



MASON-DIXON ASTRONOMER

Westminster Astronomical Society of Maryland

Volume 16 Issue 4

April 1999

SPRING OBSERVING

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COMING

ATTRACTIONS:

4/14 WAS monthly meeting

4/17 Soldier's Delight SP

4/16-18 Delmarva SP,
Tuckahoe St Park

4/24 Spring SP, Piney Run
Park

4/24 Planetarium Program
BBNC

5/12 WAS monthly meeting
at Maryland Science Center

6/12-13 Mason-Dixon SP

Regular monthly WAS meetings are held the second Wednesday of each month (except December) at the Bear Branch Nature Center (BBNC). The starting time is 7:30 p.m. Phone 410-848-2517 for BBNC.

A Short Trip to a Quasar

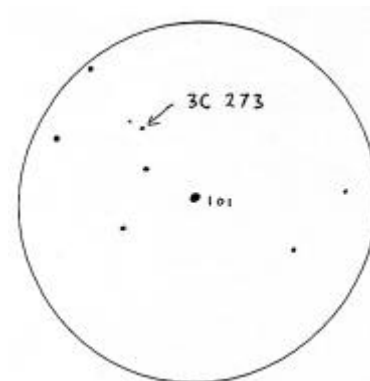
by Richard Orr

As a naturalist of the night sky, it is easy to lose perspective. I am not sure what it is, the quiet loneliness of the night, the numbing chill in the winter air, the lack of sleep, or the required deprivation of the body's senses needed to see those hard, fought-for, photons. Whatever the cause, it often untethers the mind from its daily existence and allows one to drift among the stars.

dinary clarity begs all amateur astronomers to travel as deep into space as his telescope and location will allow. Tonight I will forego Mars and hunt for a quasar.

From the deck of my suburban home and armed with a 6 inch telescope, only one
(Continued on page 3)

Like so many nights during the past couple of months, I had planned on dedicating the few remaining hours before dawn to Mars. Mars was high in Virgo beaoning with its bright orange glow. But the night sky was surprisingly transparent. Stars which normally remain invisible from my location, were shining defiantly overhead. Although a night like tonight is made for light-pollution free skies, big mirrors, and tall ladders, these nights of extraor-



Eyepiece view (sketch) at 109x made on February 15, 1999. This is a mirror-image view. "101" means 10.1 mag. Richard Orr

Next Meeting: April 14, 7:30 PM at Bear Branch NC:

METEORITES VIDEO PROGRAM

Meteorites, asteroids, and comets are a regular part of life in our solar system. An average of two asteroids pass the earth each month and small meteorites strike the earth every year. But if an asteroid measuring miles in diameter collided with earth, civilization as we know it would disappear.

Meteorites were worshiped as gods by the Anasazi Indians and forged into the dagger found wrapped with the

mummy of King Tutankhamen. The one that struck the earth some 65 million years ago is thought by many to have caused the extinction of the dinosaurs

"Meteorites" is a videotape production of the Austrian Broadcasting Corporation in two parts:

Menace From the Sky

Witness From Beyond the Times

Total running time is 84 minutes.

H H H H H

H Star Points H by Curtis Roelle

Star Points is a popular-level astronomy column written by WAS member Curt Roelle, appearing in the Carroll County Times newspaper on the first Sunday of the month.

That dazzling planet you have been noticing in the western sky during the evening happens to be Venus. It will continue to brighten until it reaches its greatest brilliance in July. By then our Earth and Venus will be separated by half the distance they are currently.

The subtle band of the winter Milky Way roughly divides the constellations of spring and winter. If you are lucky enough to be in the dark moonless countryside and your eyes have had time to adapt to the darkness you might be able to catch the glow of the Milky Way on a clear April night stretching along the western half of the sky from north to south.

The winter constellations including Orion are low in the west. Gemini's twin brothers appear to be walking along the milky path of starlight with their heads, marked by the stars Castor and Pollux, admiring the reappearing stars of spring.

