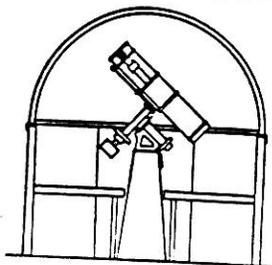


# The Spectrum



elg



BUFFALO ASTRONOMICAL ASSOCIATION, Inc.

NOVEMBER - 1994 - DECEMBER

officers

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Bob Hughes - Vice President  
Lynn Sigurdson - Secretary  
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Darwin Christy - "SPECTRUM" Editor

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The telephone at BEAVER MEADOW (716 457 3104) is for emergency use only at no cost. There is however, a box placed near the phone for which we ask that you deposit 50¢ for the first three minutes and 10¢ per minute thereafter for domestic calls. Please abide by this ruling. THANK YOU!

IN CASE OF EMERGENCY

If for any reason there might be cause for cancellation of the meetings of the B.A.A., tune your radio to WBEN (930) or WGR (550). Also, if Buffalo State College has been closed because of inclement weather, so will the meeting of the B.A.A. be cancelled.

"SPECTRUM" DEADLINE

The **deadline** for the **JANUARY/FEBRUARY 1995** issue of "The SPECTRUM" is **DECEMBER 9th**. Due to the Christmas Season, please have any article in to me on/or before that date to ensure publication. **THANKS!**

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\*\*\* MEETING NOTICE \*\*\*

November 11: Budget Astronomy - a low cost approach to enjoying astronomy.

December 9: Annual candid camera presentation by Edith Gieger. Also, a videotape presentation of the expansion of Beaver Meadows Observatory.

Meetings: 2nd Fridays @ 7:30pm Jan-June & Sep-Dec.  
Location: New Science Building Auditorium at Buffalo State College on Elmwood Ave.

We hope to see you at these meetings.  
As usual refreshments will follow.

The November meeting will feature Dave Fliss, Terry Farrell, Larry Carlino, Dan Marcus, & Mark Reville illustrating books, observing aids, telescopes and computers used in astronomy which will dispel the notion that astronomy is an expensive hobby.

Our December meeting will reveal members in a new light as seen through the camera of our club photographer. In addition, Rowland Rupp will present the Beaver Meadows expansion videotape.

Bring a friend and your ideas!



\*\*\*\* PRESIDENT'S MESSAGE \*\*\*\*

A LOOK TOWARDS THE FUTURE

In any organization there seems to be a trend of 80% of the work being done by 20% of the people. I have noticed that this trend seems to be the norm amongst the members of the BAA. What I would like to do as the new president is to change this trend to be 20% of the work being done by 80% of the members. I know that for some members it is extremely difficult to devote time to the club in addition to attendance at monthly meetings. With today's way of life it seems there are increasing demands on our free time whether it be family or career. However, most individuals need to have a hobby in order to relax and enjoy themselves. When you joined the BAA you had expectations on what the club was all about and now is the time to contribute your ideas. Even, if you can only attend the monthly meetings your input is extremely important.

I realize that at this point there are no major projects on the horizon, with the exception of upgrading the computers at the observatory, and repairing the mount on the 12 1/2" scope to allow for CCD imaging. Therefore, I am asking the members for ideas and assistance in developing activities for the benefit of all. Remember, that the BAA is your club and that all members have skills and knowledge to contribute.

I have been planning a schedule of events for this year and have been in contact with several members and plans are being made for the following: to start CCD imaging classes, a spring field trip to the David Dunlap Observatory in Toronto, open forums for the exchange of ideas amongst members, to conduct a membership survey for ideas and opinions, a field trip to the Strassenburgh Planetarium in Rochester, to increase public awareness of the BAA and astronomy in general by more publicity and holding a star party at the new observing site at Beaver Island State Park on Grand Island, and continue to host an astronomy day celebration at Beaver Meadows Observatory. In addition, to secure guest speakers for our meetings who will present a variety of topics.

Now that the astronomical task of serving as president has been bestowed upon me, I view this an opportunity which will be both challenging and interesting. I want to share these challenges with all the members and express a sincere wish for input from everyone. So, please consider what you can offer the club and let's view the future as a period of positive growth and change.



Terry Farrell

BAA HISTORY

Copies of the BAA History can still be obtained from:

Rowland Rupp  
132 Burroughs Dr.  
Snyder, NY 14226

The cost is \$7.50; mailing is an additional \$1.50. If not mailed, the history will be brought to you at a meeting. Checks should be made out to the Buffalo Astronomical Association.



