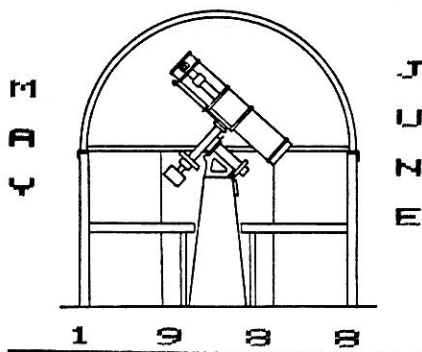




THE



SPECTRUM



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!-MEETING NOTICES-!

MAY MEETING:- The May 13th meeting will be held in "MOOT HALL" on Rockwell Road on the campus of Buffalo State College beginning at 7:00PM for cocktails. Dinner will follow at 8:00. Then our guest speaker, Trudie Brown will enlighten us with, "The Stars for Great Gran-Dad".

Tickets for this event are available from Doris Koestler at 683 2970 (OR) they may be purchased at the door. The fee is \$8.00 per person. Lets make it a big one.....

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JUNE MEETING:- The June 10th meeting will begin at 7:30 PM again at the Buffalo Museum of Science. This is our annual meeting and election of officers. After the business part of the meeting we will be hearing from Ron Mauer of the Elmira-Corning Astronomy Club giving us a treat about the planet "MARS". We should have a good turnout for this meeting which will be followed by refreshments.

* * * * *

c.l.g.

JUNE ELECTIONS NOTICE

Now is the time to start thinking about elections of OFFICERS. Its the elected officials and board members that can make the difference between a good club and a great club. All officers will be elected; you may be that person to make the difference.

Anyone interested in running for any office, PLEASE call Gene Witkowski at 883-6435.....

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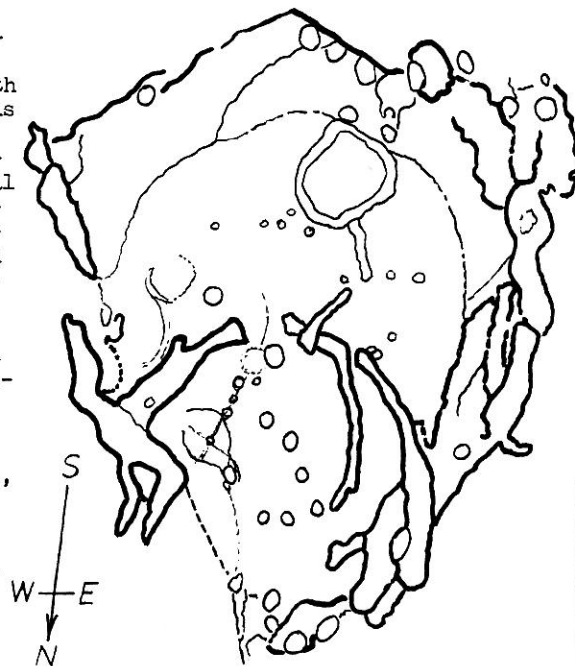
THE LUNAR RING FORMATION CATHARINA

Catharina is the southernmost member of a curving group of three large lunar ring formations skirting the western 'shore' of the Mare Nectaris. The other two members are Theophilus, the most northerly, and Cyrillius, the middle member of the group. The trio makes an impressive telescopic spectacle at lunar sunrise, about five or six days after new moon, and are then easily visible with the smallest telescope.

Catharina is about fifty-five miles across. Its most interesting structural feature is the prominent two-pronged semicircular ring that curves across the vast interior. Starting at the foot of the west wall it curves in a southerly direction and then bifurcates. The main 'prong' bends northwards, coming to a sudden stop, the curve apparently being continued by an arc of three tiny craterlets. Stt the accompanying chart. Other features on the floor of Catharina are several small craterlets, one group forming an arc curving southwards from the north end of the lesser 'prong' of the inner ring just mentioned, a linear chain of minute craterlets just to the west of these and a relatively large crater nestling under the south wall.

Neither the forked inner ring nor Catharina itself could have been formed by meteoritic impact or explosive vulcanism; if the inner ring had been formed first, then obviously the later impact responsible for the larger ring of Catharina would have completely obliterated it. Conversely, if the main outer ring had formed first then the violence of the later impact forming the inner ring would have caused extensive damage to the outer ring; on the contrary, the east 'prong' of the inner ring actually overlies the north-east wall of the outer ring without a trace of damage to it and continues a short distance on the exterior. This feature is quite impossible to reconcile with an impact or other violent origin of the inner ring.

What processes were responsible for the genesis of Catharina and its internal ring ? All the observational evidence - as opposed to speculation - indicates that Catharina is a collapsed caldera. The caldera was formed by uplift of a huge dome in the early plastic crust of the moon by internal gas pressure or intrusion of molten magma. Subsequently, the gas or magma was withdrawn leading to



F.W.P. 1988

seems to have petered out at the north end of the west 'prong' of the inner ring, the declining energy of the subsurface vulcanism resulting in the three craterlets continuing the curve of the west 'prong', a sort of volcanic 'last gasp' of the internal forces that formed the 'prong'. The overlapping of the west wall of Catharina by the east 'prong' of the inner ring can likewise be explained by the fracture passing through the wall followed by extrusion of lava which would overlay the earlier wall without damaging it.

Careful observational study of the larger lunar ring formations (often misleadingly called 'craters') always reveals structural features and peculiarities that plainly indicate their formation millions of years ago by relatively slow and gentle igneous processes rather than by sudden violent explosive events, either of meteoritic or volcanic origin.

Dr. Fred Price

SPY & TELL

Gary Kielich recently bought a 4" Schmidt Cassegrain telescope. He and his bride of a few months took a six day vacation in March and visited Kitt Peak National Observatory, and Gary took several fine pictures. Gary has worked for eleven years at Buffalo Business Machines, a family owned business.

Diane Borowski works at Empire of America in the Computer Services area in the Systems Development Department, holding the position of Saving Systems Coordinator. She has worked for seventeen years in various areas, and has been in her present position for five years. She takes a course in anthropology at Buff State in the evenings.

Ed Czaplak made an eyepiece case for John Yerger.