One of the hallmark constellations of spring is Leo the

BEEHIVE IN THE SKY

lion. Leo is high in the southern sky during mid evening. Leo's most striking feature is a bent hook of seven stars in the shape of a backward question mark. Leo's most brilliant star Regulus forms the dot at the base of the question mark, or the sickle as it is often called. To the left of the sickle stars are three more of similar brightness forming the lion's triangular hind-quarters.

Leo faces the constellation of Cancer the crab. Living in Maryland you would expect this constellation to be better known. Alas, it is one of the faintest and most nondescript constellations in our sky. It does have one redeeming feature however. It is the home of a naked eye star cluster which is known as Praesepe or by its nickname the Beehive, an appropriate nickname for a spring cluster.

Mid-April finds the Beehive well positioned for observing. At around 10 p.m. it is located nearly straight overhead. It is easy to find if you succeeded in locating Leo. With your arm outstretched use your extended fingers to measure the distance from Regulus, at the sickle's bottom tip, to the top of the sickle. Keeping your fingers locked, slowly turn your hand keeping one finger



The Editor's Eyepiece: Spring is sprung and its getting fun!

The March meeting was certainly different. After the business was concluded. Tom Van Flandern gave an excellent discussion of the possibilities of intelligent life on Mars. His theories are thought provoking. Actually they provoked a loud and lively discussion with the audience. If at all possible, I highly recommend attendance at our meetings. You never know what may happen. Tom was gracious enough to let me reprint a sample of his paper (see page 6), which can be viewed in greater detail at www.metaresearch.org.

On March 20 a large group of observers experienced the vernal equinox, or beginning of spring, while observing at the Messier Marathon. Paul Henze did a nice job of getting the ball park lights turned down for our observing. However high clouds cut our observing time way too short. At least I got some sleep this year.

But warmer weather is here, Mars is coming (January's issue), there is a quasar out there

somewhere (lead article), and Curt and Matt have a number of observing tips for us (other articles), so let's get busy.

And I hope to see you at the meetings. Oh yes, don't forget the May meeting in Baltimore (Science Center) and if you are not receiving the Astronomical League's quarterly newsletter "The Reflector", please let Richard Schoen know at 410-833-7278 or rhs@home.com.

- Jeff Asner, Editor

REMEMBER - Submit Articles To:

mailing address: 4300 Oakwood Landing Ct

Dayton, MD 21036

phone number: 410-531-3826

e-mail: CattailJFA@aol.com

“Quasar” (continued from page 1)

quasar was within my reach. To reach 3C 273 in Virgo, I would not only have to bypass Mars but actually penetrate through the great Coma-Virgo cluster of galaxies. To help my mind struggle with the incomprehensible distances that my journey would take me, it seemed appropriate to move in discrete calculated steps to my ultimate goal.

Mars was the logical first step, at 8 light minutes it is a close neighbor in space. The planet is currently closing its distance to Earth by nearly a million miles each day and the growing disk is a joy to follow in the telescope. Tonight the planet was turned so that the great Martian deserts dominated its surface. The god of war was mostly devoid of dark markings. Only a smudge of gray bordering the bright north polar cap was all that I could make out. But Mars was too bright and too close for tonight’s journey to 3C 273. It was time to move on.

At the core of the Coma-Virgo cluster rests M87. This huge elliptical galaxy ranks as one of the night sky’s most impressive objects. It is a true giant far surpassing our home galaxy in size and mass. It is home to 3 trillion stars along with 15,000 globular clusters (compare with the Milky Way’s 200). At 60,000 light years M87 rules a 2000 galaxy cluster who’s gravitational effect is felt even by the Milky Way. At magnitude 8.6 and a healthy apparent size of 7 arc minutes, M87 was an easy step in my journey to the quasar.

