

SEPT 1991 OCT

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CLUB MEETINGS

SEPTEMBER

The September 13th meeting will be held in the Auditorium of the New Science Building, Elmwood Avenue, Buffalo beginning at 7:30 PM EDT. Our guest speaker will be two. Member Triston Dilapo will enlighten us with CCD Imaging for the Amateur. Being into this part of astronomy, Triston will surely give us his very best. The second speaker for the evening will be our Observatory Director, Dan Marcus. He attended the total eclipse of the sun on July 11th in Hawaii. His talk will be more with slides, according to him. and short. Lets welcome our two members and give them our support. REFRESHMENTS FOLLOW!

OCTOBER

The October 11th meeting will be held in the same place and time as the September meeting. At this meeting we will hear from our treasurer, Steve Kramer. He will talk on Ancient Astronomical Instruments including Astrolabes, Orreries and of course the Antikythera Mechanism or the Greek Eclipse Calculator which is a product of former member Bob Mayer and himself. He has attended a meeting on this subject just recently which he will no doubt refer to. Let us welcome Steve with a BAA welcome.

REFRESHMENTS FOLLOW!

DEADLINE

The DEADLINE for the NOVEMBER-DECEMBER issue of the "SPECTRUM" is OCTOBER 11, 1991 !!!!!!!!!!!

BOOKS: DOUBLE VISION IN DIVISION

There are two books out with similar titles on the same specialized topic by two authors from two famous institutions. First came a 1987 book *The Divided Circle...* by an author from Cambridge, now comes a 1990 book *Dividing the Circle...* by an author from Oxford.

The second one was noted in the Books section of *Sky & Telescope*, and I borrowed one to read through.

Chapman, Allan, *Dividing the Circle: the development of critical angular measurement in astronomy 1500-1850*, Ellis Horwood, London, 1990. 209 pages, 36 illus.

To answer the old question, "Do the stars move?", during this period needed improved optics (telescope), timekeeping (clocks), and finally measuring scales (graduated circle). If you read books like Henry King's 1955 *History of the Telescope*, you should enjoy Chapman's book.

The author is one of a new breed of "historians of science" who actually touch the artifacts they write about. And he really writes something about the artifacts rather than blathering about their significance, implications, relevance, &c. (historians), or producing a book of pictures with simpleton descriptions (curators). He is, however, still somewhat shackled by academe concepts and doesn't want to tell too much detail.

For instance, it would be helpful to visualize what a degree, minute, and second are. On a 5 foot diameter circle, a degree is .524 inch, a minute .00873 inch, and a second .000145 inch (very small). To better visualize the small angles, increase the circle radius to 300 feet (a football field): a degree is now 5 1/4 feet, a minute 1.05 inch, and a second .017 inch or the thickness of a credit card. You celestial viewers can make a similar scale for the sky.

There are contemporary illustrations, and though he does have six drawings of his own, mostly on scaling details, it would be helpful to have more and to have some on celestial measurement. Also, a glossary of terms would be helpful. However, someone reading this book is probably familiar with these matters or knows where to find answers.

I read through the book, catching these highlights in each chapter:

1 Instruments and history.

The role and recognition of an accurate angular measurement of celestial positions has not been appreciated as much as other developments as optics.

2 The Tyconic school, and its approach to instrumentation.

Amongst many instruments, Tycho Brahe is famous for his Great Quadrant (19 feet), which increased precision by using a scale with diagonal rows of dots in the graduations and by sighting by 'peg and slit' instead of two holes. His rigorous celestial measurements have been found by modern means to be within 50".

3 John Flamsteed, and the astronomy of the 'Great Catalogue'.

The telescope appears in 1609, of course, but it was not until around 1640 that it was adapted for precise sighting using internal hairs. To one astronomer the news was so exciting 'It ravished his mind from itself and left him in an extasie...'. The filar micrometer (two parallel, moveable wires) followed for even more precision. Robert Hooke adapted the screw micrometer to replace the graduated scale. And around 1650 is the pendulum clock.

4 Dividing as a high art.

By 1760 improved shop techniques and the vernier [matching a pair of slightly differing graduations] scale had improved accuracy

dramatically. But the quadrant was still divided using compasses. This changed with the introduction the full circle divided by mechanical means.

5 The techniques of eighteenth-century positional astronomy.

Enter the transit telescope [with a laborious definition], the zenith sector, and the regulator clock. Accuracy increased from 10"-12" to 2"-3".

6 The achievements of eighteenth-century positional astronomy.

With increased accuracy, astronomical distortions of refraction, aberration, nutation became more of an issue. But now the size of the earth and effect of gravitation could be measured.

7 The precision graduation of full circles.

Jesse Ramsden (1735-1800) is prominent here. Unfortunately only a line drawing of his famous dividing engine is shown. I have seen an original and it is an impressive work for this period.

8 Dividing by machine.

An important step was making a master dividing machine with which to make working models. Previously each had been an original itself.

9 The London scientific instrument-making trade.

The situation for innovation, intellectual development, and economic self improvement was better in London, especially more so than France, for instance.