Dave and Marty Junkin left on March 14th for a two week trip to Hawaii, where they went birding, and to Point Reyes, north of San Francisco, where they visited the Point Reyes Bird Observatory.

Jack Empson and Dave Sepulveda, who are members of the Sports Car Club of America, have each applied for an official's license to work on the race tracks at Niagara Falls and Watkins Glen. Jack has applied as a track worker, and Dave in communications. Before receiving

their licenses, they must attend first aid and firefighting schools in Watkins Glen. After the classes are over, they will know by the end of May if the licenses will be granted.

Inspired by an article in the December 1987 issue of *Sky & Telescope* (pg. 646) on "Sundials on Walls," Bruce Newman has made a sundial 4'x 3' which he plans to put on the south side of his house with the coming of warm weather.

Tom Reid left for China the last part of February to attend a college in Beijing. He is part of an exchange program, and is in his last semester, majoring in critical languages. He is also doing some tutoring in English to students while in China. His course is finished in June and he will return to receive his B.A. in critical languages from the University of Buffalo.

Fred Price is enjoying a lively correspondence with Jean Dragesco, the well-known astrophotographer and Jupiter Recorder of the ALPO, who lives in Rwanda, Central Africa. Like Fred, Dr. Dragesco is a college professor of biology and astronomy is his hobby. He has kindly supplied Fred with several of his superb photographs of lunar surface features for illustrations in Fred's forthcoming book *The Moon Observer's Handbook* to be published by the Cambridge University Press later this year.

Dan Marcus, Tristan DiLapo, and Carl Milazzo bought a 4.5" f.6 refractor photographer telescope from Larry Hazel, which takes a 4"x 5" film. They have cleaned the lens and the scope is in good condition.

The annual amateur telescope makers' convention at Stellafane, in Springfield, Vermont, will be held August 13. Hundreds of amateur astronomers gather each year to view the fruits of the telescope makers' creative ideas, and to enjoy lectures on the many aspects of astronomy. So far, the following BAA members will be present at the meeting: Dave Sepulveda, Jack Empson, Larry Hazel, Brian Fallon, Mr. and Mrs. Bill Halbert, and Carl Milazzo. If you would like to attend and want further information, contact Carl.

It is rather unusual not to be reporting on a trip to those far away places by the Koestlers. They are not planning to travel this summer.

Dave Bull states that he hasn't any news for Spy and Tell because his wife reads all his Spectrums. Tee-hee!

Edith L. Geiger

KELLOGG OBSERVATORY REPORT

Spring has brought many Scout Troops to "discover" the stars. These young people have profited much from their visits, since upon questioning, they didn't know in which direction the sun rose and set! The last public night will be Friday May 20th. Public observing will resume again in September. Help is needed for two upcoming astronomical events. Plans are in the works for special events during the upcoming Lunar Eclipse on Saturday, August 27th, and for observing Mars on Wednesday, September 28th. Telescopes and astronomy minded people are needed to help the public view these events from the Museum's roof. Anyone interested please contact Marilou at 896-5200 ext. 214.

INSTRUMENT NOTES

The observing was poorer than normal at Beaver Meadow Observatory this past winter. The March date coincided with a snowstorm. There ought to be a law (there is - MURPHY'S).

The April meeting is scheduled for the 15th (third Friday) at the observatory at the usual 8 PM. The photo group will meet again on the following evening after the public observing session has wound down. Remember to save the dates - APRIL 15th and 16th. We will need two good nights in a row - don't say it can't happen here!

Some optical work has also been going on. Dan Marcus has been cleaning and refurbishing a surplus lens from an aeri-

at camera. He plans to make a 4 by 5 camera with it. Then comes the try-out on the stars, the most severe test for a photographic objective.

Ed Czapla has tracked down a commercial 12½ inch mirror. We will be testing it on one of these evenings. Commercially made mirrors vary all over the lot. I remember quite a few years ago that a firm was seeking a 6 inch telescope mirror for five dollars. One of the boys bought one and we tested it. The surface was a series of concentric rings like a Fresnel lens that you might find in the beacon of a lighthouse. It must have been made on a drill press. We never mounted it. I can't imagine what you would see with it - maybe my imagination won't stretch far enough.

Then I found a perfectly spherical 10 inch. Perfect, that is, for starting a fire at your camp out (I've done that!) But for astronomical viewing the spherical gem would have been poorer than a beginner's quarter wave effort. I have also seen some beautiful commercially made mirrors. They can do it! It's a question of how much time the boss allows them. What probably happens is that they produce several lines. The better ones are skimmed off for a premium priced market.

So unless you can test the mirror, you are buying a pig in a poke unless you deal with one of the more reputable manufacturers.

Last issue's notes had some typos thanks to my poor typing and the carelessly written inserts. If you can find the issue and the notes, check the first word at the top of the second column on the page. It reads "scattered". It should read "gathered".

Down in the next to the last paragraph of the Notes there is a line which reads quizzically, "look as hard and as rapidly as you can down at your feet, then blink your eyes for a count of 15 seconds." This line should read, "look down at your feet. Then blink your eyes as hard and as rapidly as you can for a count of 15 seconds." This ought to make more sense for someone wishing to try the method.

Ed Lindberg.

OBSERVATIONS

While looking at the conjunction of Venus and Jupiter on the evening of March 11th, I noticed the zodiacal light from Boston, NY. It was 20 degrees wide near the horizon, and was about 50 degrees long and tapered with M-45, the Pleiades open cluster, at its end.

Later that night, a galaxy cluster was seen with my jointly owned 26-inch Dobsonian 'scope near the star Alpha Lynis. It is known as Abell 779; and 11 galaxies were seen within the field of view of a low power eyepiece. The brightest and largest was NGC 2859 which is 5 arc minutes in size and of 10.7 magnitude of medium surface brightness with a brighter center.

Also, the planetary nebula in Auriga, Kohoutek 2-1 which is labeled in the Uranometria 2000 star charts as PK 173-5. 1. A UHC nebula filter helped a little on this low surface brightness object, but it was seen faintly without the filter. It is 2 arc minutes in diameter with slightly brighter edges that were sharp with 8 faint stars sprinkled around.

