

AD ASTRA

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The Newsletter of the Atlanta Astronomy Club

March 1987

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CLUB CALENDAR

Next Meeting: March 20
Program: To be announced.

AD ASTRA is published monthly during the academic year by the Atlanta Astronomy Club, Inc. The Atlanta Astronomy Club, an organization dedicated to the advancement of amateur astronomy, meets on the third Friday of each month (second Friday of December) at the Bradley Observatory on the Agnes Scott College campus at 8:00 PM. Membership dues are \$25 annually and include a subscription to *Sky & Telescope* magazine and use of club observatory facilities.

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CLUB MINUTES

The February 20, 1987 meeting was held at the Bradley Observatory with Dave Roberts presiding.

John Burgess, an astronomer with the Fernbank Science Center, spoke about archaeoastronomy. He began his lecture by showing slides of Stonehenge, the ancient observatory found in southern England. He also talked about the giant guide-stone monument near Elberton Ga., and his own research concerning the rock wall on Fort Mountain in north-west Georgia. Though there is some controversy as to exactly who and when the Fort Mountain wall was built, his slides demonstrated how it might have been used to determine the yearly solstices.

ANNOUNCEMENT: SERAL CONVENTION, JUNE 19, 20
The SERAL committee has set this date for the regional convention to be hosted by our club. More information to follow in future newsletters.

THE MAN IN THE MOON

by Sharone Franklin

No one talks about the Moon anymore. That is, unless it is to blame it for something. When it's full, people say it causes an increase in crime, marriage proposals, drug abuse and even teenage pregnancies. The Atlanta Astronomy Club publishes moon rise and moon set times every month in this newsletter. This is so anyone who wants to observe dim deep sky objects won't try to do so when the ghostly beast is hanging around creating too much brightness. Any day now I expect the news media to tell us that the Moon conspired with Marine Lt. Col. Ollie North and stored weapons bound for Iran.

LOVE'S THEME

As a child I would ask what those dark patches on the Moon were. The answer I received most of the time was that the "man in the moon" was looking at me. Sometime later, I read that these large gray areas are the maria (Latin for "seas"). Although they are devoid of water, the "seas" are dark rolling plains that form the features some people imagine as the "man in the moon." They are made mostly of basalt, resulting from lava penetrating through the moon's crust about 3 billion years ago.

As the Moon begins to move away from being between the earth and sun, a faint crescent starts to glow. But it is not until first quarter that it becomes an interesting telescope object. This is when its mountains (some as high as 30,000 feet) cast shadows from the sun's rays. With a 2-inch or larger telescope and using about 50x magnification, one can easily see individual mountains, peaks and thousands of craters. After observing dim deep sky objects, a look at the Moon leaves me with the urge to brush it's dust off my shoes.

When the Moon is full, I like to identify as many maria as I can using 7 x 35 binoculars. My favorite is the Sea of Cold at the north end. It's elongated and winged shaped like an eagle soaring in search of food or shelter. Soon the eagle will fly around the Bay of Dew and over the Sea of Rains and gracefully land on one of the Apennine mountains. With his wings folded and his claws clutching a pinnacle, his eyes look toward the star-shaped Lake of Dreams.

Though the Moon has had a turbulent history, it now appears idle. Since it lacks an atmosphere, scars from past meteor impacts remain unchanged. It is these wounds that have mesmerized us since the beginning of our time. If love's theme is written anywhere in our solar system, it would have to be across the face of the earth's moon.

THE FORMATION OF THE MOON

Before the Apollo missions, there were three general theories on how the Moon came to be. They were: capture, co-accretion, and fission. All three have imperfections. It seems that capturing a body the size of the Moon without it fragmenting is highly improbable. As for co-accretion, it's unlikely that the earth and Moon formed as neighbors at the same time from the same stuff and now have such distinct compositions. For fission to have taken place, the earth would

have had to gain and then lose an incredible amount of rotational energy. Ah! There is "collisional ejection." It seems that theorists think that a Mars-size body could have hit the earth, creating an orbiting cloud of debris that regrouped into a single satellite. Hmmmm. (S&T: December, 1986, page 558.)

TWO LUNAR OBSERVATIONS FOR 1987

Excluding occultations and eclipses, there are two interesting observations of the Moon that can be carried out this year with or without optical aid.