10 The technical frontier; astronomical instruments and the cosmological framework.

Improved and increased knowledge necessitated changing the concept of man in the universe. But "Do the stars move?" was not answered until 1838.

11 The archaeology of the graduated circle.

This contains the results, published elsewhere, of the author's project examining artifacts made 1450-1750 with modern means. The best accuracies he found are a remarkable 15" at 7 feet [0.002 inch], but on another only 8' at 16 inches [0.02 inch].

Appendix: The practical operation of the dividing engine.

The author's brief experience at the bench.

Notes and references.

These take up a fifth of the book, which originally was his 1978 Ph.D. thesis.

For the other book I only have a review by Will Andrewes, a curator at Harvard.

Bennett, J.A., *The Divided Circle: A history of Instruments for Astronomy, Navigation and Surveying*. Phaidon Press, Oxford, 1987. 224 pages, illus.

It apparently covers ancient to modern history. It does not have footnotes, but a long bibliography instead. There is an index of makers and of technical terms. Also it seems to be more illustrated, though illustrative diagrams are not mentioned.

Steve Kramer

5 YEARS AGO - Who were the speakers for September and October 1986? We didn't know at the time THE SPECTRUM went to press. We were assured that there would be speakers, but who they would be was to be a surprise.

Paul Noye, a BAA member now deceased, had an article in THE SPECTRUM explaining how to polar align portable telescopes and how to use setting circles. Perhaps some newcomers would benefit from reading these articles. See me for copies. Dr. David Meisel contributed a brief article on findings obtained from the recent apparition of Halley's Comet. Michael Idem provided a comprehensive analysis of the incidence of fog at Beaver Meadow.

10 YEARS AGO - Several BAA members were speakers at the September meeting held a decade ago at Buff State. They reported on summer star parties, Stellafane, Mees Observatory, observations made during the summer and "Astrological Experiences", whatever that intriguing topic might be. For October, Orrin Christy spoke on "Mapping Our Galaxy Using the Hertzsprung-Russell Diagram".

THE SPECTRUM carried two articles on Jupiter, one by Fred Price, the other by Jim Machowski. Spy and Tell reported that October's speaker, Orrin Christy, and his long-time friend Michael Lance, took second place in a canoe race from Tonawanda to Albany. It took nearly 57 hours to complete. Orrin and his friend not only made the kayak they used, they also made the kayak used by the winner! On the sadder side, THE SPECTRUM carried the obituary for Rudy Buecking, one of the BAA's original members and a member of its College of Fellows. He was 79.

15 YEARS AGO - Fred Price took office as President of the BAA, a position he was to hold for the next four years. Our speakers for the first two meetings of 1976 were Dr. Gunter Wessel and Dr. Martin Green. Dr. Wessel's topic was "Jupiter" and Dr. Green's was "Television Astronomy".

The Viking landers, then heading for Mars, evoked an article by an anonymous member entitled "Mars: Then". It assessed the nature of the Red Planet from a perspective of what was known about it in the late 19th century, emphasizing the prospect that it might harbor life. It's hard to believe that the long-anticipated Viking mission took place fifteen years ago.

Our newly elected Treasurer, Tom Dessert, was holding classes in astrophotography at Beaver Meadow. Twenty-two students signed up!

25 YEARS AGO - September's speaker was Ernst Both, whose topic was "Amateur Astronomy through the Ages". In October members of the Instrument Section held a show and tell about the telescopes they built and how they did it.

The first part of a two part article by Carl Kalweit, "Where Is Everybody", appeared in the October issue. This is the famous question posed by Fermi that provides a strong argument against a plethora of advanced civilizations in the galaxy. Kalweit argues against this conclusion, citing the "zoo principle", in which other societies choose to watch us rather than make their presence known. Using the Greenbank Equation (Drake Equation), he suggests there may be between 40 and 10,000,000 advanced civilizations in the Milky Way right now. Are we any closer to resolving this issue after 25 years? I think so, and I think the answer leans toward Fermi's view.

Rowland A. Rupp

INSTRUMENT NOTES

There are several tasks awaiting the attention of our group during our fall meetings. Among other problems, here are two mirrors to test and possible indicate corrective measures. Then there is a completed telescope to check out. And we are still working on our practice telescope for use at Beaver Meadow.

Mirrors are given a routine test with a Ronchi screen. This test is not as rigorous as the Foucault knife edge test. However if a mirror tests very good on the Ronchi test it will be satisfactory for all but the most exacting requirements. If the mirror shows defects on the Ronchi test it can be tested with the knife edge to point out the necessary correcting action.

For testing the mirror of a reflecting telescope, the mirror can be tested while it is in position in the tube. Then the diagonal is replaced and the collimation tested with a Cheshire eyepiece. If the mirror test and the collimation are acceptable the telescope is ready for a star test. All of the tests so far are for a reflector. If the telescope is a refractor not much can be done. The lenses can be tested using a collimator. But if there are defects we do not have facilities for correcting the figure of objective lenses. So we would test a refractor directly on the stars as we are now ready to do with our reflector.