A nice surprise was in northern Lynx which was not in Burnham's nor the Skalnate charts, was a galaxy of high surface brightness. It was NGC 2521 with a total magnitude of 11.5 and 3x1 arc minutes in size. It resembled the Sombrero galaxy M-104.

On March 22nd, only 4 degrees from Polaris, I observed the variable star TY Cephei, which is of the semi-regular type. It was that night, 11.9 magnitude but can vary from 9.7 to 13.3 and near it was a nice double star of 8th mag.

In Draco near the North Ecliptic Pole was the galaxy 3C371, it is of the rare N-Galaxy type which is closely related to the Seyferts. Its nuclei can vary from 13.1 to 15.9 in magnitude and that night it was 14.8 mag. Background stars were as faint as 16.2 and could have been a

magnitude fainter if it was not for the alignment of Buffalo 20 miles north of it, with its light pollution. Also, it was far from the zenith and there was some haze in the sky.

At the North Ecliptic Pole is the very bright and turquoise planetary nebula of high surface brightness, NGC-6543 on April 5th. It has a total magnitude of 8.5 and a disk of 20 arc seconds in size. It has a low contrast internal structure shaped like a pretzel. In the same field was the galaxy NGC 6552 which is 14th magnitude and one arc minute with a medium surface brightness.

Finally, one degree N.W. of the globular cluster M-92 in Hercules is a group of 5 galaxies. NGC 6329 is in the middle and they are all about 1 arc minute, 14th magnitude of medium to low surface brightness.

Carl Milazzo

Observations on a Comet lately discovered: communicated by David Rittenhouse, Esquire.

On the 21st of January last (1784), John Lukens, Esq., informed me that he had discovered a comet the preceding evening, and on the evening of the same day, assisted by Mr. Lukens and Mr. Prior, I observed the apparent place of the comet to be in the 15th degree of Pisces, with 16° 6' south latitude. By subsequent observations I found its motion to be north easterly, with respect to the ecliptic, and that its nearest approach to us had preceded our first observation. It passed the ecliptic on the 31st in the 25° of Pisces, and February the 17th it was in Pisces 29° with 13° 10' north latitude. This was the last time I saw it, clouds and moonlight having since prevented.

The light of this comet was so very faint that it was impossible to observe it with accuracy, at least without better instruments than I am possessed of, especially as the comet was always involved in the day light, moonlight or the thick atmosphere of the horizon. No pains or attention however were wanting, and from the best observations I could make, I find it passed its perihelion about the 20th of January, its distance from the sun being about 7/10 of the sun's distance from us. The place of its ascending node is in the 25th degree of Taurus, and the inclination of its orbit 53°. Its motion is retrograde, that is, contrary to the order of the signs. I have still hopes of seeing it in the morning, though its distance is now so great that it can scarcely be visible to the naked eye.

(From American Philosophical Society, Transactions, II (1786, p. 195). Read Mar. 19, 1784)

The Catalog of Cometary Orbits by Brian G. Marsden lists Comet 1784 (only one that year) of perihelion Jan 21.70, 336.00°, .708 a.u.; node at 59.15°, inclination 128.86°; non-returning.

Steve Kramer

BENEFITS of RECORDING WHAT YOU SEE !

Want a new slant on the old, mundane routine of dragging out the telescope and scanning the skies? I recommend the keeping of a nightly journal of your observations. This is not an idea that I claim credit for dreaming up. Observers since the dawn of written history have made written records of their observations. Of this fact I, a former history teacher, am well aware. It took reading my trusty Astronomy magazine to rekindle in me the practice of making notes about an evening's observations. The January 1988 edition of Astronomy carried an article entitled, "Should you keep an Astronomical Notebook?" by Andrew M. Thorpe. I freely admit that up to the time I read the article I had been remiss in keeping a log.

There was no good reason for not recording my observations. Being January I made a New Years resolution then and there that I would be more methodical in keeping my notes. For the past three months I can write I have faithfully followed this program. It has made a great difference in

the enjoyment I receive from observing the wonders of the Universe! Writing my impressions and recording what I see has opened new doors for me in understanding the nature of the universe.

With sharpener handy and colored pencils firmly in my grasp I record what wonders traverse the night sky over my backyard. During March the stages leading to the conjunction of the Moon, Venus and Jupiter provided some sketches I will always enjoy seeing again. Then there has been the nightly appearance of the winter constellation Orion with its many different spectral types of stars. Just one evenings recording of this celestial traveler had me reciting the proper names of the principal stars in this constellation. The sense of accomplishment which accompanied this feat is hard to describe short of using the term cosmic.

All of a sudden I realized it was just not enough to record the physical aspects of the object. It became a matter of researching why the object behaved as it was observed. My log was not satisfied if the entry did not contain information referencing experts in the field. I was being forced to engage in a serious quest for knowledge. My reference library began to grow. More importantly I began to use my books on astronomy! What I have learned in a short period of time has given me a greater appreciation for the wonders of the heavens. My log has become my companion. It is a quiet witness to my nocturnal adventure!

While the pages in my notebook are filling up I have found another benefit which is priceless. My daughter is four years old and very inquisitive. As with any four year old the very sight of colored pencils, and a blank sheet of paper sends them into space! The chance to draw with Daddy and to share Daddy's own tools is too much to pass up. My log has given me the opportunity to involve my daughter in my hobby. Her primitive drawings have helped me see the Universe in a new and uncluttered way. The memories of these shared experiences will live with me forever.

I hope by sharing my experiences you will be encouraged to maintain a log of your nightly observations. I am sure you will agree that there are many priceless rewards awaiting you if you try. Thank you Mr. Thorpe for getting this amateur observer back on task!

Paul F. Warms

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WHAT IS AN AMATEUR ASTRONOMER ??

What is an Amateur Astronomer? One who does it, not as their profession for making a living, but for the love of it as a hobby. Other definitions are:- after over ten years and is still not very good at astronomy; not of a professional quality; one who climbs a ladder in the dark; one who, when they go out the door, looks up at the sky at night and even in the day time; one who drives into parking lots and drives away with their yellow fog lights on; and one who uses a red flashlight outdoors. Also those who wear parkas, even in the summer. That weirdo, according to the neighbor, walks around with a 'bazooka', 'cannon' and binoculars and hides in the shadows. A nocturnal creature that goes on summer vacation during the week of the new Moon and one who goes a little crazy around a new moon; also one who names their pets after astronomical objects. Also one who isn't afraid of the dark, but hates bright lights, tall trees, clouds, dew, ground fog, wind and mosquitos especially at twilight and the full moon. One who has not traveled through any time zones, yet often has jet-lag. Even one who sometimes comes home at sunrise, not drunk, have breakfast and then goes to bed. AND---one living on a hilltop, rather than in a valley, and finds a sunset to be more beautiful than a sunrise.