Because of the Sun's gravitational pull on the Earth and Moon, the Moon's orbital path is not in the exact same place around the ecliptic each month. This causes the two points where the Moon's orbit intersects with the ecliptic (lunar nodes) to regress westward every month. This regression of the nodes completes a cycle ever 18.6 years. The Moon's orbit is tilted about 5.09 degrees toward the ecliptic, and the ecliptic is also inclined. In some years this results in their tilts augmenting one another causing the Moon to have a higher and lower declination than usual. This phenomenon will take place in 1987. The Moon's declination will change 57 degrees during every month of this year! But September is the month to be most alert. On September 15 during last quarter, the Moon will rise a few minutes after midnight (easing into Sept. 16) in Atlanta. Its declination will be about +28.43 degrees. On September 30, the first quarter moon (this phase happens twice in Sept.) will rise in Atlanta about 2:18 p.m.. Its declination will be about -28.43 degrees!

When the dark portion of the Moon is lit by sunlight reflected from earth, it is called "earthshine." Earthshine is an elegant event to witness. Its maximum visual intensity is two to three days before or after the New Moon. Romantically called "the Old Moon in the New Moon's arms," the thin crescent shines brightly while the earthshine portion appears an amber-gray. I like to observe earthshine with binoculars or no optical aid. If you are tempted to use your telescope, use low magnification in order to contain the entire moon in your field of view.

THE MOON AND POLITICS

Now how could the Moon be of any importance to the governments of the world? The answer is space exploration and world dominance. Say what?? I guess the "man in the moon" never thought he could possibly rattle the imaginations of warriors, but he has. Well, it kind of goes like this: the foundation upon which the world has evolved and therefore survives is literally the earth's crust. Not just to anchor buildings in, but to take food, fuel and metal ores out. The stuff that helps countries prosper and maintain military and economical prestige. Most of all, the *exhaustible* stuff.

The U.S. Census Bureau projects a world population of 6.2 billion by the year 2000. Depletion of essential minerals, clean water and air will become a serious long-term problem. The standard of living will decline in the industrialized nations and the unstable governments of the poor countries will worsen.

We humans have evolved into separate lots (races) and we've fought over the earth's lands to claim title to its riches only to misuse our treasures. History has proven that no past mistakes will change our attitudes. We therefore transport our misjudgements and carelessness into space.

The "man in the moon" awaits for a permanent space station to be built. If and when this happens, no doubt most of the results will be positive. Just think of the scientific data that could be obtained there. There's no atmosphere to interfere with any type of telescope. We could perform experiments essential to understanding the history of the universe. The results would be economic, cultural and moral benefits. Just as electricity, magnetism and quantum mechanics have been from past discoveries. With one-sixth the gravity of earth, the Moon could literally become a stepping-stone to the asteroids to mine precious minerals. But which country will dominate? Which country will win this new game of survival? Will the "man in the moon" witness a nuclear war so that no one wins? While aim and speed was once vital with the use of the bow and arrow, it is now equally important with the use of the neutron. We play with atomic particles like the NFL plays with footballs, and we're headed for the Super Bowl.

Yes, it is true that we all don't have the same color skin, or ethnic background, and some of us are male and some of us are female. Nevertheless, we are *humans* before any of these other classifications. This means that we are more alike that we are different. Perhaps it is this likeness and not the differences that cause so much tension among us. We all look up at the same moon against the same backdrop of infinity and are subject to the same laws of nature. Why in Jupiter's name must we fight to the very edge of our existence just to prove that we exist? Indeed, this is a paradox that leaves us with a snowball's chance of survival. Blame it on the Moon.

THE OLD FASHION WALTZ

If an amateur Martian astronomer looked at the earth-moon system through his telescope, his view would rival that of Saturn. He would observe the earth in a humble bow of about 23.5 degrees. He might then hear a solar symphony reverberating across the galaxy. The earth and moon would appear to be conversing as they join with the cosmos and dance to the old fashion waltz.