For the star test we wait patiently for a night of good seeing. We start out by setting up on Polaris. This star is of good brightness for our test and it has very little motion so we do not need a clock drive, and the star has a close companion which is a good test for a six-inch scope, as well as for the observer's eyes. If we can see the companion star with our six-inch reflector or a 3 or 4 inch refractor we are off to a good start. We next examine the star closely. It will appear as a disk, called a spurious disk. It should appear as a point, as it is so far away, but because of the inherent defects of optical systems, it will look like a disk. The smaller the disk the better the optical system. The disk should be perfectly round. There should also be concentric diffraction rings and these should be round. Departure from roundness or concentricity indicates optical distortion, astigmatism or misalignment. Next, throw the image out of focus by moving the eyepiece inward. The disk should remain evenly illuminated. If it is brighter at the rim than in the center, there is spherical aberration, probably in the objective. If the eyepiece is now moved outside of the focal plane, the center will appear brighter than the edge of the disk if there is spherical aberration. If a telescope passes these tests it is looking better and better. Now we are ready to try it on observing as it was intended to be used.

There are a number of celestial objects that can be used to test a telescope. Each observer has his favorites. Just observe the activity at a star party. One object that is a very good test is Albireo in Cygnus. It is a beautiful blue and gold double. If the colors are bright you have a good scope and good eyes. Also try Epsilon Lyrae, the double double in Lyra. It is easy to see the group as a double but to separate each component so that there are four stars requires a good six-inch reflector. I am not sure of the minimum refractor size. There are many other doubles and nebulae. The experienced observer can compare the scope under test with a familiar one that he has used. This is being done at every star party. The eyepiece swapping at star parties points up another rule -- Be sure you have a known high grade eyepiece when making comparisons.

Ed Lindberg

OBSERVATIONS WITH AN OIII FILTER

Lumicon guarantees that you can see an invisible nebulosity with it or your money back. Well, they don't have to worry. I saw the Veil Nebula from Buffalo, New York using a C8 with limiting magnitude a bit better than fourth and a gibbous moon in the low eastern sky! Even a four inch refractor showed the Veil under these conditions using averted vision.

Admittedly, I had to use averted vision for the fainter sections with the C8 but the nebulosity was not that difficult. Even some mottling was seen. Without the filter, no evidence of the nebula was detected and even the

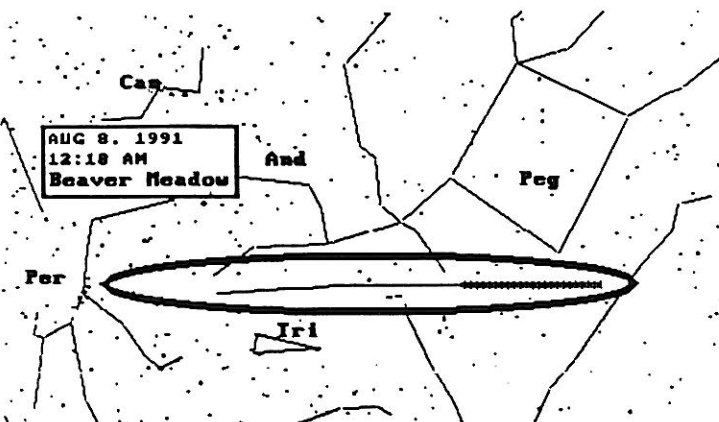
UHC filter didn't bring it out under these conditions.

At Beaver Meadow using a 28mm ortho eyepiece on the 12", the Veil could just be made out with averted vision and no filter. The Milky Way was easily seen overhead and magnitude limit was better than fifth. With the OIII, the Veil was just like in the photographs, some sections appearing like wind blown lace curtains and some like twisted rope. I couldn't get it in all one field, but had to scan along the nebula.

The other nebulas I've so far tried with the OIII are the Dumbbell (loses all internal detail because it becomes so bright at low powers) and the Ring Nebula (may require a neutral density filter to tone it down).

David Fliss

An Early Perseid?



In the early morning hours of August 8th while observing at Beaver Meadow, an early(?) Perseid meteor put on quite a show. I just happened to be looking toward the northeast and caught the entire start/finish of this spectacular sight. Referencing the diagram above, the meteor started out well below and to the left of the Andromeda Galaxy. A bright, thin streak of light about magnitude -3, lasted for 35-40°. At a point just below the left hand side of the Great Square in Pegasus, the streak changed from a thin bright line to a white hazy line 1/2° in height and lasted for an additional 20° in length. This very distinct portion of the trail lasted 5-6 seconds and then faded from view. It was truly quite a sight.

Bruce Newman

JULY AND AUGUST AT BEAVER MEADOW

July 11th's partial solar eclipse was seen by over 40 people that were at Beaver Meadow that day. Most were family groups and all were intrigued by the event and the sunspots visible through the telescope. The children were really impressed when viewing the sun with a solar filter held up to their eyes to see the "bite" out of the sun and hung around for more than one look.

The weekend of July 20 and 21 for Beaver Meadows Nature Festival was quite successful with an attendance of over 170 people going thorough the observatory. The Beaver Meadow staff and their volunteers were also favorably impressed with our efforts. I'd like to thank everyone that came out to help as they were really needed.