Carl Milazzo

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More to....what is an Amateur Astronomer ???

, and hates daylight savings time. That fruitcake according to the relative. who has a planetarium in his backyard, which has in it a long microscope, which is used for doing astrology, and that last step is a dozy. And in winter, some risk frostbite steadyng a ladder for another observer and one who listens to a lot of radio but not much TV. One

who crosses the border legally with M-80 not exploding and one that is not standing on its head, yet sees things upside-down. Finally, one who goes back in time, using a time machine that is round and long.

C.M.

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PROFILE

DAVE SEPULVEDA - continued

During the summer vacation, Radio Shack arranged with the repair shop manager to try out Dave. After two hours, the manager decided that he wanted him on the job, so Dave remained as store manager until December 31st, after which he repaired computers for Radio Shack. It took four months for him to take over the field service. He and another fellow were the only ones employed by Radio Shack to fix computers. The two fellows took care of the area from Batavia to Lake Erie and from Pennsylvania to Lake Ontario. This field repair took five days out of a week, and Dave fixed computers for three and a half years.

In November of '86 he read an ad in the paper about an opening for computer technicians at the University of Buffalo. He applied and was accepted. He left Radio Shack and became employed at the university, Amherst campus, in March of '87. He is very happy with his new job.

Dave wants to finish his Associate degree so he is going to ECC on Monday and Wednesday nights, taking courses in engineering technology. He plans to finish the requirements for his degree in December 1988.

He did some photography in his senior year of high school. Later on there was a national polaroid contest which he and his mother decided to enter. They had one pack of film and went to the Allentown Art Festival for photographic inspiration. They took a total of eight pictures. His mother entered one picture in the contest and won first place, and Dave entered a picture and won second place, an outstanding accomplishment.

His interest in astronomy began while in grade school. As a member of the Boy Scouts he learned some astronomy when working on his astronomy merit badge. It was in January of '84 that he met BAA member, Jack Empson, another employee of Radio Shack, and they became good friends. After meeting Jack and also seeing an 11x14 photo of the dipper taken by Dan Marcus, he found himself becoming more interested in astronomy. He attended his first BAA meeting three years ago when Tom Dey was the speaker. Suddenly he had won a book donated by the speaker. He decided that this was a great group when he could win a book at his first meeting. He has become one of our active members and is presently serving the BAA as its secretary. He is interested in observing man-made satellites, naked eye viewing, astrophotography, planetary, lunar and solar observations, and electronics and computers in relation to astronomy. He has an almost finished darkroom in an about to be finished attic.

For several years, Dave and Jack have been entering an unusual car race, the Road Rally, which is sponsored by the South Towns Motor Club and sanctioned by the Stock Car Club of America. It is held in Boston, Colden, and other places in the southern tier. It is a race against a schedule in which a very strange course is plotted where each car must travel the course in the same time as the one who charted it. It is a very difficult, invigorating race which Dave and Jack enter with enthusiasm. They are overjoyed at winning second place in this challenging event in September of '87.

Dave, Cathy and their toddler son, Adam, enjoy tent camping on many weekends during the summer. Adam is learning about the stars at an early age, and loves the sound of the word, Jupiter.

Dave is a very energetic young man with a terrific drive. He has an engaging sense of humor, a zest for living, and always has his sights on distant horizons.

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Edith L. Geiger

APUS

And all the stars shine in southern skies

Had been admired by none but savage eyes.

Ode to Doctor Charleton.

APUS, the Bird of Paradise, originally is found only in the Papuan Islands. Later, Bayer placed it on his planisphere as 'Avis Indica' in 1603. In 1720 his works were abridged in a German edition and was written 'Apis', which was, perhaps, a typographical error in spelling or the mistake of an engraver, as this is a Swallow, not a Bird of Paradise.

Apus is surrounded by Triangulum Australe, Ara & Circinus on the north; Octans on the south; Musca & Chamæleon on the east; and Octans & Pavo on the west. Not many deep-sky objects of interest are in Apus, but there are two galaxies, NGC's 5612 & 5967; two globular clusters, NGC 6101 & I,4499. One double star, Kappa and three variable stars, R, VS & Theta.

ARA

ARA, the Altar, is located as Aratos described it-----
'neath the glowing sting of that huge sign

The Scorpion, near the south the Altar hangs-----
And in classical times it was intimately associated with Centaurus and Lupus which it joined, even before Norma was formed. It was a constellation much before 1000 BC and could be used as an ancient constellation now, even though it is still recognized in our modern times.

Ara is bordered on the north by Scorpio & Corona Australe; on the south by Apus; Pavo & Telescopium on its east; and by Triangulum Australe & Norma on the west. Objects of interest include galaxies, NGC's 6215, 6221 & 6300. Open clusters, NGC's 6193, 6204, 6208, 6250, 6253, also H-11, H-13 and I,4651. Globular clusters are NGC's 6352, 6362 & 6397. Planetary nebulae are NGC 6325 & I,4642. One diffuse nebula is NGC 6180.

Double stars include R, Gamma, Epsilon & Upsilon with variable stars being R, RW, RY, U, X & Y; also On Nova, N-1910.

AQUILA

Jove for the prince of birds decreed,
And carrier of his thunder, too,
The bird whom golden Ganymede
Too well for trusty agent knew.

from Horace's Odes.....

AQUILA, the Eagle, is bordered on the north by Sagitta; on the south by Capricornus & Sagittarius; by Delphinus and Aquarius on the east; and by Hercules, Ophiuchus, Serpens Cauda and Scutum on the west.

Aquila is next

Divided the eather with her ardent wing
Beneath the Swan, not far from Pegasus,
Poetic Eagle.