My greatest temptation against continuing my quest for 3C 273 was the Coma-Virgo galaxy cluster. On a night like tonight, in the heart of the Virgin, galaxies are everywhere. To become lost, slowing skewing one’s telescope from galaxy to galaxy, soaking in the light of trillions upon trillions of unnamed suns has to be one of the ultimate journeys that an amateur astronomer can experience. Like the ancient Greek sailors drawn to the seductive songs of the sirens, I too was lured to the galaxy cluster’s celestial call, and for over an hour I unconsciously coasted from NGC number to NGC number.

With my eyes dark adapted, it was time to travel beyond the great galaxy cluster. At magnitude 12.8, qua-

sar 3C 273 was a reasonably easy star hop from Eta Virginis. Of course, getting to it is not the problem. Recognizing which point of light is the quasar among the stars in the eyepiece is.

The term quasar is really short hand for “quasi-stellar radio sources”. It was later determined that many of these objects were not strong radio sources and that QSOs (Quasi-Stellar Objects) was a more accurate description. But traditional names are hard to change and it seems that the name quasar is here to stay. Current thinking is that quasars are very distant, very young, galaxies in which newly formed massive black holes at their cores are being fed copious amounts of matter. This makes them the brightest objects in the universe and thus can be seen at great distances. The spectral lines of 3C 272 are shifted by 16% which is interpreted by most astronomers as meaning that this particular quasar is approximately 1.5 BILLION light years away and receding from us at a rate of 47,000 kilometers per SECOND.

3C 272 was not difficult. Using a 13mm Nagler (86x) the quasar and its dimmer apparent companion star (mag 13.4) were clearly visible. I switched to a 7mm Nagler (156x) and settled back to absorb the light that left this quasar when life on Earth was just getting a foot hold and the first vertebrate was a billion years in the making. After a few minutes I reached for my ever present notebook and made a sketch of the star field with the quasar at the center. After which, I laid the drawing aside, and again focused on the incomprehensible distant point of light.

The increasing sky shine from a coming dawn slowly pulled me back to Earth and reality. In a few hours I will be surrounded in my normal daily routine of children, house chores, and work. Quasar 3C 273 will exist as a pleasant memory, a distant but constant reminder that for a brief moment of my earthly existence, I saw to the edge of the universe.

Never pass up a clear sky.

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“Starpoints” (continued from page 2)

on the sickle, while studying the spot of the sky at the same distance to the sickle’s right.

There you might notice a small misty spot. As with the invention of the telescope in 1610, binoculars will help reveal the true nature of what Hipparchus referred to as the "Little Cloud" in 130 B.C. As Dave Bowman said in the movie 2001, "it's full of stars!"

To be exact as many as 350 stars have been counted in the Beehive whose estimated distance from us is some

500 light years. When you look at the beehive, the light you are seeing left the cluster about the same time that Columbus was discovering Hispaniola.

So, did you find the beehive? Let me know via e-mail at StarPointsUSA@yahoo.com.

H H H H H

UNDER THE DOME



The Place to Find Out What's Up

Messier Thanks

Hi Curt;

It was nice to meet you Saturday. My thanks to you and whom ever else helped put together the Messier Marathon. I had a good time and hope to get to more WAS star parties this year.

Regards;
Mark Abernathy
Space Science Telescope Institute

I agree Mark. Seems to me that we never give enough thanks to those that set up and run our events. This is especially true for Curt Roelle. - ed.

Spring Observing

by Matt Orsie

It's time to dust off that telescope of yours and spring into some of the objects the heavens provides. This is the time of galaxies, clusters and groupings. So much to look at in such a short period of time.

Let's start off by taking a look at a very popular and bright galaxy group in Leo, the NGC 3190 group. You can find this beautiful 4 galaxy showpiece by locating the 2 easternmost stars of Leo's "Sickle", Zeta and Gamma. The group is mid way between the two stars. Some of you may already know Gamma Leo as a splendid double. Compare your observations with my take on these four galaxies:

**Legend... N = North, S = South, E = East, W = West, PA = Position Angle of the major axis.

NGC 3185 (13.0): Rather large and bright. Diffuse with a brighter stellar core. A triangle of 10 mag stars lie 5 min, 7 min, and 10 min E, NE, and E respectively. 14th mag 1 min SW. Part of the 3190 group. NGC 3190 is 11 min N, NGC 3187 is 11 min NNE, and NGC 3193 is 15 min NE. Hickson 44C.