Ed Czapla helped out with the solar observing on Saturday, braving the 112 degree temperature in the observatory. In the evening, Bruce Newman, Marilou Bebak, Russ Bly and Joe from the Lockport Astronomy Club showed up to help with the public night. Unfortunately, it clouded over and not even the moon was able to penetrate the overcast. Had it been clear, we should have had a good crowd as we had been promoting it during the day. Even so, we had about six people stop by.

On Sunday, Wade and Lynn Sigurdson and Dave Sepulveda brought their computer systems and demonstrated some of the newer concepts in astronomy. They had some very attentive people throughout the day asking questions. I know I learned a lot just by looking over their shoulders.

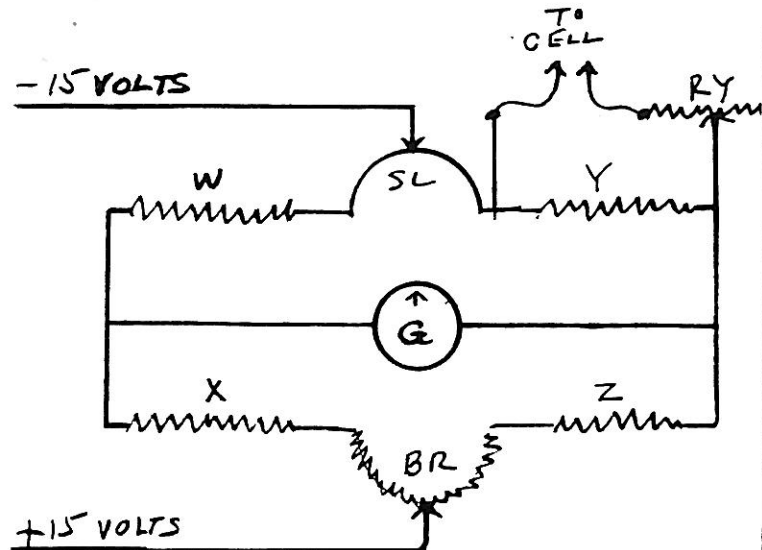
David Fliss

PARTIAL SOLAR ECLIPSE

A total eclipse of the Sun occurred on July 11, 1991, and was observed throughout Mexico, the Baja and even as far west as Hawaii on the southern coast of Maui. Here in the Buffalo area, we saw what appeared to be a small chunk cut of the southern part on the sun's disk by the moon, nearly 5%. As the eclipse of May 30, 1984, I set up my recording instruments to view the partial eclipse as seen from the Honey-House Observatory in my backyard. With little interference from clouds, it proved to be very interesting as well as beneficial.

The instruments used were Micromax recorders which can be made to record many things such as light deficiency, movement, gases, electrical impulses and many others. I used them to record light deficiency of the solar eclipse caused by the moon's passing in front of it. This is accomplished in one of two ways. One is by the use of a Voltaic Cell or Photoelectric Cell, the other is using a resistance cell or Cadmium Cell. The Voltaic Cell produces an electrical current when exposed to light whereas the Cadmium Cell becomes less resistive when exposed to light. Their powers are to upset a balance in a bridge system.

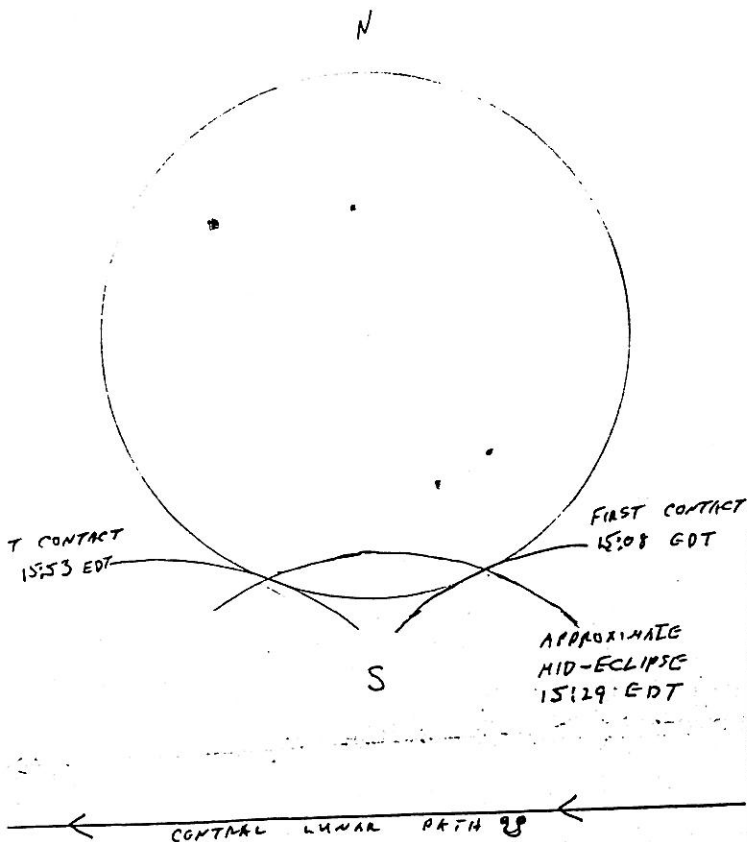
The bridge system in figure (1) is the basic diagram used, but with the fine details for accuracies left out. Resistors W, X, Y & Z are all within a .25% tolerance from each other. Resistor BR is used to obtain a balance in the circuit in conjunction with resistor SL. The galvanometer (G) is what tells the SL where to cause the bridge to be balanced to a zero setting on a chart or graph. A pen is mechanically set to zero through the resistor SL. This is all done with the cadmium cell disconnected. When the cell is connected across resistor (Y), and is exposed to light, (G) in the bridge is upset and seeks 100%. Resistor RY, a variable resistor or potentiometer, is used to controll the maximum allowable gain the cells can produce from the light source. As the sun's disk is cut by the moon, the light from the sun is caused to be less bright. This light deficiency causes the cell to become more resistive and the galvanometer will react causing SL to seek a new position of balance by a given percent. The explanation of a voltaic cell is much more involved so I decided to leave that diagram out. Should anyone wish an explanation, I'll be glad to show them as the time permits.