In mythology we find that this constellation dates back to the earliest times, around 1200 B.C. So---it could be one of the ancient constellations which appear in the 'SPECTRUM' as well as being a modern one. It did appear on an Euphratean Uranographic Stone as a bird figure representing this constellation.

The bird of Zeus, an Eagle, has a close connection between Aquila and Aquarius which are supposed to relate to Ganymede, the Cup Bearer of the Gods, as is expressed in the foregoing writing of Horace's Ode.

Down through the ages Aquila has been known as a Bird of Prey. It has bore the titles of, "Eagle of the Winds" & "The Soaring Eagle". In this region around Aquarius we find aquatic creatures, thus we find birds in it is part of the heavens too.

Aquila is surrounded by Sagitta on the north; on the south by Capricornus and Sagittarius; by Delphinus and Aquarius on the east; and by Hercules, Ophiuchus, Serpens Cauda and Scutum on the west. Within its boundary are found many deep-sky objects of interest. One galaxy, NGC 6814; a diffuse nebula, V-603 (N-1918); and one globular cluster,

NGC 6760. There are three open clusters, NGC's 6709, 6755, & 6756; also several planetary nebulae, NGC's 6741, 6751, 6772, 6779, 6781, 6790, 6803, 6804 & 6807 as well as I,4846 and one at Right Ascension 19 hours 40 minutes and at declination +16 degrees.

Double stars are:- 5, 11, 21, 23, 51, 57, 68, 71, FF, QS, U, Beta, Chi, Delta, Iota, Mu, Omicron & Zeta. Variable stars are:- EL, FF, QS, R, RR, RT, RU, RV, S, SY, TT, U, V, Eta, Rho, V-342, V-368, V-373, V-450, V-500, V-528, V-599, V-603, V-604, V-606, V-805, V-822, V-844, V-913, W, & X. Novae include:- N-1899, N-1905, N-1918, N-1927, N-1936, N-1943, N-1945, N-1970 & N-1975.

Darwin Christy

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ASTRONOMICAL HAPPENINGS

SOLAR:-----

The Sun is still climbing northward causing the nights to become shorter and the daytime longer. In June, though, it will reach its maximum northern journey and head back south, making for longer nights once again. Even though it is rather bright, the Sun will be in conjunction with Jupiter on May 2nd. Something to try looking for.

LUNAR:-----

There will be two Full Moons in May. The first is the 'Full Flower Moon' occurring on the 1st, and the second is the 'Full Planting Moon' on the 31st. The second Full Moon is also referred to as the 'BLUE moon' arriving from the fact that there are two full moons in the same month. The next 'Blue Moon' will not occur until December 1990.

Other phases of the moon are:- First Quarter on May 23rd & June 22nd; New Moon on May 15th & June 14th; Last Quarter on May 8th & June 7th; and another Full Moon on June 29th, called the 'Strawberry Moon'.

LUNAR CONJUNCTIONS:-----

Antares on May 2nd & 31st and June 27th

Spica on May 27th and June 24th

Uranus & Saturn on May 5th and June 1st & 28th

Neptune on May 6th and June 2nd & 29th

Mars on May 9th and June 6th

Mercury on May 17th

Venus on May 18th

PLANETARY EVENTS:-----

Venus will be at greatest brilliancy on May 6th and will be at inferior conjunction on June 12th

Mercury will be at greatest elongation (22° E.) on May 18th and at inferior conjunction on June 12th. It will be stationary on May 31st and June 24th.

Uranus will be at opposition June 19th

Saturn will be at opposition June 20th

Neptune will be at opposition June 30th

Conjunction of Saturn & Uranus on June 26th

METEOR SHOWERS:-

For May we should find the Omega Scorpiids of the 3rd near radiant R.A. 16h 00m and declination -22°. Little is known of this shower and would, perhaps, need further observations. The average magnitude is about fifth, of a whitish hue, 3 to 12 hourly, lasting about 30 days (15 days each way of maximum).

For June another lesser known shower, the Chi Scorpiids, occur on the 5th. Its R.A. is 16h 28m at declination -13°. What is known of them is they are white of 5th magnitude or brighter averaging 3 to 15 hourly. The duration is about 24 days and could use more observation data.

Other showers for May are:-

Phi Bootids on the 1st

Eta Aquarids on the 4th *****

O Cetiids on the 15th

Zeta Hercullids on the 17th

Eta Pegasids on the 30th

For June:-

Tau Hercullids on the 3rd

Librids on the 8th

Arietids (day-time) on the 8th

Zeta Perseids (day-time) on the 9th

Alpha Scorpiids on the 9th
 June Aquariids on the 10th
 Sagittariids on the 11th
 Omicron Ophiuchids on the 13th
 Lyrids on the 15th
 Ophiuchids on the 20th
 Vulpeculids on the 25th
 Corvids on the 28th
 Bootids on the 28th
 Draconids on the 28th *****
 Beta Taurids (day-time) on the 30th.

Darwin Christy

PLANETARY TEMPERATURES

The March-April issue of 'The SPECTRUM' carried an article showing the expected temperature for each of the planets based on its distance from the sun and its reflectivity. It also listed the temperatures that had been measured, and pointed out that there are wide discrepancies between the theoretical and the actual values. The cause of these differences will be covered in this article. The table of planetary temperatures is repeated here---

Planet	AU	Albedo	Tss	Tp	Ta	Measured
Mercury	.387	.06	635	445	438	103 to 623
Venus	.723	.76	465	318	228	750
Earth	1.000	.40	395	277	244	183 to 333
Moon	1.000	.07	392	277	272	120 to 293
Mars	1.524	.16	320	224	215	133 to 293
Ceres	2.77	.054	237	166	164	--
Jupiter	5.203	.51	173	121	102	163
Saturn	9.54	.50	128	90	75	93
Uranus	19.18	.66	90	63	48	57
Neptune	30.07	.62	72	51	40	57
Pluto	39.44	.40	63	44	39	50

Recall that 'Tss' is the temperature expected at the subsolar point (directly below the sun), 'Tp' is the average temperature of the planet's entire surface and 'Ta' is the average temperature of the planet if one accounts for its reflectivity, or albedo.