THE MAN IN THE MOON

by John W. Gaines
(1889-1967)

*The man in the moon is ninety feet tall
And weighs six thousand pounds
His hair is blue, his eyes are green
His complexion is chestnut brown
His meals are poor, only one a day
Yet that will make you laugh
For he feeds himself with a steamshovel
For five long hours and a half
He shaves himself with a mowing machine
That he totes in a pack on his back
He cleans his teeth with a grinding rock
And trims his nails with an ax
He needs little rest, only naps, they say
Yet these are twelve hours or so
He tucks peacefully down in his bed of gold hay
And rocks on the winds and snow*

THE FRUSTRATIONS AND CONFESSIONS OF A DEEP SKY OBSERVER

by Tim Rockwell

That's it! I can't stand it anymore! I'm going nuts, crazy, insane! Where's the straight-jacket! Here it is, the first week in February, the middle of the observing season, and when was the last time I was able to get outside? No need to check my observing log. It's etched in my brain. November 26, over TWO MONTHS ago!

"Why haven't you been out?" you ask. I think the sky has something against me. Something personal. It's trying to prevent me from learning it's secrets!

Well, I did ask for a straight-jacket. But how else could I feel? I have a 17.5" f/4.5 Dobsonian, set up in my own observatory, in my own backyard. (And I'm out in the country too.) O.K., O.K. I know what you're thinking. "This guy's a Jerk! He's got a set-up like that and he wants us to feel sorry for him?!" But wait, hear me out. All that aperture, just sitting there, crying to be exposed to remote globulars and "faint fuzzies," which happens to be my observing desire. The problem is, it never quite seems to work out. "Faint fuzzies" and remote globulars require dark, transparent skies.

"So what?" you ask.

This gets back to the "thing" which the sky has against me. How come is it, when the sky is clear, *really* clear, there's also a big, bright, full or nearly full moon? Then, during the dark of the moon it's raining, or overcast, or partly cloudy (Translate, overcast) or some other stupid "thing."

Anyway, enter last Saturday, February 7. Started cloudy, became clear, then got *really* clear! But, you guessed it, 6 days before full moon. I can't stand it anymore! Moon or not I'm rolling off the roof and staring at a moonlight-polluted sky if nothing else!

9 p.m. Saturday night. After a few minutes of dark (?) adaption, I began to realize I could see the stars of Orion pretty good. Even Lepus and Columba. (Yes, I have a decent southern horizon.) Maybe I'll actually get to see something tonight. After a few more minutes of searching in vain, I realized "faint fuzzies" were out of the question. Let's see, there's gotta be something else out there to look at on a moonlit night. Checking Tirion, page 19, I see NGC 2298 (one of those remote globulars), located in Puppis no less. Well, let's try it. O.K. there's that guide star and this one, it should be right in between....Yes! There it is! Not really resolved but definitely a globular cluster. Perhaps this won't be so bad, I think to myself, as I cast a disdainful eye at the sky-ruining moon. OW! There goes what little dark adaption my eyes had. Turning back to Tirion, (sometimes, on rainy nights, I get my charts out and just look at them), anyway, I notice on page 19 numerous small and not-so-small yellow circles. Yes, they are star clusters. You know that, and I know you know that but, "What's going to show up tonight?" I ask myself, resisting the temptation to look directly at the moon again. Messier objects are actually too easy, showing up nicely in binoculars and my finder scope. So, let's try these obscure yellow circles with the NGC numbers. There's NGC 2362....Look at that! A cluster of 30-40 faint stars surrounding a 2nd or 3rd magnitude star. Turns out, that star is Tau Canis Majoris. A real nice cluster! Suddenly, I'm aware my frustration is disappearing.

Maybe, just maybe, the sky doesn't really have anything personal against me. What's next? More clusters. NGC 2477 in Puppis is very nice, quite faint but pretty large. The moon is probably washing out the fainter members. (Only a little snarl now.) A couple of very small clusters could not be found. Hold on a minute! What's that bright star shining through the trees slightly to the west of where I'm observing? A quick check of Tirion confirms my suspicion. CANOPUS! In Carina! We're talkin' south declination here. 52 degrees to be fairly exact. This is really turning into a great night. Hey, you still with me out there? O.K. good.