By using three different instruments, I was able to come up with a little more accuracy than if I had used only one. In the May 30, 1984 eclipse, I used two instruments, one with a cadmium cell, the other with a photoelectric cell. proving one against the other. They did give me an exact accuracy of 77% which was the amount of light deficiency then.

The partial eclipse of July 11, 1991 was recorded with great success. One cadmium cell instrument showed 5%, the other cadmium cell instrument read 4.95% and the photoelectric cell instrument read 4.938%. These totals averaged out to be 4.963% which was -.02% of what they should have read. The charts are large enough that I was not able to reproduce them for the "SPECTRUM."

The drawing was taken from an observation of the eclipse which I projected on a white card. The telescope used was a one inch refractor projecting an image with the equivalent of 700-inch focal length. Sunspots were drawn in to show the placement, not the actual sizes and shapes.



The eclipse times are not accurate as I did not have my clock set to WWV or CHU. Also, inaccuracy of the first contact was not perceived due to the grazing effect of the moon's disk coming into contact with the disk of the sun. A time estimate can be determined through steps taken by observations of the shadow movement. I recorded first contact near 1508 EDT; mid-eclipse occurring at about 1529 EDT; and final contact happening near 1553 EDT. Total time for the eclipse was 45 minutes. Throughout the entire eclipse, I did not see one cloud hampering the observation. Too bad it could not have been a total eclipse here with the weather conditions we had!!

Darwin Christy

OBSERVATORY REPORT #457-3104*

Aloha!! You didn't see totality? well we missed it too. The Big Island of Hawaii was clouded out where Elaine Blecki, Melissa and I along with Sky & Telescope's tour group were. We saw the last 1/3 really well, too bad that cloud patch did not leave thirty minutes earlier!! Them's the breaks. Virgin Islands in 98 anyone?? Start saving now, just 139 pennies a day at 5% will get you over \$4,000 by the time you leave! So start saving for it now!! May 10, 1994 there will be an annular eclipse of the Sun going right through Buffalo. WE should start gearing up for it NOW. Sun Goggles, T-Shirts, Information Pamphlets, team up with Nature Company, The opportunity is Knocking for making \$\$\$\$\$. On the less mercenary side what a great opportunity to get the public interested in the BAA.

Thank you to: Irene & Rowland Rupp, Lawrence Carlino, Jayne & Jack Mack, and Bill Smith for having star parties this summer. As usual everyone enjoyed themselves in spite of some occasional clouds, and pesky aurora, which kept the stars at bay.

PUBLIC NIGHTS: Clouds as usual? Nature Company and the Siera Club showed up on August 3 for a cloudy night and were treated to a slide show by Dave Fliss, and myself. They enjoyed it so much they asked to watch another after seeing the first! P.S. People even called on the phone to see if we were going to be there that night. Speaking of the phone, people were really interested in the Eclipse, because the machine had at least 15 calls. So keep handing out our Observatory slinger, post it in your local library, schools, supermarkets, and any other place you can think of.

HEEELLPP!!! Are you bored, need something to do on the weekend of Beaver Meadow's Trash and Treasure Sale (come on all you garage sale junkies) Saturday September 14 and 15 th? We need help manning the Observatory from 10am to 5pm, 7pm to 10pm Saturday and 1pm to 5pm on Sunday. Bring a scope, books, computers, satellite radios, pictures, a friend, or just come and join the fun! Never know what sort of treasure you might find. Thanks to Dave Fliss, Ed Czapla, Lynn & Wade Sigurdson, along with the rest of you who showed up in the heat to do the July public weekend, while Melissa and I were enjoying our Hawaii vacation!

Observatory Projects: I must apologize for not getting of my fat duff and moving on the tracking mount, but this past year has been busy for me, and looks like it will be that way into November. I would like to give a special thanks to Dave Fliss who has been doing some repairs, and modifications to the observator. ie fixing entrance stair, folding shelves, and in general sprucing up the place. Public night September 21, I will be there at around 3pm for a repair session. In addition to repairs, I will be glad to talk to anyone willing to lead a project, and coordinate the ones we wish to tackle. Once organized we can submit our proposals to the board for approval. Give me a call before hand if you wish to help with repairs.