MEMBERSHIP CORNER

It appears as though the retailers of the country have once again conspired to shorten our year. A walk through some of the stores at your favorite mall will quickly make you realize that they are already after your Christmas dollars. I wonder how long it will be before Toys'R'Us has a date conflict between their After Christmas Sale and their Before Christmas Sale. Another date which is quickly approaching is the deadline for renewing your membership in the BAA. We would like to thank those of you who have already renewed for the 1994/1995 membership year but if you have not yet done so, you can see us at the next general meeting or mail your renewal to us at 125 Roycroft Blvd., Snyder, NY 14226. The dues are still \$20 for Family, \$15 for Individual or Regular, and \$10 for Student or Senior Membership.

A fair question to ask, especially if you are a newer member, is "What do I get for my money?" Well, in addition, to receiving the Spectrum six times a year you have access to all the equipment, the reference library, and the computers at our Beaver Meadow Observatory. Talk to Dan Marcus or Bob Titran about what's available and how you can get to use it. As a member of the BAA you're also entitled to reduced subscription rates for Astronomy and Sky & Telescope magazines and discounts on orders from Sky Publishing. If you are interested in any of these, see our treasurer, Steve Kramer, who can fill you in on the details.

We would like to remind all our members that the two of us do more than just collect your dues once a year and keep the Spectrum mailing list current. We're also here to make sure you get the most out of your membership in the BAA. If you're interested in helping out at the observatory, would like to host a star party, would like some help deciding on which piece of astronomical equipment to invest in next, or have any other question about astronomy or the BAA, please stop by the "membership table" at the back of our meeting room and see us or give us a call at 839-9109. We'll be more than happy to answer your questions or direct you to the people who can help you. Remember, this is part of why you pay us the big bucks.



Joe and Bev Orzechowski

ASTRONOMICAL HAPPENINGS

NOVEMBER

- 2 - Conjunction - Mercury & Moon  
Venus stationary and at inferior conjunction
- 3 - NEW MOON  
Moon at perigee (357,240 km)  
A total eclipse of the Sun will not be visible in the United States or Canada
- Conjunction - Mercury & Spica  
Southern Taurid Meteor Shower
- 5 - Mercury at greatest elongation (19° west)  
Vesta stationary
- 8 - Conjunction - Neptune & Moon  
Conjunction - Uranus & Moon  
Pallas at opposition
- 9 - Saturn stationary  
Cepheid Meteor Shower
- 10 - First Quarter Moon  
Northern Taurid Meteor Shower (this sometimes is as late as the 13th)
- 11 - Conjunction - Saturn & Moon  
Mu Pegasid Meteor Shower
- 12 - Conjunction - Mercury & Venus  
Arietid Meteor Shower
- 14 - Bielid Meteor Shower (sometimes called the Andromedes)
- 16 - Leonid Meteor Shower
- 17 - Conjunction - Jupiter & Sun
- 18 - Moon at apogee (406,346 km)  
FULL (BEAVER) MOON  
A penumbral eclipse of the Moon will be visible throughout the United States and Canada
- 20 - Conjunction - Pluto & Sun
- 21 - Venus stationary
- 22 - Conjunction - Vesta & Moon (this could be seen as an occultation in lower latitudes)
- 25 - Conjunction - Venus & Moon
- 26 - Last Quarter Moon
- 28 - Andromedes Meteor Shower (these are **not** to be confused with the Bielids)
- 30 - Conjunction - Venus & Moon

- 2 - NEW MOON  
Moon at perigee (357,264 km)
- 5 - Conjunction - Neptune & Moon  
Conjunction - Uranus & Moon  
Phoenicid Meteor Shower
- 9 - First Quarter Moon  
Conjunction - Saturn & Moon  
Venus at greatest brilliancy
- 10 - Monocerotid Meteor Shower  
Northern Chi Orionid Meteor Shower
- 11 - Rho Hydrid Metro Shower  
Southern Chi Orionid Meteor Shower  
Delta Arietid Meteor Shower. The three previous meteor showers could prove interesting to locate and sort them out.
- 13 - Mercury at superior conjunction  
Geminid Meteor Shower
- 15 - Moon at apogee (405,019 km)
- 17 - FULL (COLD) MOON
- 18 - First photo of the Moon taken in 1839
- 21 - **Winter Solstice**
- 23 - Conjunction - Mars & Moon  
Ursid Meteor Shower
- 24 - Ceres stationary
- 25 - Last Quarter Moon  
Vesta at opposition
- 28 - Conjunction - Venus & Moon
- 29 - Conjunction - Jupiter & Moon (an occultation will be seen in most of Japan and NE Asia)
- 30 - Moon at apogee (360,488 km)