The agreement between calculated and measured temperature isn't particularly good. In fact, only the three outer most planets have average temperatures reasonably close to their predicted values. Some planets have a wide range of values, like our own, others just appear to have the wrong temperature. Each planet has its own peculiarity that leads to the discrepancy. Some explanations are quite simple, others are not.

Mercury is fairly easy. The highest temperature measured is close to the subsolar temperature; the lowest, which is low indeed, is the temperature on the night side. Mercury's days are long, a76 of our days (synodic days), and it has no atmosphere to transport heat, so the highest temperature should be close to the subsolar temperature since the sun is directly overhead for a long time. The long night gives the Mercurian surface plenty of time to cool off.

As an aside, the fact that Mercury's night-side temperature is as high as it is led astronomers to conclude that the planet's rotation might not be precisely locked to its period of rotation around the sun. For a century or so before, it was accepted that Mercury's night side never saw the sun, as one side of the moon never sees Earth, and would therefore be extremely cold. Measurements of the night-side temperature convinced astronomers that either Mercury had a thin atmosphere, or it rotated at a different rate than previously had been thought. In 1965 astronomers using the Arecibo Radio Telescope bounced radar signals off the planet and, by measuring the Doppler shift of the returned signal, determined Mercury's true 59 day rotation period.

Venus is the hotspot of the planets with a surface temperature of 750 degrees K, or 900 degrees F. The predicted temperature, taking the planet's highly reflective clouds into account, is only 228 degrees K, colder by far than the freezing point of water. The cause of this great difference is the famous "runaway greenhouse effect" caused by Venus'

thick atmosphere.

While Venus reflects 72% of the sunlight that falls on its sulfuric acid clouds, the remaining 28% penetrates through the atmosphere and heats the planet. This energy is carried away in the form of infrared radiation, but the heavy atmosphere, composed almost exclusively of carbon dioxide, blocks it. As a result, the surface of Venus heats until its radiation increases to balance the incoming solar energy. This equilibrium occurs at a surface temperature of 900 degrees F!

The "runaway" part of the effect occurred long in the past. If Venus had retained water on its surface, as Earth did, its atmosphere would be far thinner than the 90 Earth atmosphere it is now. The presence of water enables sedimentary rocks to absorb great quantities of carbon dioxide, a process that has taken place on Earth and helps explain the low concentration of that gas in our atmosphere. However, early in the history of Venus the sun's heat was great enough to start evaporating any liquid water that existed on its surface. The additional water vapor plus the carbon dioxide absorbed more infrared energy, raising the temperature still higher. More water evaporated, less carbon dioxide could be absorbed by rocks, so more energy was trapped, etc. In the end Venus became an intensely hot planet, as dry as a bone, with a carbon dioxide atmosphere that exerts 1300 pounds on each square inch of the planet's surface.

How can Venus be as dry as a bone if all the water evaporated into its atmosphere long ago? Scientists aren't quite sure. Venus may have started with a water deficiency. But more likely, ultraviolet energy from the sun caused water molecules to dissociate into hydrogen and oxygen near the top of Venus' atmosphere. The light hydrogen could then escape from the planet while the oxygen combined with other chemicals and disappeared as a constituent of the atmosphere.

Venus is iniformly heated because of this thick atmosphere. Even though Venus rotates very slowly (243 days) its atmosphere does not. Measurement of the speed of rotation of the clouds indicates a period of only four days. Just how this high speed is obtained is a mystery at present, but this rapid rotation causes even heating over the entire surface, even at the poles.

The temperature of the cloud tops has also been measured. It is found to be about 240 degrees K, which compares very well with the 228 degrees K calculated for a body with such high reflectivity. It is only the surface temperature, heated by the greenhouse effect, that is in such wide disagreement with the theoretical temperature.

Leslie Martin

to be continued in the July-August "SPECTRUM"

MORE ADVICE TO A NEW MEMBER

"450 X TELESCOPE FOR ONLY \$ 99 !". YOU'VE SEEN THE ADS. WE ALL HAVE. TO THE BEGINNER THEY MAY BE VERY TEMPTING. THE BEST ADVICE ANYONE CAN GIVE ABOUT PURCHASING A TELESCOPE IS : "TALK TO OWNERS, NEVER FALL IN LOVE WITH AN AD." YOUR OBSERVING FUTURE DEPENDS ON YOUR CHOOSING A SCOPE THAT SUITS YOUR INTERESTS AND IS CONVENIENT TO USE. THE MAXIMUM POWER A SCOPE CAN THEORETICALLY USE HAS NOTHING TO DO WITH THE PROCESS OF CHOOSING A SCOPE. BEWARE OF IGNORANT ADVERTISERS!

I'LL ADMIT, I'VE BEEN TAKEN IN BY THE LURE OF AN IDEA. "SKY & TEL" IS FULL OF TEMPTING ADS, AND THERE IS NO WAY YOU CAN TEST THEIR CLAIMS BY REREADING THE COPY OR EXAMINING THE PICTURES OR DIAGRAMS. TO MAKE A WISE PURCHASE YOU NEED TO DO SOME RESEARCH - RESEARCH ONLY YOU CAN DO. YOU FIRST HAVE TO ESTABLISH WHAT KIND OF OBSERVING YOU LIKE. THE VARIOUS TYPES CAN BE BROKEN DOWN INTO: VARIABLE STAR, DOUBLE STAR, PLANETARY AND LUNAR, AND DEEP-SKY OBSERVING. YOU MIGHT ALSO CONSIDER PHOTOGRAPHY WITHIN THESE CLASSES OF OBJECTS. EACH APPLICATION CALLS FOR A DIFFERENT TYPE OF SCOPE, ALTHOUGH

ALL SCOPES CAN DO ALL TYPES OF OBSERVING AT DIFFERENT LEVELS OF PERFORMANCE.

THE WAY TO ESTABLISH YOUR PERSONAL PREFERENCES IN OBSERVING IS TO BEGIN TO USE THE BEAVER MEADOW SCOPE. THEN GO TO THE SUMMER STAR PARTIES AND CALL CLUB MEMBERS AND PLAN PRIVATE STAR PARTIES. YOU MAY FIND THAT OBSERVING IS NOT YOUR CUP OF TEA. THEN YOU'RE FREE TO DEVOTE TIME (AND MONEY) TO ARMCHAIR STUDY OR INSTRUMENT MAKING WITHOUT BEING STUCK WITH AN UNUSED SCOPE.