Daniel R. Marcus

While in Hawaii for the solar eclipse, Dan Marcus ruined his back when hauling a 12 volt battery for the drive on his telescope. For all the eclipse was disappointing because of the clouds, Dan and Melissa enjoyed snorkeling in the ocean; seeing the lava flow of a volcano, and taking a scuba diving lesson in a pool. As to the eclipse, Dan's single comment: "Expensive!" Melissa's comment on the trip: "We had a wonderful time."

Dave and Cathy Sepulveda and the children visited Cathy's mother in Sandwich, Cape Cod, from August 16-24, and rushed home to attend a wedding of a friend. In September, Adam will be starting kindergarten at the Drake Elementary School in North Tonawanda.

Computer dealers beware! Steve Kramer is trying to upgrade his computer, but the last two dealers from whom he decided to buy, promptly went out of business. Now Steve is just waiting for prices to come down, as the current trend is dropping. He needs to upgrade his computer to do three dimensional drawings of gear diagrams for his manuscript on the "Rittenhouse Orrery," about which you will be hearing in October.

Jack Empson and Dave Sepulveda spent the weekend of August 10th at Watkins Glen as marshals for the NASCAR race, the big race of the season.

The Biggie boys are attending Carnegie-Melon University in Pittsburgh, where Kevin is a junior and Chris is a freshman. Both are studying engineering. Kevin is in ROTC, and for five weeks during the summer he spent time with the Navy out in a submarine; on an aircraft carrier; with the Marines; ground forces and so forth, in the area around San Diego and San Francisco. Ken has been flying and sailing occasionally this summer. In September, Ken and Diane are planning a vacation in New England.

During the spectacular conjunction of Venus, Jupiter, and Mars in June, Gene Witkowski took the opportunity to try to use Venus as a guide to try to find Jupiter in daylight. He was successful, and against the blue background of the daytime sky, Jupiter appeared to be a pinkish-orange color, with the belts visible. Gene continued to find crescent Venus during the day until it departed.

In September of '90, Michael Krasner went to Spain, Portugal, and Morocco for two weeks. In the beginning of the summer of '91, he went to see Frank Lloyd Wright's houses in Chicago, and saw a Chicago Cubs game in Wrigley Field.

Since 1974, Jean Rachlin has been a computer programmer analyst at Frontier Science & Technology Research Foundation, Inc.

Joan Eschner, who teaches 5th grade in West Seneca, has received a great honor. She is one of three runners up for the Presidential Award for New York State Mathematics Teachers. From around 1000 names that were submitted for the award, Joan was one of the top three chosen. Congratulations! Will keep you posted on the final results which will be announced at the end of August.

Edith L. Geiger



HUBBLE TROUBLE

How does an insider view the source of the highly-publicized Hubble Space Telescope focusing problem? This is an account from a newly-hired employee of the mirror's manufacturer:

To put it bluntly, the error in the primary mirror was all my company's fault. A technician set up an optical test fixture incorrectly. The test involved a beam of light shining through a hole in an aluminum plate and reflecting off a glass rod to an interferometer. The interference pattern, displayed on the technician's screen, would be used to determine how much to polish the mirror. The pattern reflecting from the glass rod was too faint for this technician, who was

erroneously focused on the reflection from the aluminum plate rather than the glass rod. As a result, the reflection was two millimeters off, and the mirror was correspondingly polished to the wrong prescription. Needless to say, the name of the technician has not been revealed, and probably (and rightfully so) never will.

However, it is the job of engineers and managers to catch all errors that could lead to any performance degradation, and here is where the fault comes in. There were two warnings that something was wrong. The first came when the technician, in trying to focus the fixture, turned the adjusting screws as far as they could go and still couldn't get it to focus. Instead of questioning this, a new fixture was made with a larger adjustment, even though the first one was designed so that it would have enough adjustment. The second warning came when the company tested the mirror with a second piece of test equipment, which showed that there was an error in the curvature. The data from this test were ignored, however, because managers decided that the first fixture was more accurate. No additional testing was deemed necessary, nor was there an investigation to determine the cause of the conflicting results because the program was behind schedule and over budget.

The good news is that now we know the cause of the error, we can correct it. The head of the Hubble program has recently issued a report that states that the error is one hundred percent correctable. Since all of the cameras on board the Hubble were designed to be replaceable on-orbit (this was the first satellite designed to be maintained while in orbit) and, in fact, were to be replaced in 1993, everyone is breathing a sigh of relief. A series of corrective mirrors and lenses, which will not appreciably affect the light-gathering capability, will be installed along with the cameras and new solar arrays (the old ones vibrate too much—we weren't the one who designed those), and then the Hubble will work as designed originally, although a significant portion of its fifteen year life will have passed.

As a postscript to this unfortunate incident, we are currently designing two more space telescopes—one that sees in x-rays and one that sees in the infra-red. Apparently we are the only qualified company able to do these things, and, therefore, are guaranteed, at least for now, a monopoly on space-based optics. This reminds me of Morton-Thiokol, who designed the Shuttle booster rockets that killed the seven Challenger astronauts, and then were paid to redesign them because they were the only ones who could. What a shame!