NGC 3187 (13.4): Rather dim slash elongated 5 to 1. Slightly brighter core. 14th mag star 30 sec SW of the core. A pair of 12th mag stars lie 3 min W. Part of the 3190 group. NGC 3190 is at right angles 5 min SE, NGC 3185 is 10 min S and NGC 3193 is 8 min ENE. Hickson 44D.

NGC 3190 (mag 12.1): Very bright and medium sized oval elongated 3 to 1 with a very bright elongated core. Hint of dust lane seen. 12 mag star is 3 min N. Part of the 3190 group. NGC 3187 is at a right angles 5 min to the NW. NGC 3185 is 10 min SW and NGC 3193 is 5 min NE. Hickson 44A. H400.

NGC 3193 (mag 11.8): Very bright and round with a much brighter

core. 1 min N is a 9th mag star. 4 min NE is a 10th mag star. Part of the 3190 group. NGC 3190 is 6 min SW and NGC 3187 is 8 min WSW. NGC 3185 lies 15 min to the SW. Hickson 44B. H400 ARP 316.

** Notice that all of these galaxies are in the Hickson Compact Group # 44, two of them are in the Herschel 400 and NGC 3193 is an ARP.

Now lets take a look a another galaxy group in Virgo, the NGC 5850 group. A cool string of 5 galaxies running east to west. The group is 3 degrees west of the great globular cluster M5. NGC 5850 is the easternmost galaxy.

NGC 5850 (mag 10.7): Rather large, diffuse and slightly oval extended 1 1/4 to 1 with a brighter core. Pair of 12th mag stars are 4 min N. Averted vision shows a dust lane running the length of the galaxy. PA = 160. Part of the 5850 group. NGC 5846 is 8 min W, 5845 is 12 min W and 5839 is 20 min W. H800

NGC 5846A (mag 13.8): Very, very small. Stellar looking with a bright stellar core. Part of the 5850 group. NGC 5850 is 10 min E, NGC 5846 is 40 sec N, 5845 is 7 min W and 5839 is 14 min W. H800

NGC 5846 (mag 10.0): Medium sized, very bright and slightly oval extended 1 1/2 to 1 with a much brighter oval core. PA = 0. Companion 5846A is embedded just S of 5846's center. Part of the 5850 group. NGC 5845 is 7 min W, 5839 is 12 min W and 5850 is 8 min E. H400

NGC 5845 (mag 12.5): Very small and slightly oval extended 1 1/2 to 1 with a stellar core. Averted shows it better. PA = 160. Part of the 5850 group. NGC 5846 is 7 min E, 5839 is 8 min W and 5850 is 13 min E.

(Continued on page 5)

Continued on page 5

"Spring Observing" continued from p. 4

** Note here that two of these galaxies are in the Herschel II listing (which I call the Herschel 800 objects) and one is in the Herschel 400.

Finally, There's the spring challenge object LEO I. This is a very large (10x8 arc mins) and rather bright (integrated brightness 11.2) galaxy that lies just 20 minutes

north of Alpha Leo (Regulus). Due to it's size, low surface brightness, and proximity to Regulus it's a tough catch. See if you can get a glimpse of it this spring in the darkest, most transparent skies you can find.

LEO I (UGC 5470 mag 11.2): Very large, round, and diffuse glow. Ever so slightly brighter core. I see 3 very faint 16th mag

stars around the center. A pair of 11th mag stars are just to the NE and a triangle of 11th and 12th mag stars are off the NW side. To the SE about 1 min are a group of four 10th --> 12th mag stars forming a "J" shape. IC 591 lies 15 min W. Keep Regulus out of the field.