ONCE YOU KNOW WHAT TYPE OF OBSERVING YOU LIKE, YOU NEED TO LEARN ABOUT FOCAL RATIOS, DAWES LIMITS, FOCAL LENGTHS, APPARENT FIELDS, TRUE FIELDS, ETC., ETC.. WITHOUT THIS FUNDAMENTAL KNOWLEDGE YOUR PURCHASE DECISION WILL BE JUST A MATTER OF LUCK. THE BEST PLACE TO LEARN ALL THIS INFORMATION IS WITH A CLASSIC - SAM BROWN'S ALL ABOUT TELESCOPES. THERE IS NO BETTER INTRODUCTION TO THE NOMENCLATURE OF INSTRUMENTS. THE BOOK IS AVAILABLE THROUGH SKY PUBLISHING CO..

ONCE YOU HAVE A BASIC COMMAND OF THE VARIOUS TERMS OF OPTICS I ADVISE YOU TO PUT THEM ASIDE FOR A BIT AND LISTEN TO YOUR OWN EXPERIENCE. I REMEMBER FIRST LEARNING ABOUT THE THEORETICALLY PERFECT EYEPIECE FOR MY FIRST SCOPE. I COULDN'T WAIT TO TRY IT OUT, ONLY TO LEARN THAT A MUCH LOWER FOCAL LENGTH EYEPIECE GAVE ME AN IMAGE THAT I LIKED MUCH BETTER. IMAGE IS A MATTER OF PREFERENCE AS WELL AS EXPERIENCE. FOLLOW YOUR AESTHETICS RATHER THAN YOUR FORMULAS. A TRICK I USED IN PICKING THE SCOPE I WANTED TO OWN WAS TO PURCHASE A GOOD EYEPIECE (I RECOMMEND THE MEADE - RESEARCH GRADE - ERFLES) AND CHECK OUT THE IMAGE OF THE SAME OBJECT ON THE SAME NIGHT IN AS MANY DIFFERENT SCOPES AS YOU CAN. THIS IS ONE OF THE MAJOR REASONS FOR STAR PARTIES.

NOW FOR A QUICK BASIC INTRODUCTION TO TELESCOPES. BIGGER MIRRORS OR LENS GIVE YOU BRIGHTER IMAGES. LONGER FOCAL RATIOS (FOCAL LENGTH OF THE MIRROR OR LENS DIVIDED BY THE DIAMETER OF THE MIRROR OR LENS $F/DOBJECTIVE = FL/D$. WRITTEN $F/8$.) GIVE MORE IMAGE INFORMATION AND NARROWER FIELD OF VIEWS. HOWEVER, BIGGER MIRRORS OR LENS ARE MORE EXPENSIVE AND HEAVIER, AND LONGER FOCAL RATIOS MAKE LONGER TELESCOPES. HEAVIER MIRRORS OR LENS AND LONGER TUBES MEAN HEAVIER AND MORE EXPENSIVE SCOPES, PARTICULARLY IF YOU INSIST ON A CLOCK DRIVE. THE RULE OF THUMB IS - THE EASIER A SCOPE IS TO SET UP AND USE, THE MORE YOU TEND TO USE IT.

THERE ARE 3 BASIC TYPES OF TELESCOPES : REFRACTORS (LENS), REFLECTORS (MIRRORS) AND COMBINATIONS (MAKSUTOV-CASSEGRAINS AND SCHMIDT-CASSEGRAINS.) REFRACTORS ARE GENERALLY LONG, EXPENSIVE AND GOOD FOR PLANETARY AND LUNAR OBSERVING. (K-MART 60 MM REFRACTORS ARE USELESS BECAUSE OF THE FLIMSY TRIPODS.) IF YOUR HEART IS SET ON A REFRACTOR, DEFINITELY SEEK ADVICE FROM A PRESENT OWNER.

MAKSUTOV & SCHMIDT-CASSEGRAINS ARE VERY POPULAR, BUT EXPENSIVE FOR THEIR SIZE. MANY NEWCOMERS BUY CELESTRON 8" (CALLED C-8'S) WITH THE DREAM OF EVENTUALLY DOING SOME ASTROPHOTOGRAPHY. TALK TO DAN MARCUS AND TRY BEAVER MEADOW'S 12" BEFORE YOU BUY ONE OF THESE. (P.S. CLUB MEMBERS SEEM TO FAVOR THE MEADE 8" SCHMIDT OVER THE C 8'S.)

I FAVOR THE RICH-FIELD (SHORT FOCAL RATIO) REFLECTORS. THEY'RE CHEAPER, EASIER TO MOVE, AND GOOD FOR DEEP-SKY OBSERVING (MY PREFERENCE). I OWN A COULTER 10" AND CO-OWN A HOME-MADE (BOB MAYER) 26" DOBSONIAN. BOTH SCOPES ARE $F/4.5$, PORTABLE (THE 26" IS ON WHEELS!), AND AND EXTREMELY INEXPENSIVE FOR THEIR SIZES. THE REAL TRICK IN KEEPING COSTS DOWN IS AN ALTAZIMUTH MOUNT WITHOUT A CLOCK DRIVE. (ALTAZIMUTH MOUNTS WOULD REQUIRE A COMPUTER TO FOLLOW THE MOVEMENT OF THE STARS.) MOST BEGINNERS BELIEVE THAT CLOCK DRIVES AND SETTING CIRCLES ARE A MUST. YET, EXPERIENCED OBSERVERS STAR HOP AND ONLY NEED A CLOCK DRIVE FOR NARROW-FIELD (LONG FOCAL RATIO) SCOPES. IN FACT, BECAUSE OF THE C-8'S LONG FOCAL RATIO (IT HAS A

SHORT TUBE BECAUSE OF ITS "FOLDED OPTICS"), IT IS MUCH MORE DIFFICULT TO STAR HOP.