Have you ever looked at a 9 or 10 day-old moon with 17.5 inches of aperture? Don't do it! It will make you think you've gone blind in that eye! Now I remember I've got a 5 inch aperture mask for just such occasions. I still had to wince. After a good while of exploring rilles, craters and canyons, I decided to let my pupil dilate again. (Yes, an f 4.5 can be cranked up to 400-500X even during mediocre seeing conditions.) Now that first cluster, what was it, NGC 2362, yes that's right, that would make a very good entry in my sketch book....Almost done. It doesn't look exactly like the cluster, but at least another observing session is down on paper. Wow! It's almost midnight. Oh well, one does need to sleep. Roll the roof back and lock up.

Nearly all my frustration over the lack of observing time is gone and to think, the moon was up! Time to go in....Somebody's coming. Maybe the neighbors heard all my exclaiming and now they want to complain. No, one of them is my wife, and she's holding what looks like a white suit coat....Wait! Stop! I don't need a straight-jacket now! Whadda ya mean only a crazy person would be out in the middle of the night, in the middle of February, looking at stars? But you don't understand! 'Stop! Put me down! Hellppp!!!

STARDUST: (SHORT ITEMS ABOUT STARS)

by Tom Buchanan

On December 5, 1986, I could see the Blue Ridge Mountains from my 25th office floor. The mountains approach no closer than Mt. Oglethorpe and visibility extended to Brasstown Bald, which is 85 miles away. The sky was overcast. On the following evening I went to Pine Mountain, which is at 32° 51' N and at elevation 1395 ft. The sky was very clear. During the evening I saw Achernar easily with binoculars, slightly below naked eye visibility. It culminates at 10' below the horizontal since its declination is 57°19' S. My height above the visible horizon gave me an eight-minute advantage, but Achernar was visible only because of atmospheric refraction which raised its apparent height about 33'. I had previously seen Peacock (56° 47' S) from this location. I hope to see Gacrux (57°02' S) in the future.

Perhaps the Light Pollution Committee needs a more imaginative name. How about "Georgians Advocating Dark Skies" (GADS). If you have any ideas, contact Tom Buchanan.

CLASSIFIED

12.5" f/6 Dobsonian, full thickness primary mirror, Novak spider & secondary holder. 1.25" and 2" focuser. Meade 9x50 finder scope. Contact Tim Rockwell - 684-5994 in Rockmart.

FORT MOUNTAIN STONE WALL

(c) 1987 by John Burgess

A stone wall located at Fort Mountain Georgia State park is an impressive structure of considerable size built by an unidentified society for an undetermined reason at an unknown date. The stones are indigenous to the site and range in size from those that could be easily moved by a child to large boulders requiring a sizable workforce to put into place. The straight line length from end to end is over 600 feet but the total length including all the zig-zags is over 900 feet. The structure appears to be of considerable age and, although its greatest height is on the order of a few feet, when it was new it could have had, depending on its original thickness, a much greater height. In places the volume of rock is much greater than near the ends where its cross-sectional area is less than 16 square feet. In the more massive sections the cross-sectional area is at least four times as great. It is located at the military crest of the mountain which is the taller of two peaks connected by a saddle.

The shortest access to the site from the base of the mountain from the north, east, or west, would have been difficult as the terrain is steep and rough. An approach from the south, along the route of the modern roadway, would have been the easier route but the distance to the valley -- the most likely place for villages -- is several miles. Judging by its remoteness and the number of man-hours required for its construction, the builders must have had a specific and important reason to construct it. Since it has no spring or other natural water source close by and no obvious or natural manmade cisterns, it was probably not used in conjunction with lengthy habitation. This and the absence of manmade artifacts indicate it could have served some ritualistic purpose for its users did not linger there. Several hypotheses of its purpose (including defensive fortifications from which its name is derived) seem to have no basis in fact.

The Cherokee Indians had several legends about a mythological giant serpent which haunted remote areas. The Uktena ("strong looker" or "keen eyed") was dangerous to anyone who approached it; for doing so was certain death to the individual and/or his family. One story is told of an Uktena which lived and was subsequently killed in the Cohutta mountains of North Georgia by Aganunitsi, a captive "...Shawano, who are all magicians...". The Uktena was said to have "...a bright, blazing crest like a diamond on its forehead..." called the Ulunsuti ("Transparent", or "Daylight") and the medicine-man who could possess it might do marvelous things. The Shawano obtained the Ulunsuti "and from that time he became the greatest medicine-man in the whole tribe". (Mooney, James, *Myths of the Cherokees*, myths numbers 50 and 51).