Happy hunting and clear skies always, Matt Orsie

Reminder: May meeting at Maryland Science Center – Brian Eney

Hi everyone, this is just another reminder that, the May 12th, meeting will NOT be at Bear Branch Nature Center. I am happy to say it will be at the Maryland Science Center!! The agenda for the evening is a 40 minute presentation in the Davis Planetarium; "Rocks in Space." After that we will go on up to the fourth floor to the Crosby Ramsey Memorial Observatory. This contains the newly refurbished 8" f/15 Alvan Clarke & Sons telescope. She is a beauty!! We will observe (weather permitting), many of the bright celestial objects around the city's sky.

As for directions:

From I-83 take St. Paul St. exit (you can only go one way). Be careful, the exit splits so bear to the left. Continue on St. Paul St. (it changes into Light St.) Continue on Light St. past Pratt St.; by this time try to be in the far left lane. Follow the traffic light to the left onto Key Hwy. The employees parking lot is the second driveway on the left.

From I-95 take Key Hwy. Exit (there is only one way to go). Follow Key Hwy. until you see the Science Center on the right. You should see a yellow gate. This is the employees parking lot. You're there.

Our web site will be posting a zoomable map, for more detailed directions. Or you can visit the Maryland Science Center's site at www.mdsci.org. And for the non-web heads, call the main number for the MSC at 410-685-5225. I would like to give a special thanks to Melissa Jan, Observatory Coordinator, and Jim O'Leary, Planetarium Director, for making all this possible.

Hope to see all of you there.

H H H H H

Member shipping out (Navy style) to Virginia Beach and Naples, Italy

The skies in the Virginia Beach area are much improved over those in the greater Baltimore area, especially the view to the south. With summer coming, I should be able to get some observing time in on my favorite area of the sky, the southern Milky Way. Also, looking forward to seeing the historical sites in Italy, especially those of the great Italian astronomers like Galileo, Schiaparelli, Cassini, etc.

Hope all is well with you and the astro club. Everyone there was great, and I will always cherish the memories of meetings and especially the nights with Ron Smith at his mountaintop resort! Thanks again for the articles, I do read and enjoy them.

Best wishes,
Bruce McDonald
mcdonald@sybercom.net

“The Face on Mars”:

Excerpts from Meta Research’s Web Site (by permission from Tom Van Flandern)

The so-called "Face" on Mars and the surrounding anomalous objects in a region called "Cydonia" appear at first glance to be randomly located and oriented on the planet. But it has previously been established that the martian poles had a different location with respect to the planet's surface in the past, and apparently jumped from that location to the present one in relatively little geological time. We draw attention to the fact that the Cydonia area is right on the old equator, and the "Face" is oriented perpendicular to that old equator, to within the measurement uncertainties. This has only about a 1% probability of occurring by chance. Both the line of inquiry that led to this discovery and a possible purpose for building such an artificial structure looking into space were suggested by the exploded planet hypothesis. Taken with the finding of bilateral symmetry in the Face and the anomalous nature of other nearby objects on Mars, the existing evidence has, in this author's opinion, shifted in favor of an artificial origin of the Cydonia complex. With luck, the Mars Global Surveyor spacecraft now en route to Mars will confirm or refute this conclusion.

Description of Cydonia

The Cydonia region of Mars is located at 41° north latitude, 10° west longitude on the red planet. It was photographed several times by NASA's Viking Mars-orbiting spacecraft in the mid-to-late 1970s. One ground object drew the attention of researchers because of its striking resemblance

to a human face. In the opinion of many who have viewed the higher resolution images, the resemblance is closer than seems likely to have arisen by chance, despite half the "face" being hidden in shadow. Because it is three-dimensional and not just a profile, it has been described as the next best depiction of a human face in stone (~ 1 kilometer scale) in the explored solar system after Mount Rushmore in South Dakota.