WELL, IN THE SMALL SPACE AVAILABLE, I HAVE TRIED TO HELP YOU AVOID THE PITFALLS OF TELESCOPE PURCHASING. PLEASE CALL (634-5443) AND ASK QUESTIONS OR TALK TO ME AT A MEETING. IN MY NEXT ARTICLE I'LL TALK ABOUT EYEPIECES AND ATLASES. I'LL END WITH AN INCOMPLETE LIST OF SCOPES THAT CLUB MEMBERS OWN. SEE CARL MILAZZO FOR MORE DETAILS.

4" REFRACTORS = JOHN YERGER.
5" REFRACTORS = CARL MILAZZO, BOB SNYDER.
RV 6 = ROWLAND RUPP, TRISTAN DILAPO.
C 8'S = ERNST BOTH, MIRO CATAPOVIC, BILL KIRST.
COULTER 10" = AL KOLODZIEJCZAK, BILL OWENS.
COULTER 13" = PETER OLCHVARY, BRIAN FALLON.
14" REFLECTOR = GENE WITKOWSKI.
COULTER 17.5" = TRISTON DILAPO, CARL MILAZZO.
20" SCHMIDT-CASSEGRAIN = MIRO CATIPOVIC.
22.5" DOBSONIAN = LARRY CARLINO.
25" DOBSONIAN = TED ZENDARSKI.
26" DOBSONIAN = (4 OWNERS - CARL MILAZZO, TRISTAN DILAPO, ADRIENNE MORRIS AND AL KOLO).

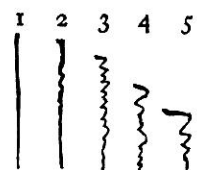
ALPHONSE KOLODZIEJCZAK

From *Transactions of the American Philosophical Society*, Volume II (1786), p. 173-6. Read May 2d, 1783.

To DAVID RITTENHOUSE, Esquire, from JOHN PAGE Esquire.
Williamburg, December 4, 1779.

Dear Sir,

I have often thought there was a strong resemblance between some of the phenomena of electricity and magnetism... I wish we had more cafes stated of the effects of lightning and the Aurora Borealis on the needle. But mentioning the Aurora Borealis recalls to my mind, the meteor which was seen at many distant places in Virginia on the 31st of October, at about 6h 10m P.M. It was what is vulgarly called a falling star. It fell as seen at Rowell about three of four degrees to the north of west and left a bright trail of light behind it; which extended from the horizon perpendicularly above 7°; unluckily I lost a view of it when falling, but was called out time enough to see the grand and beautiful appearance of its trail of light. It was seen for near 15m, it was as bright as shining silver, and as broad as the enlightened part of the new moon, when first visible, and about 7° in length. It might be represented by N° 1, when I first saw it, and by the other figures at intervals of about a minute after. Just before it disappeared it resembled the edge of a cloud. The sky was remarkably clear and serene. It appeared in the same manner exactly to several gentlemen above an hundred miles from Rowell, but on a different point of the compass. I have not yet had so accurate an account of its bearing as to ascertain its height and distance, Did you see anything of it?



I am, dear sir, yours most sincerely,
JOHN PAGE

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ACKNOWLEDGMENTS:-

Their names may not be at the end of any article, but they did contribute to the "SPECTRUM" in some way or other. Edith Geiger, Ken Biggie, Gene Witkowski, Dr. Fred Price, Marilou Bebak, Ed Lindberg and Carl Milazzo; also Steve Kramer, Jack Empson, Paul Warms, Darwin Christy, Leslie Martin, Al Kolodziejczak, Rowland Rupp, Doris Koestler and Ruth Christy. My many thanks for those contributions!

Up-coming articles for the next issue of the "SPECTRUM" are:- David Rittenhouse's answer to John Page; Planetary Temperatures; the constellation "Cygnus"; and perhaps one of the most controversial astronomers who lived in the last century through this century, Thomas J. J. See.; other articles as well as the "Star Parties" will be addressed. Any article anyone has or can have written will be greatly appreciated. The more articles from the members is a 'boom' to the "Spectrum". I need them for future "Spectrums"!!!

Darwin Christy, Editor

* * * * *

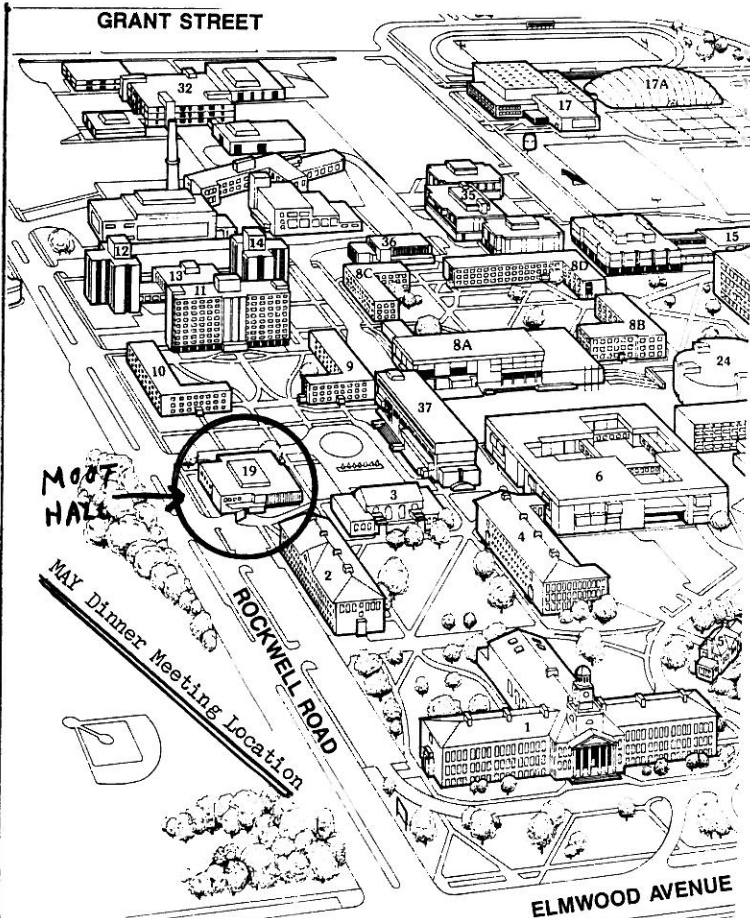
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Chris Milmerstadt

!WELCOME!

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