-inch (f/5) Newtonian reflectors for club members to check out free of charge and use for a limited time.

The first scope is a Celestron model SP-C6 on a Super Polaris German equatorial mount and wood tripod. It will readily fit disassembled in any

car and is easily transported and can be set up quickly at remote observing sites. The scope comes with an Orion Ultrascope 10mm and Meade MA 25mm eyepieces with 1.25-inch barrel sizes. To borrow this scope you will need to show your NOVAC observing pass and leave a \$500.00 security deposit.

The second scope is a home-made six-inch reflector on a dobsonian mount and comes with a 25mm Kellner eyepiece. It is easy to transport to dark sky sites and easy to use. To borrow this scope you will need to show your NOVAC observing pass and leave a \$250.00 security deposit. If you are interested in borrowing either of these scopes, contact Bob L'Hommedieu, NOVAC President, at (703) 978-0946. He will schedule a time for you to pick the scope up at his home. Bob resides at 4415 Eastwood, Fairfax, VA 22032.

NOTE: Checks must be made payable to NOVAC. Checks used as security deposits on telescopes ARE NOT deposited in the bank and will be returned to the originator when the scope is returned in the same condition it was checked out. The scopes may be checked out for two to four weeks at a time depending on demand.

NOVAC Library

NOVAC has established a library at the Arlington Planetarium for use by NOVAC members. Books may be checked out and returned only at the monthly meetings. Members may check out books for one month at a time. To check out a book, see NOVAC librarian Linda Thomas at the monthly meeting. The NOVAC library seeks book donations to the library. If you have any astronomy books or materials you are thinking of discarding, please consider a donation to the NOVAC library. A complete list of all library holdings will be published in a future issue of the newsletter and detailed lists with Library of Congress publication data will be made available at the monthly meetings.

NOVAC Meeting & Observing Schedule for March/April 1994

Observing at C.M. Crockett Park

March 4, 5, 11, 12

April 8, 9, 15, 16

Observing at Parsells Field

March 4, 18

April 1, 29

General Membership Meetings are held at the Arlington Planetarium on the THIRD WEDNESDAY of every month. Meetings will be held March 16 and April 20 at 7:30 P.M. The Arlington Planetarium is located at 1426 N. Quincy Street, Arlington. Trustee Meetings are held on an *as needed* basis, usually the Tuesday before the week of the General Membership Meeting. Non-Trustees interested in attending

should contact a Club Officer or Board Member for further information.

Observing Site Rules

Crockett Park: NOVAC members may use Crockett Park for observing on nights other than those scheduled for club observing. However, **YOU MUST HAVE PRIOR APPROVAL FROM PARK MANAGER GARY KWOLEK.** Call (703)-788-4867 early in the day on which you wish to observe. If you reach the answering machine, leave a message saying that you are a NOVAC member and you wish to observe that night. Also, leave a telephone number where someone can reach you. If you do not receive a return call, you **MAY NOT** use the park. **THERE ARE NO EXCEPTIONS!** Use of the park is limited to NOVAC members only. Park management locks the entrance gate at sunset and you may use the combination shown on your Observing Pass to gain access. Do not reveal it to anyone. You must lock the gate behind you after entering and please remember to lock it after you leave.

During EDT, you must set up on the large field to the left. During EST, you must set up on the paved cul-de-sac 200 yards past the gate. No loud radios, alcoholic beverages or loose pets. Do not leave trash or debris behind. We are guests of the park and park management may revoke our observing privileges at any time due to the carelessness of one person.

Parsells Field: NOVAC members may use Parsells Field in Loudoun County as an alternative observing site **ONLY ON THE NIGHTS DESIGNATED** for general observing and meteor showers. Currently there are no provisions for unscheduled observation nights. You must park and set up **ONLY IN THE PARKING AREA** and not go onto the field itself. Please park to the left near the entrance and set up to the right away from the entrance. No loud radios, alcoholic beverages or loose pets. Do not leave trash or debris behind. We are guests of the Dulles Little League and they reserve the right to revoke our observing privileges any time due to the carelessness of one person.