The Stone Wall at Fort Mountain winds up and down slope in a serpentine fashion on the southern and eastern slopes on the westernmost peak of the Cohutta range. Due to the similarities in the legend and the position and snake-like shape of the stone wall it can be conjectured that the wall may be related to the Aganunitsi-Uktena story. The Uktena was associated with the sun (Mooney, myth number 50) and it is the position of the sun in the sky that causes the seasons. The medicine-men or shaman of prehistoric cultures performed

many duties which were vital to the tribe. Among them were predicting the time of ripening of edible plants, migration of animals and fowl used for food and clothing, major changes in the weather, etc. which required an understanding of some form of calendar to predict the seasons.

The date of construction of the Fort Mountain stone wall has not been determined. This is also true of similar structures and stone mounds of various sizes scattered around the southeastern United States from Virginia to the Gulf Coast to Missouri. Current estimates date the construction from the Woodland period. The Cherokee evidently knew of the Fort Mountain stone wall but had no cultural memory of its construction nor its function. According to Cherokee tradition when their ancestors arrived in their traditional homeland, probably from the area of the northeastern United States, they displaced a race of "moon-eyed" people. According to persons familiar with the Cherokee language, the Cherokee words for moon-eyed could also be translated moon watchers -- or something equivalent. Therefore, if the forerunners of the Cherokee were interested in astronomical observations, e.g. the moon and the sun, they may well have been the builders of the wall.

The Aganunitsi story could have been an altered carryover from the ancient past when the earliest Cherokee interlopers knew of the function of the wall as an observatory or it may have reference to an actual individual who rediscovered its purpose. (This hypothesis, however, requires further research by scholars of disciplines other than archaeology and archaeoastronomy.)

Fort Mountain is presently heavily wooded and an unobstructed view of the horizon is impossible, except from a few areas at the wall where small horizontal angles of the nearby mountains and hills may be seen through the trees. At some time in the distant past the mountain may have been cleared so that a complete panorama may have been possible. The rising positions of the stars, moon, and sun could have been made by an observer from or near the wall. The seasons of the year are marked by the position of the rising sun on the horizon and many ancient cultures targeted these positions as evidenced by Stonehenge in England and certain structures in the southwestern United States. The position of the sunrise at the summer solstice, when the sun is at its northernmost position, was of great importance to peoples who depended upon astronomical observations for calendar purposes.

The north end of the Fort Mountain Stone Wall points toward the position on the horizon where the sun rises on the summer solstice. If a clear view of the horizon were possible, an observer standing on this nearly straight section of wall would find that, using it as a sightline, the time of the summer solstice could be determined when the sun rises at that point on the horizon pointed to by the wall. If the wall were considered to be an effigy of a serpent this end may be considered to represent the head, and the rising sun may have represented the blazing crest of the Uktena. And Aganunitsi may have discovered a "metaphorical" Ulunsuti which gave him a method of determining a very important time of year which could have led to a method of predicting seasonal changes. A shaman with this important knowledge would have had considerable standing within the tribe.

The horizon position of summer solstice sunrise also happens to be near the same location of the rising winter full moon. By observing the northernmost rise of the winter solstice full moon an estimate of the length of time until the beginning of spring can be made by counting lunar cycles. Due to the wobbling motion of the moon's orbit this moonrise varies over a nineteen year cycle of slightly more than 12 degrees around the summer solstice sunrise point on the horizon. Cherokee and other native American festivals were based on certain phases of the moon which occurred at certain seasons of the year, and a reference point which related the lunar phase to the seasons would have been helpful to a shaman in anticipating the correct time for certain festivals, even though they may occur several lunar cycles later.

Preliminary investigations reveal that several sections of the wall and other wall features could have been used as potential sightlines or alignments to certain important rising points of the sun and moon on the eastern horizon. Future surveys may give evidence that these alignments are accurate and lend credence to the hypothesis that the stone wall could have functioned as a calendar device in a similar manner as many other structures built by other ancient societies around the world.