The immediately surrounding area likewise contains a number of anomalous-looking objects. One of them, dubbed the "D&M pyramid" after its discoverers Vincent DiPietro and Gregory Molenaar, is shown in Figure 3. It has a more-than-passing resemblance to a four-sided, or possibly a five-sided, pyramid. The formation of a small crater seen very close to the base on the shadowed side has apparently thrown debris onto that side of the object, and possibly caused it to split or separate, leading to the ambiguity in the number of original apparent pyramidal faces. But the three faces not coated

with debris appear remarkably smooth and triangular, separated by seemingly linear edges.

Still another nearby object has been dubbed the "Fortress" because of a modest resemblance to structures called that on Earth. (See Figure 4.) Its linear features and sharp angles suggest artificiality to some. A nearby cluster of vaguely pyramidal objects surrounding some unusual small mounds not commonly seen away from Cydonia has been dubbed the "City". (See Figure 5.) Two or perhaps three other nearby features are each in its own way mildly anomalous or unique on the planet. These may be viewed in (Carlotto, 1991), in (DiPietro, Molenaar & Brandenburg, 1988), or on the World Wide Web at www.psrw.com/~markc/marshome.html.



Close-up of the "Face" at Cydonia on Mars.
Source: www.metaresearch.org

Conclusions

The "Face" on Mars has now passed each test of artificiality yet proposed. These tests include a three dimensional structure, a lack of fractal patterns in the image, non-random distribution of the nearby small mounds, proximity of other anomalous landforms, an apparent bilateral symmetry, being located on the martian equator, having a culturally significant orientation, and serving an apparent culturally significant purpose. It would be an exaggeration to say that the case for artificiality is now compelling, and many thoughtful people will still find that

conclusion less likely than all these "coincidences" put together. Yet the balance of the evidence, considered objectively, now weighs clearly in favor of artificiality over a natural origin of the Cydonian landforms.

As a counterpoint, it is sometimes argued that the probability of artificial structures on Mars must be vanishingly small. However, for all we know, intelligent life may have developed elsewhere in our galaxy long ago, and long since explored the galaxy and left structures on all terrestrial planets in the galaxy. If that were the case, then the probability of finding artificial landforms on Mars is close to 100%. This illustrates that the probability of the Cydonia landforms being artificial is unknown, which is very different from being very small. An unknown probability can lead to either outcome without being statistically improbable.

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April 1999 Lunar Almanac

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 91 RA 96.5 TA 48.0 SA 266.2	2 92 RA 101.7 TA 43.8 SA 261.0	3 93 RA 106.4 TA 40.0 SA 256.1
4 94 RA 110.7 TA 36.0 SA 251.4	5 95 RA 115.4 TA 31.9 SA 246.3	6 96 RA 120.1 TA 27.8 SA 241.2	7 97 RA 124.8 TA 23.7 SA 236.1	8 98 RA 129.5 TA 19.6 SA 231.0	9 99 RA 134.2 TA 15.5 SA 225.9	10 100 RA 138.9 TA 11.4 SA 220.8
11 101 RA 143.6 TA 11.4 SA 215.8	12 102 RA 148.3 TA 7.3 SA 210.7	13 103 RA 153.0 TA 3.2 SA 205.6	14 104 RA 157.7 TA -0.9 SA 200.5	15 105 RA 162.4 TA -6.8 SA 195.4	16 106 RA 167.1 TA -12.7 SA 190.3	17 107 RA 171.8 TA -18.6 SA 185.2
18 108 RA 176.5 TA -24.6 SA 180.1	19 109 RA 181.2 TA -30.5 SA 175.0	20 110 RA 185.9 TA -36.4 SA 169.9	21 111 RA 190.6 TA -42.3 SA 164.8	22 112 RA 195.3 TA -48.2 SA 159.7	23 113 RA 200.0 TA -54.1 SA 154.6	24 114 RA 204.7 TA -60.0 SA 149.5
25 115 RA 209.4 TA -65.9 SA 144.4	26 116 RA 214.1 TA -71.8 SA 139.3	27 117 RA 218.8 TA -77.7 SA 134.2	28 118 RA 223.5 TA -83.6 SA 129.1	29 119 RA 228.2 TA -89.5 SA 124.0	30 120 RA 232.9 TA -95.4 SA 118.9	

Westminster, MD
Time Zone: EDT (4)
Latitude: 39.58 N
Longitude: 77.00 W

RS = Moonrise, upper limb on horizon.
UT = Upper Transit, highest in sky.
ST = Moonset, upper limb on horizon.
Times are rounded to nearest minute.