METEOR SHOWERS

The Leonid Meteor Shower

The Leonid Meteor Shower (Comet Temple 1866I) Must have appeared well before 1866, because in 1833 there were as many as 10,000 meteors seen at that time. In 1866 there were as many as 1,000 seen in one hour. They radiate from 10h 00m Right Ascension and +22° Declination. This irregular shower emits very swift, long streaks of 3rd magnitude, bluish in hue, lasting 4 days around the 16th of Novemebr. They come with sharp increase and quick decline in appearance. In 1965, they were again predicted to display upwards of 10,000 hourly, but cloud prevented it, but high flying planes were able to see them and there were as many as 100,000 observed. They came in so fast that the observers were unable to get an accurate count.. Hopefully, in 1998 we will once again be in for an excellent display of blue meteors.

One of the best showers in December, the Geminids will radiate from 07h 32m Right Ascension and +32° declination. This annual shower produces short, swift, 2nd magnitude white meteors, lasting about 4 days around the 13th. They should also produce as many as 40 to 60 hourly and can even be seen during a Full Moon.



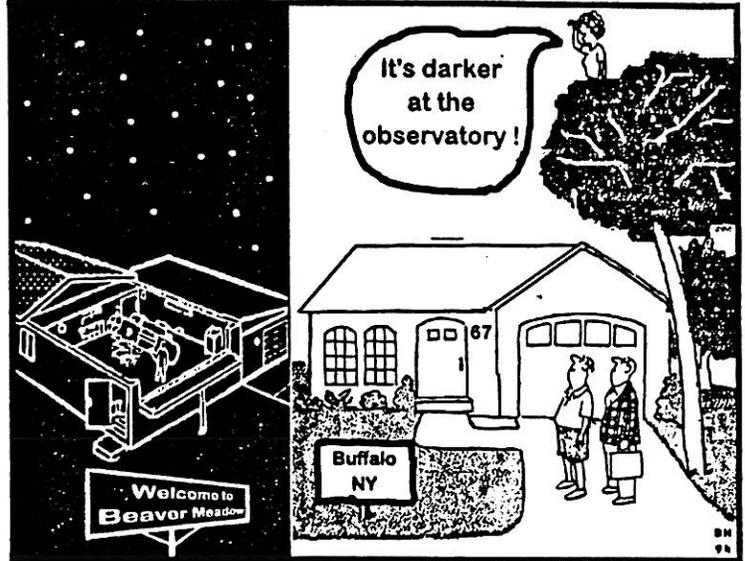
Darwin Christy

PUBLIC NIGHT PLANNING SESSION

As the new Assistant Observatory Director, I'll be helping out with the planning, coordinating and scheduling of club and public activities at our Beaver Meadow Observatory. With the new addition complete and the 1994 summer season behind us, now's the time to start planning for next season's activities. **YOUR INPUT IS IMPORTANT!** We need to take advantage of everyone's ideas and experiences in order to make the most of our facilities in the upcoming year.

On Saturday, November 12 at Beaver Meadow, after the usual BBQ and picnic (about 5:30), I'd like to have a meeting of

observatory users, potential users, and other interested parties to make some decisions about 1995 programming. I'd like to discuss the format of our public nights, public night staffing, traffic flow through the observatory, activities for rainy nights, and what things should have priority on the observatory's "shopping list." I'm sure folks have thoughts on these issues as well as other ideas - bring them out and pitch in your 2 cents! If you can't make the meeting, please jot down your ideas and send them to me.



**WISH LIST** - There are two items we need. First, we'll be assembling some new slide shows to use during public weekends and on rainy public nights. While purchasing slide sets is an option, I'm sure the club membership has a large inventory of interesting slides. If you've got astronomical slides you'd be willing to either donate, loan to us for several months, or sell to us really really cheap, let me know. Secondly, we're still having troubles with the images we get using the 12 mm Nagler II eyepiece in the 20" scope. The manufacturer says there's nothing wrong with the eyepiece, but we still don't like what we're seeing. If you've got a 12 mm Nagler II, we'd like to try it out in the big scope to see if it's any different from the Club's eyepiece. If anyone can help us out here, please give me a call.