Membership Corner

by Bruce Newman

Just as a reminder, the month of September starts a **NEW** membership year. If you are not planning to attend the September general meeting, please renew early by mail. Your 1990-91 Directory contains a renewal form. Please fill it out as thoroughly as possible so we may have the most up-to-date (telescopes, computers, interests, etc.) information for the 1991-92 Directory. Let's get the new **wallet-sized** membership cards out early this coming year, and let's get some more information on **YOU** other than name, address, and telephone number!



ASTRONOMICAL HAPPENINGS

SOLAR: The Sun will travel from Leo into Virgo on September 12th, then enter Libra on October 24th. There it will remain until November 17th. On the 23rd of September the Sun will cross the Autumnal Equinox, the beginning of the Fall Season.

SOLAR CONJUNCTIONS: Mercury in superior conjunction on October 3rd.

LUNAR: The phases of the Moon will be Last Quarter on September 1st & 30th and October 30th; New Moon September 8th and October 7th; First Quarter September 17th and October 15th; Full (HARVEST) Moon September 23rd and Full (HUNTER'S) Moon October 23rd.

LUNAR CONJUNCTIONS: Venus - September 6th; Mercury - September 7th; Jupiter - September 7th & October 5th; Mars - September 9th; Uranus - September 17th & October 14th; Neptune - September 17th & October 14th; and Saturn - October 16th.

LUNAR OCCULTATIONS: Venus - October 4th.

PLANETARY EVENTS: Mercury at greatest elongation (18° west) - September 7th; Venus stationary - September 11th; Uranus stationary - September 19th; Venus' greatest brilliancy - September 28th; Saturn stationary - October 4th.

PLANETARY CONJUNCTIONS: Mercury & Jupiter - September 10th; Venus & Jupiter - October 16th.

MINOR PLANET EVENTS: Juno stationary - September 6th.

METEOR SHOWERS: for September:

Beta Lacertids and Aurigids - 1st; Epsilon Perseids - 11th; Southern Piscids - 20th; Kappa Aquarids - 21st; Alpha Aurigids - 22nd; Sextantids (daytime bolides) - 29th for October:

Quadrantids (4 hours long) - 2nd; Andromedes - 3rd; Giacobini-Zinner Comet 1985 - 8th; Draconids - 9th; Northern Piscids - 12th; Epsilon Arietids - 17th; Epsilon Geminids 19th; Orionids - 21st; Leo Minorids - 24th.



PRESIDENT'S REPORT

Welcome to a new year of activities with the Buffalo Astronomical Association. I hope you found time during the busy summer to attend a couple of star parties and get better acquainted with your fellow members and with the variety of astronomical equipment they have. Special thanks go to those who hosted parties: Larry Carlino, Jayne and Jack Mack, Melissa and Dan Marcus, and Irene and Rowland Rupp.

We have some projects to work on during the coming year. We're still modifying the telescope mount donated by Bell Aerospace for astrophotography at Beaver Meadow. The Instrument Section is in charge of this project. Newcomers to the club are reminded that we have a group of telescope builders and testers who meet about once a month. Everyone is invited to attend, whether experienced in instrument building or not.

Another project is a study to determine if it is feasible to purchase a charge coupled device (CCD) imaging camera for the observatory. Russ Bly, Jack Mack, Ken Kimble, Dave Fliss, Dan Marcus, Ed Lindberg and Joel Stuckey have volunteered to undertake this study. I hope they will have a report in the first couple of months of this new year.

A second committee, composed of Ken Biggie, Rick Janas and Jack Mack, is studying the advisability of meeting again at the Museum of Science. Preliminary reports indicate the Museum can accommodate us; we should make a decision early this year.

Members sometimes ask what, as an affiliate, we contribute to the Museum. Some of our service consists of support at Kellogg Observatory on public nights, responding to astronomically-related questions from the public that the Museum routes to us, helping them to conduct telescope clinics and other volunteer activities and teaching classes as part of their adult education

program. Speaking of classes, we are planning to conduct an eight week class in basic astronomy this fall. See the Museum's brochure, or see me, for details. And finally, evidence of affiliation with public groups is a plus in the Museum's eternal quest for funding.

One other project is participation in a "Community Bazaar" at the Boulevard Mall on Friday, October 25, and Saturday, October 26. We'll need volunteers to talk up the club, and astronomy in general, from 10 AM to 9 PM those two days. Prohibitive insurance costs prevent us from holding the independent mall shows we used to have.

I'd like to remind you to contribute to THE SPECTRUM. Darwin Christy always needs articles—you don't have to be Isaac Azimov to get published in THE SPECTRUM. If articles aren't your thing, try observation reports. We also encourage observation reports at our general meetings. They're a good way to get to know members and to raise discussions about astronomical events. Also, time during our general meetings is devoted to answering questions relating to astronomy. Either ask the question on the spot or, if you'd rather, pass the question to Doris Koestler. She'll find someone to answer it at the next meeting and provide a five or ten minute information session for us all.