Yet another feature of the wall, overlooked by previous investigators, is the similarity between the contour of the wall and the horizon. Viewing the horizon perpendicular to the wall at any given point along its length shows a dip or rise in the wall that corresponds to the figure of the horizon itself. Although this comparison is difficult to make because of the abundant foliage, it is as if the wall is a shadow projection of the horizon. In the late winter, however, when the deciduous trees are bare of leaves, the curvature of the horizon is more evident -- though still difficult to see in many places due to the numerous evergreens. Although the curvature of the wall seems great when viewed from ground level, considering the topography of the terrain, if the wall were viewed from a point approximately level to the wall from a distance its curvature is only slight. This vertical curvature of the wall measured from a plane closely approximates the horizon elevations. Could the builders have been sculpting an effigy of the boundaries of their territory?

The Fort Mountain Stone Wall may have been a place where a shaman of some ancient tribe performed rituals, observed the movements of the sun, moon, and stars and anticipated the changes of nature which are governed by the seasons. Further archaeoastronomical research on this structure is indicated and may be fruitful. Considerable archaeoastronomical research has been accomplished in the southwestern United States but little has been performed in the southeast. If the stone structures in this region were indeed used for astronomical activities by ancient cultures, a fertile field of research exists because archaeologists have not been able to explain the purposes of many of the thousands of stone effigies, piles, mounds, and "walls" found throughout this area even though they have been under study for the last one hundred fifty years (*Symposium: The Stone Mound Problem: Toward Definition and Resolution*, Southeastern Archaeological Conference, 1985)

STAR LIGHT, STAR BRIGHT, FIRST STAR WE WON'T SEE TONIGHT

by Don Barry

One hundred and fifty thousand years ago, one hundred and fifty thousand years away, as light goes, our story begins with an abrupt ending. And then . . .

In 1969, N. Sanduleak, making a table of bright Magellanic Cloud members, catalogued a small, magnitude 12, possibly double star, which he designated Sanduleak -69 202 = CPD -69 402. Later, in 1978, Rousseau et al. returned to this star, establishing the primary as V=12.24 magnitude, spectrum B3 I.

Just after sunset on February 23, 1987, 23.44 UT, G. Garrard of Australia made a routine astrophoto of the Large Magellanic Cloud in Dorado, repeating an exposure taken the preceding evening. Some 18 hours later, at 24.23 UT, Ian Shelton of Las Campanas Observatory, Chile, took a 3 hour exposure of the LMC as well. As he developed his photos, he remarked to a fellow observer, "Gee, why didn't I guide on that bright star?". When the reply was, "The LMC looked strange tonight," suddenly, Eureka!, and the race was on to document the brightest supernova since Johannes Kepler's star of 1604.

Soon after, at 24.72 UT, Albert Jones Nelson in New Zealand noticed the nova stella, already near magnitude 4.5, and with Shelton, became the second person to sound the rising alarm when he telegraphed Brian Marsden at the clearinghouse for astronomical information, the Center for Astronomical Telegrams at the Smithsonian Astrophysical Observatory. He also notified the Australians, including Garrard, who indeed found a 6th magnitude image on his previous night's film where none had been before. As darkness fell, telescopes across the southern globe began to turn to the greater cloud of Magellan.

R. Kirshner of Harvard was fortunate enough to be the Supernova Target-of-Opportunity observer on the International Ultraviolet Explorer earth satellite and began measurements near UT 24.8, followed by the Europeans on the next shift. Solar Max was called into action to garner gamma radiation from the object, and the Astro-C satellite began counting x-ray photons. As the stellar atmosphere slowly cooled and thinned, astronomers watched spectral lines emerge, gracefully, solemnly, like the stars at dusk.

The curtain now closes on star CPD -69 402, formerly an unprepossessing supergiant likely formed out of one of the tendrils of 30 Doradus, the Tarantula Nebula. As its ghost races outward into the void at over ten thousand kilometres per second, its death gasps raise an increasing light in our skies, and a growing knowledge in the eyes and minds that turn to it. Sometime in early March this spectre will peak at magnitude 0 or 1, and after the prodigious gluttony of its death-rattle, fade slowly to invisibility, lost from human sight.