RA = Azimuth of rising moon.
TA = Altitude of moon at transit.
SA = Azimuth of setting moon.
Altitudes and azimuths are in degrees.

Moon phase is shown each day at 12:00 noon in the time zone indicated.

Moon image is not accurately oriented relative to the terminator.

The times listed are for standard refraction (34.5') and an observer at sea level. If these conditions do not hold, then actual rise and set times may differ.

Calendar by Ray Sterner
Johns Hopkins Applied Physics Lab.
Laurel, MD 20723

April 1999 Solar Almanac

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 91 MA 83.0 TA 56.1 SA 278.3	2 92 MA 88.5 TA 52.4 SA 273.2	3 93 MA 94.0 TA 48.7 SA 268.1
4 94 MA 88.0 TA 56.1 SA 278.3	5 95 MA 93.5 TA 53.5 SA 273.2	6 96 MA 99.0 TA 50.8 SA 268.1	7 97 MA 104.5 TA 48.2 SA 263.0	8 98 MA 110.0 TA 45.5 SA 257.9	9 99 MA 115.5 TA 42.8 SA 252.8	10 100 MA 121.0 TA 40.2 SA 247.7
11 101 MA 126.5 TA 37.5 SA 242.6	12 102 MA 132.0 TA 34.8 SA 237.5	13 103 MA 137.5 TA 32.2 SA 232.4	14 104 MA 143.0 TA 29.5 SA 227.3	15 105 MA 148.5 TA 26.8 SA 222.2	16 106 MA 154.0 TA 24.2 SA 217.1	17 107 MA 159.5 TA 21.5 SA 212.0
18 108 MA 165.0 TA 18.8 SA 211.9	19 109 MA 170.5 TA 16.2 SA 206.8	20 110 MA 176.0 TA 13.5 SA 201.7	21 111 MA 181.5 TA 10.8 SA 196.6	22 112 MA 187.0 TA 8.2 SA 191.5	23 113 MA 192.5 TA 5.5 SA 186.4	24 114 MA 198.0 TA 2.8 SA 181.3
25 115 MA 203.5 TA 0.2 SA 176.2	26 116 MA 209.0 TA -2.5 SA 171.1	27 117 MA 214.5 TA -5.2 SA 166.0	28 118 MA 220.0 TA -7.8 SA 160.9	29 119 MA 225.5 TA -10.5 SA 155.8	30 120 MA 231.0 TA -13.2 SA 150.7	

Westminster, MD
Time Zone: EDT (4)
Latitude: 39.58 N
Longitude: 77.00 W

MA = Morning astronomical twilight, sun is at -18 degrees altitude.
MN = Morning nautical twilight, sun is at -12 degrees altitude.
MC = Morning civil twilight, sun is at -6 degrees altitude.
RS = Sunrise, upper limb on horizon.
UT = Upper Transit, highest in sky.
ST = Sunset, upper limb on horizon.
EC = Evening civil twilight, sun is at -6 degrees altitude.
EN = Evening nautical twilight, sun is at -12 degrees altitude.
EA = Evening astronomical twilight, sun is at -18 degrees altitude.
Times are rounded to nearest minute.

RA = Azimuth of rising sun.
TA = Altitude of sun at transit.
SA = Azimuth of setting sun.
Altitudes and azimuths are in degrees.