Bob Titran

David Rittenhouse,  
Colonial America's Astronomer  
Part II -- The Transit of Venus

We are now to 1767, and Rittenhouse is age 35. He has achieved considerable fame and accomplishment as a scholar-craftsman. He has now begun the serious design and preliminary fashioning of the work which was to bring fame to both him and to the colonies - the large orrery project. For now this is a labor of love: there is no prospective contract or buyer. But there is no deadline.

However there is a definite deadline for the transit of Venus across the face of the Sun to

occur on June 3, 1769. Transits of Venus occur about 120 years apart in 8-year pairs; thus: Dec. 1631 & 39, June 1761 & 1769, Dec. 1874 & 82, June 2004 & 12. [There is a mathematical sequencing - see Meeus] Edmund Halley had promoted measuring the coming transits in the 1750's and expeditions had been sent around the world for the 1761, which though not very successful, was probably good for the experience for the better placed 1769. This one would be visible in Europe and America and the best thing since Newton's work (1680's), important mathematical developments (1750 period), and improved telescopes.

It would be the most important astronomical event of the time: we could now determine the distance to the Sun and thus the actual size of the solar system. The figure sought is the "solar parallax" or the angle of the radius of the Earth at the Sun's distance - about 8.8" (1" [one second of arc] is 1/3600 of 1 degree, or 1/1,296,000 of a circle; about the thickness of a credit card at 100 yards). For the solar system, we knew quite accurately the times and behavior of orbits, and the relative scale of their distances. But we did not have a reasonably accurate distance to use as a base. The Sun could be 60 to 110 million miles or so. [It's 93]

To determine such a distance, we needed something farther than the moon (which we knew), but not something too far. A Venus transit across the Sun would provide the solution. Mercury transits are frequent - about every 7 years - but not very suitable. The Venus transit is much slower, 10 hours maximum, and therefore easier to time and to plot. As in surveying, the system would use the triangle - for this, the long, skinny kind. Two widely separate Earth locations, whose exact distance is known, would be the base of this triangle.

There are two methods. The preferred one is to compare the exact seconds, determined by their exactly known local times, that the edge of Venus touches the edge of the Sun. This event is invisible until it actually starts and is quite nerve-racking. The other method is that the two Earth locations each plot the path across the Sun. The distance of the plotted solar paths would complete the triangle data needed, instead of the exact-second clocking.

This was the best event for now. In about 20 years the development of ships chronometers would be able to readily establish Greenwich time around the world to within some seconds (making shipping safer). Then, direct triangulation of Mars at night could be a better and more convenient possibility.

Rittenhouse started his observatory, at the farm 20 miles north of Philadelphia, with consultation of colleagues at the Philosophical Society in November of 1768. A drawing shows it to be a barn type design. He continually rechecked the regulator he had made - a highly accurate grandfather type clock which only shows time and has a 12 pound pendulum for stability but used only a 5 pound weight to run it.

Since he was an instrument maker, he also made necessary equipment of such quality they measured to an arc second and are in museums today.

An equal-altitude instrument determined an accurate East-West line by aligning on equal rising and setting angles of a star or the sun.

Thus the meridian can be determined.

A transit scope pivoted to move only on the meridian then clocked the meridian passage of stars to determine the exact local time.

Another telescope: this one a refractor with a 3 inch glass, 36 inch f.l.

In addition:

An astronomical quadrant, by Sisson, was borrowed to determine the exact latitude.

A colleague waylaid a refractor of 42 inch f.l. on its way from England to Harvard.

Another colleague had a Gregorian reflector of 2 foot f.l. by Nairne.

(Smoked glass was used for eye protection.)

Calculations determined first contact would be at 2:11 PM mid-point at 5:26 and to exit at 8:14 PM (not visible in the Philadelphia area). A nice clear day. Rittenhouse and two others observed and indicated sightings silently by hand gestures to a person recording the times. The data was gathered. Equipment and calculations were checked and rechecked. Publication. Comparisons with other American and European sources. [I've avoided referring to the intense rivalry with the other Philadelphia group.] We now had the 8.8.. figure we needed.

Now we could continue that search for a suspected seventh planet. And wonder about the similarity of our sun to the stars, how far away they must be, what was the shape of their apparent grouping. And what were those annoying cloudly things always being mistaken for comets.

And when would that orrery get finished.