Directions to Crockett Park

From the Washington DC/Northern Virginia area, go west on I-66 to the 47-a exit. This is 234 South to Manassas. Continue on 234 for 2.8 miles then turn right on Godwin Drive at the "Po Folks" restaurant. Follow Godwin Dr. for 1.8 miles to where it merges with Rt. 28 West. Once on Route 28, continue driving for another 13.7 miles through the towns of Nokesville, Catlett and Calverton until you turn right on Rt. 643 toward Warrenton. There is a small country store (Mayhugh's) on the corner of the intersection. Go on about a mile up Rt. 643 to the Park Entrance road. Look for a small sign for C.M. Crockett Park on your right directing

you to turn left. Once on the park entrance road, go one-half mile to the park gate.

Directions to Parsells Field

From the Northern Virginia area go west on the Dulles Access (Toll) Road until you reach Route 28 (last exit before Dulles Airport). Proceed north on Route 28 until you come to Route 625 (Waxpool Rd.). You may also take Route 7 (Leesburg Pike) to Route 28 and go south on 28 until you reach Route 625. Go west on Waxpool Rd. passing through the town of Ryan and Route 641 (Ashburn Rd.). Continuing on Rt. 625, Parsells Field will be on your left a short distance beyond Ryan. If you make it to Route 659 (Belmont Rd.), you've gone too far.

Jupiter Watch - July 21 (Rain date July 23)

Mark your calendars for Jupiter Watch at the USNO. NOVAC members have been asked to participate. Watch for details in the next issue.

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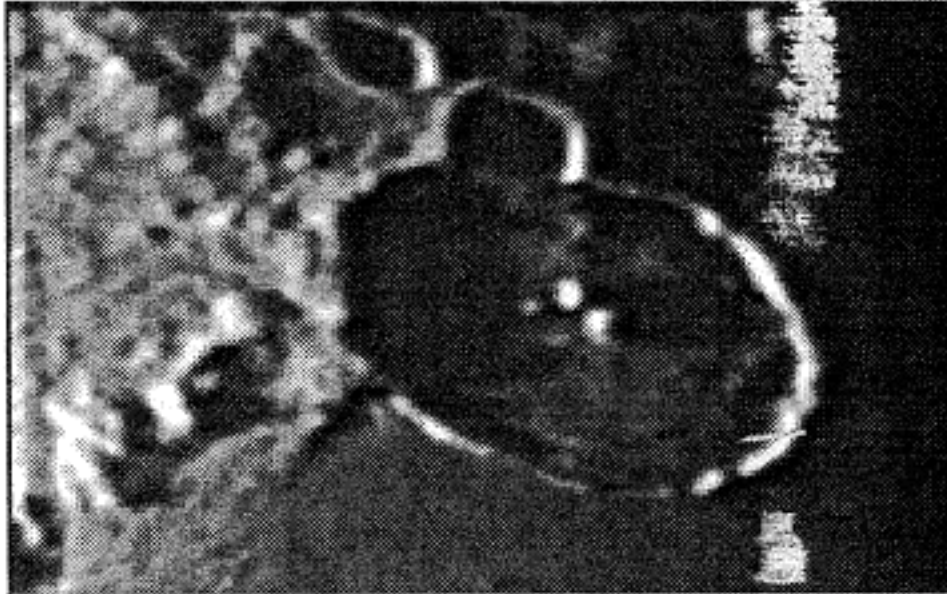
Membership in the Northern Virginia Astronomy Club is \$18.00 per year and is open to anyone interested in astronomy or the sciences. Contact Brenda Jones, Treasurer, 883 North Kentucky Street, Arlington, Virginia 22205, telephone (703) 527-7963. All notices of change of address should be sent to Brenda Jones. Please include both old and new addresses.

NOVAC does not knowingly accept advertising for products of inferior quality nor does it accept the responsibility for the quality of such products.

NOVAC members are invited (and ENCOURAGED!) to contribute materials of interest for publication consideration in the NOVAC Newsletter. The editors, however, reserve the right to edit all materials submitted. Ideally, materials submitted for publication consideration should be sent on 3.5" or 5.25" floppy disks in ASCII text format to the address of the editor. Other electronic formats are acceptable as well as double-spaced typed and letter-quality manuscripts. Contributors may post their article submissions to the NOVAC RBBS. Please post them as personal uploads to Tom Parry. Contact the editors for details and/or possible direct electronic file transfer.

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**Images:
Lunar Crater Gassendi**



*Lunar Crater Gassendi imaged by NOVAC member
Myron Wasiuta with an Electrim CCD Camera and
10-inch f/8 Newtonian reflector.*

NOVAC

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