But this is no death. The shock-wave of gases violently expelled will ride herd through Magellan's cloud, gathering the galactic mists and vapours and incubating a new stellar hatch. Long after we have witnessed the funeral, stars will blazon forth in youth, orbited by planets made of the stuff of Supernova 1987A. Perhaps, even, a future denizen of one of these will look up with instruments at our mighty galaxy, filling the sky, and notice a small, aged, G2 star, parent to a tiny rocky world -- a world from which an old explorer once returned the glance and lent his name to the sight.

OBSERVER'S ALMANAC

Moon Rise, Set, and Phase
(All times are EST)

Date	Rise	Set	Phase	Date	Rise	Set	Phase
03/15	19:08	07:00	99%	04/01	08:03	22:34	7%
03/16	20:10	07:26	99%	04/02	08:39	23:36	14%
03/17	21:13	07:52	96%	04/03	09:19	----	21%
03/18	22:20	08:22	92%	04/04	10:06	00:35	30%
03/19	23:29	08:55	85%	04/05	10:58	01:29	39%
03/20	----	09:35	76%	04/06	11:54	02:17	48%
03/21	00:40	10:24	66%	04/07	12:53	02:58	58%
03/22	01:48	11:23	55%	04/08	13:53	03:35	67%
03/23	02:51	12:29	43%	04/09	14:53	04:06	76%
03/24	03:45	13:41	32%	04/10	15:53	04:35	84%
03/25	04:30	14:54	22%	04/11	16:54	05:01	90%
03/26	05:07	16:05	13%	04/12	17:56	05:27	95%
03/27	05:39	17:13	6%	04/13	19:00	05:54	99%
03/28	06:08	18:19	2%	04/14	20:07	06:22	99%
03/29	06:35	19:23	0%	04/15	21:17	06:55	98%
03/30	07:03	20:27	0%	04/16	22:29	07:33	94%
03/31	07:32	21:30	3%	04/17	23:40	08:20	87%

(-----) indicates phenomena will occur the next day

LUNAR PHASES

Month	New Moon	First Qtr	Full Moon	Last Qtr
Mar.	29 07:46	07 06:58	15 08:13	22 11:22
Apr.	27 20:34	06 02:48	13 21:31	20 17:15

SUPERNOVA 1987A

Co-discovered by Ian Shelton, Las Campanas Observatory, and Albert Jones, Nelson, New Zealand. Located in Large Magellanic Cloud, 163,000 light years distant, at RA = 5h35m50s.11, Dec = -69d17m58s.5 (1950). May reach mag 0.

COMET TERASAKO (1987A)

T = 1986 Dec 24.8975 ET w = 195.6091°
q = 0.395122 A.U. W = 96.9334°
i = 40.8496°

1950 Equator and Equinox
COORDINATES FOR CURRENTLY VISIBLE COMETS
(GIVEN FOR COMET-RISE)

Date	Comet	RA-2000	Dec-2000	Rise	Mag
Mar 15	Terasako	02:49.2	-03°59	08:00	11
Mar 15	Halley	10:18.9	-12°05	08:00	15
Mar 15	Levy	14:27.0	-19°04	11:00	11?
Mar 20	Terasako	03:00.5	-02°23	08:00	12
Mar 20	Halley	10:14.3	-11°28	08:00	15
Mar 20	Levy	13:56.0	-21°15	10:00	11?
Mar 25	Halley	10:10.0	-10°51	08:00	15
Mar 25	Terasako	03:11.2	-00°56	08:00	12
Mar 25	Levy	13:24.3	-22°54	09:00	11?
Mar 30	Halley	10:06.0	-10°14	08:00	15
Mar 30	Terasako	03:21.2	00°22	08:00	12
Mar 30	Levy	12:53.5	-23°56	09:00	11?
Apr 05	Halley	10:01.8	-09°31	08:00	15
Apr 05	Levy	12:20.5	-24°27	08:00	11?

POSTMASTER:

If undeliverable, please return to:

AD ASTRA
c/o Rick Clark
584 South Mt. Carmel Rd.
McDonough, Georgia 30253



W. Tom Buchanan
3518 Roswell Rd. Apt. C-6
Atlanta, GA 30305

8801

If marked with X above, your membership has expired.
Please contact the Treasurer promptly to insure continuous membership.