[to be continued]



Steve Kramer

#### BAA ANNALS

5 YEARS AGO - Dr. Emil Wolfe, Professor of Physics and Astronomy from the University of Rochester, spoke at our November meeting on a new mechanism for producing red-shifts that he was researching. Recognition of his work appeared in SKY & TELESCOPE around that time. For December 1989 we asked members to submit their astrophotos for the rest of us to view. My recollection is that very few were shown. Edith Geiger, on the other hand, had plenty of photographs to show for her annual BAA activities exposure. Joe Provato once again hosted our Christmas wine and cheese party.

SPECTRUM highlights dealt with BAA observatories past and future. President Doris Koestler announced that the observatory planning meeting she convened had determined that a twenty-inch Dobsonian telescope would be the best choice for our new instrument. We determined to build an addition to Beaver Meadow Observatory for the new telescope and for storage. Dan Marcus was already measuring for the addition.

Rowland Rupp announced that the equatorial mount donated by Bell Aerospace would be converted for wide angle astrophotography. This project has moved somewhat slowly to say the least. Presently Bill Smith has it and is putting on the final touches—I hope!

Finally, Ed Lindberg wrote about the planning and construction of the old observatory at Newstead. His article includes the history of the development of the 12.5-inch telescope in which Ed played a prominent role.

10 YEARS AGO - "Impact Craters on Earth" was John Murtaugh's topic at our November 1984 meeting. He was Professor of Geoscience at Buffalo State. In December we heard about our gaffs from Edith, and about a trip to Stellafane from Carl Milazzo.

Edith Geiger wrote a profile on Michael Idem, a very

active observer in those days. He wrote two articles on observing for that SPECTRUM alone. In one he compared viewing at Beaver Meadow to his own viewing site in the suburbs. He concluded that the sharper temperature drop at the meadow in the early evening led to more dewing and that seeing was poorer at BMO. The meadow has less cloud cover in the summer, but decidedly more in winter. The meadow's big advantages, he concluded, were relative freedom from light pollution and very transparent skies that permitted naked eye viewing to 6.6 magnitude. His other article was a report of his extensive observations made during the past month.

**15 YEARS AGO** - In November Dr. Duane Anderson spoke on "Water and Ice on the Icy Moons of Jupiter". In December Paul Schenk and Ken Kimble gave brief talks, and Edith finished up with her annual photographic summary of the year's events. I don't think we had figured out the importance of wine and cheese yet.

Jack Mack was the subject of Edith's profile. Read it - you'll be impressed. Larry Carlino wrote a performance review of the Celestron C90 telescope. It sold for all of \$495 in 1979! Al Kolodziejczak wrote briefly of his informal visit to the offices of SKY & TEL while he was in the Boston area for a conference.

**25 YEARS AGO** - Our own Ray Manners spoke on UFOs in November 1969. I wonder what he had to say. In December Ed and Olga Lindberg spoke on their travels to astronomical facilities in Europe. Edith Geiger spoke on - you know what. We concluded the meeting by viewing the astrophotography exhibit at the museum that the BAA had sponsored.

The November SPECTRUM had an article by Ernst Both on the lunar crater Plato. Dr. Fred West wrote an article for the December issue on "Saturn's Satellite System", and Dr. Fred Price submitted an observation report, including his detailed sketch, on Mare Crisium.

**40 YEARS AGO** - In November 1954 Dr. Shirley Jones and Rev. George Walker, both BAA members, spoke on their trip to Canada to view the July eclipse. In December Dr. C. M. Birdsall of Linde Air spoke on sources of nuclear energy.



Rowland A. Rupp

#### SPY and TELL

Last August, Wade and Lynn Sigurdson and children spent three weeks visiting family members in and around Winnipeg. At 17 months, little Hannah is quite a climber, attempting anything in sight, and Ryan who has turned 4, finds pulling clothes out of the clothes basket to be great fun. Lynn still works for UB as a research fellow at Buffalo General Hospital. Wade is at UB also working as a research fellow.

Bill Smith exhibited his photographic prints September 9-11 at the Affair in the Park at the Pittsburgh Civic Garden Center, and sold around 65 to 70 of his fine photos. His work as an excellent photographer is well-known.

During the summer, Ken and Diane Biggie drove along the Hudson River, and sojourned to Poughkeepsie, enjoying the scenery and places of interest. They spent a few days at St. Johnsbury, Vermont, visiting the parents of their daughter-in-law, Nicole, and then went on to include a Moose Festival at a little town called Pittsburg, in New Hampshire, along the Canadian border.

Ken is working on his second internship at the Potter Road Elementary School in West Seneca, where he is an assistant administrator two days a week, and continues to work as a substitute teacher the rest of the week. He is taking two evening classes a week at Canisius and will have his work for a second Masters finished in December.