The times listed are for standard refraction (34.5') and an observer at sea level. If these conditions do not hold, then actual rise and set times may differ.

Calendar by Ray Sterner
Johns Hopkins Applied Physics Lab.
Laurel, MD 20723



Westminster Astronomical Society

Events for April 1999

Sunday:	Monday:	Tuesday:	Wednesday:	Thursday:	Friday:	Saturday:																																																																																																									
<table border="1" style="margin: auto;"> <tr><td colspan="7" style="text-align: center;">March</td></tr> <tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr> <tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr> <tr><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td></tr> <tr><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td></tr> <tr><td>28</td><td>29</td><td>30</td><td>31</td><td></td><td></td><td></td></tr> </table>	March							S	M	T	W	T	F	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31					<table border="1" style="margin: auto;"> <tr><td colspan="7" style="text-align: center;">May</td></tr> <tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td></tr> <tr><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr> <tr><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td></tr> <tr><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td></tr> <tr><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td></tr> <tr><td>30</td><td>31</td><td></td><td></td><td></td><td></td><td></td></tr> </table>	May							S	M	T	W	T	F	S							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31							1 Jupiter is in conjunction with the Sun, 1 am EDT	2 <i>First Photo of Sun taken, 1845</i>	3 The moon passes 3 deg north of Mars
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4 <i>Largest group of Sunspots ever on record, 1947</i>	5 <i>Pioneer 11 launched toward Jupiter and Saturn, 1979</i>	6 <i>Greeks record a total eclipse of the Sun, 648 BC</i>	7 <i>Huge fireball lights up eastern Australia, many report they could hear its passage, 1978</i>	8 Last Quarter Moon	9 <i>NASA selects first 7 astronauts</i>	10 The Moon passes 1.1 deg north of Neptune, 5am EDT																																																																																																									
11 The Moon passes 1.0 deg north of Uranus, 3am EDT	12 <i>Charles Messier dies, 1817</i>	13 The Moon passes 1.1 deg south of Mercury, 12am EDT	14 WAS Meeting, Bear Branch Nature Center, 7:30pm	15 <i>The Titanic sank, 2:27am, 1912</i>	16 New Moon	17 <i>Surveyor 3 launched - it became the first spacecraft to sample the surface of the Moon, 1967</i>																																																																																																									
18 The Moon passes 7 deg south of Venus, 5pm EDT	19	20 Asteroid Pallas is in conjunction with the Sun, 7pm EDT	21 Venus passes 7 deg north of Aldebaran, 4pm EDT	22 First Quarter Moon Lyrid meteor shower	23 <i>Max Planck, physicist and quantum mechanics pioneer born, 1858</i>	24 Mars is at opposition STAR PARTY - Piney Run Park																																																																																																									
25 <i>An unmanned Mercury test exploded on the launch pad, 1961</i>	26 Nicholas Copernicus made his first observations of Saturn, 1514	27 Saturn is in conjunction with the Sun	28 <i>Issac Newton's "Principia" published by Edmond Halley at his own expense, 1686</i>	29 The Moon passes 4 deg north of Mars, 5pm EST	30 Full Moon																																																																																																										

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The Mason-Dixon Astronomer (MDA) is the monthly journal of the Westminster Astronomical Society (WAS) of Maryland and is mailed free of charge to members. Club officers are: Skip Bird, President; Brian Eney, Vice President; Phil Schmitz, Secretary; Paul Henze, Director at Large. Membership rates are \$15 Family & \$13 Single. Forward remittance to Treasurer Carl Koch, 16 Highstream Court, Germantown, MD. 20874. Use of material published herein is permitted if credit is given to the author and the MDA. The MDA is edited by Jeff Asner (410-531-3826). Written contributions are always encouraged. Deadline for submission is the 20th of the month prior to the month of publication. Items for publication may be submitted to the address below, or by internet electronic mail to "CattailJFA@aol.com". WAS Internet home page can be found at www.erols.com/roelle/was/.

The Mason-Dixon Astronomer

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