Rowland A. Rupp

A PROFILE

Thomas F. Nigrelli

Tom, one of our recent members, was born on Buffalo's west side and received his early education at Holy Angels Grade School, and went on to Grover Cleveland High School. His college education consisted of attending four colleges in four years. He started at Buff State in a summer session studying meteorology and oceanography, and the following summer took a fun trip to Hawaii with friends, where he used the above, especially enjoying a swim in the ocean. He attended U.B. and Canisius trying out various courses, and finally went to Erie Community, North, to study computers.

As an occupation he went into something entirely different from anything he had studied; that of the building trades in which he has been engaged for sixteen years. He first worked for a general contractor, then became a Union carpenter and as such, worked on several projects including the Rapid Transit System, and the Hilton Hotel with the Cowper Construction Company, and various other jobs like that at James Audubon Industrial Park. Probably the most memorable assignment was working on the set of the movie, *The Natural*, starring Robert Redford, which was produced in Buffalo. The first day when Redford stepped out, there was an eye to eye contact between Redford and Tom at 100' away, an event which Tom cherishes. When he was doing some carpentry work on the field, he commented to Wilfred Brimley (the oatmeal man) whom he didn't recognize, "Looks like they hired a lot of extras." (Hope Brimley didn't mind Tom's casting him as an "extra.")

Tom worked with a smaller company for a couple of years, then formed his own company, Thomas Development, specializing in building custom kitchens and bathrooms. He has been running the business from his home for eight years, and with a three man crew they work in some of the finer homes in Buffalo, Amherst, Williamsville and Clarence.

Tom became interested in astronomy two years ago as a result of organizing a cruise on Lake Erie for the running club of which he is a member. It was a beautiful trip with clear skies and a total eclipse of the moon (August 17, 1989), which was most impressive. There had been an earlier spark of interest twenty years ago when a neighbor friend brought his telescope over so Tom could take a look at the moon. Tom recently joined the BAA, and in September he will become a member-at-large on the Board of Directors.

being a carpenter by trade, he enjoys working with his hands, which led him into making a 10" Dobsonian. He purchased a Galaxy mirror, a fiberglass tube from Parks Optical, inner parts from Kenneth Novak & Co., and a focuser from Tectron Telescopes. His special interests in astronomy include deep-sky, double stars, and clusters.

Tom, a runner, is a past president for four years of the Buffalo Philharmonic Athletic Club, a running club started in 1968 by some Philharmonic members. It is the oldest running club in the area. He runs in marathons and was a participant in the Buffalo Skylon Marathon six years ago. He has been involved in shorter races and is in the top third of his age group in the area. Besides running he enjoys bicycling and goes with friends on two hour rides in North Tonawanda and Buffalo.

Tom bought a house three years ago, removing the interior and remodeling it from scratch with everything brand new. It is ninety-five percent complete and should be finished before too long.

Music, both classical and new jazz, provides him with many hours of enjoyable listening from Bach and Vivaldi to Bangelsis, and Kitaro. About twelve years ago he found the flute appealing and studied the instrument for awhile at the Community Music School on Elmwood Avenue. Too many activities prevented him from pursuing it further.

On July 18th, Tom and Nancy Glose eloped on the tenth anniversary of their first date. Our best wishes for a lifetime of happiness. They share their love of gardening and have wildflowers and perennials in the garden at their home.

Tom is bubbling over with energy and delights in trying one thing after another. His outgoing personality makes it easy for him to make many friends. We will be following him as he finds new spheres of activity that excite his curiosity.

Edith L. Geiger



* THE SPECTRUM *

BUFFALO ASTRONOMICAL ASSOCIATION, INC.

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* PRESENT CONSTELLATIONS *

* SCORPIO and HAND of JUSTICE *

This constellation was commemorated, in 1679 by Royer, to his King, Louis XIV. A century later, in 1787, Bode substituted it, calling it Frederici Honores, in honor of his sovereign, Frederick the Great. While Royer's figure has been entirely forgotten and Bode's nearly so, leaving Lacerta holding its place among the present day constellations.

* FREDERICI HONORES *

Following the constellation of Royer, Bode introduced this constellation which in 1790 was published in the 'JAHRBUCH', a minor constellation, called Friedrich's Ehre (Frederick's Glory). The constellation was made up from 34 stars in a space between Cepheus, Andromeda, Cassiopeia and the Swan. The space is where Royer attempted to replace the earlier Lacerta of Hevelius in 1679. Royer had borrowed for his creation from the hand of Andromeda, moving it a more easterly position, entirely indifferent to the fact that it had been 'stretched out for over 3000 years.' Bode's figure was described thusly: 'Below a Nimbus, the sign of royal dignity, hang, wreathed with the imperishable Laurel of Fame, a Sword, Pen and Olive Branch, to distinguish this ever to be remembered monarch, as hero, sage and peacemaker.'

As mentioned it is seldom or no longer mentioned in the maps and charts, while Lacerta maintains its position in the spot much occupied.

Darwin Christy



Thank you for your support! Rowland Rupp, Edith Geiger, Ed Lindberg, Dan Marcus, Steve Kramer, David Fliss, Bruce Newman, Ruth and Darwin Christy (who is he!)

EDITOR