On August 2, Carl Milazzo received a call from Karen Seifert at Beaver Island State Park, asking him if he would help the Parks Department by giving the general public a view of Jupiter. Carl consented and took charge, but as is often the case, Jupiter was clouded out, and Vega was the only object that peeked through the clouds. The poor weather didn't interfere with a fine slide presentation arranged

by Karen Seifert showing the Jupiter collision. Joel Stuckey also showed the slides he had taken of the impact. Other members in attendance were: Art Gielow, Bud Abate and Dan Marcus.

Carl was to speak at the Huronia Convention in Ontario over the Labor Day weekend. His talk was to include such subjects as astrophotography; setting up a portable observatory, and selecting observing sites. He canceled his talk because the sky was so clear for observing.

Richard Berry (former Editor-in-Chief; Astronomy magazine) contacted Carl about using a couple of his photos in the magazine's Exploring the Universe 1995 Calendar. The publication shows two of Carl's photos of Stellafane at night. The October issue of Sky & Telescope shows another of his photos; an amateur backyard observatory owned by Marvin Scott of Queenston, Ontario, who is a member of the Niagara Falls Astronomical Society.

Marguerite Aiple has suffered with a back strain for several months, but has improved and feels much better, so we will see her at more of our meetings this year.

Ruth Christy, who is an expert with a fishing rod, caught a 45" long muskellunge in the Niagara River. She and Darwin played around with it for about 10 minutes, until it became tired. Darwin brought it into the net, in which it bit a hole and went right on through, back into the river. They stayed with the line, as the fish had the lure, and again tiring it out, Darwin renet it backwards and got it out of the hole and into the boat. Fishing can be an exhausting experience for both fish and fisherman.

On September 24th, Darwin went to the 70th Fighter Squadron Reunion in San Antonio, Texas. While there, he and some other members enjoyed a three day visit to the Alamo Complex. Darwin is the official photographer for the reunions, and once again has a fine photo to send out to the 34 members who attended.

On October 13th, Darwin gave a lecture to the Kenmore Lodge on the annular eclipse of May 10th, and the Jupiter impact.

Darwin and Ruth celebrated their 51st Wedding Anniversary on October 14th. Happy Anniversary, and continued happiness in the years ahead.



Edith L. Geiger

#### WHAT IS A JULIAN DATE?

Those of you who regularly attend the monthly BAA meetings have heard Steve Kramer mention the current Julian date as part of his Treasurer's report. Some of you may also have come across a Julian date for some event or other in an astronomical text or handbook. Well, what is a Julian date and what good is it?

The Julian date system is just a method of sequentially numbering each day. The time of day is represented by a fractional day with each Julian day beginning at noon. So, for example, it is 3:00 PM August 12, 1994 as I am writing this and the Julian date is 2449578.125. The decimal 0.125 represents the 1/8th of a day (3 hours) since 12:00 noon. What possible use could such a system have? Isn't August 12, 1994 an easier way of specifying a date than 2449578? It all depends on what you are going to do with that date. In the every day world of birthdays, anniversaries, phone bills and mortgage payments, our regular calendar of 12 months with 30 days each (more or less) works just fine. On the other hand, if I told you that a certain asteroid has an orbital period of 467.1 days and asked you on what dates it would be in the same place in its orbit as it is now, working with days, months and years (not to mention leap years) can get a little complicated. Using today's Julian date of 2449578.125 it is quite simple to repeatedly add 467.1 days to arrive at the desired dates (which, by the way, are 5PM on November 22, 1995, 8PM on March 3, 1997, 10PM on June 13, 1998, etc.). Of course, you need a formula or a computer program to convert from Julian date to calendar date and vice versa but these are easy to come by.

The Julian date system was devised in 1582 by the French scholar Joseph Scaliger. He was particularly interested in chronology and is considered the founder of modern chronological studies. He studied the calendars of various early civilizations in an effort to correlate them so that he and others could date events mentioned in various historical accounts. This was not an easy task because of the many different calendars used by ancient civilizations. While many used some form of solar calendar, others used a calendar based on the lunar month and still others reckoned their dates according to regnal years. For example, a certain event in Egypt happened in the "12th year of Sesostris III". Even when calendars were based on the solar year, each civilization had its own starting date. Frustrated by this diversity, Scaliger decided to create a calendar which would transcend all of these and allow a simple comparison of historical dates.

Scaliger decided that the day was the only unit of time common to all calendars and a natural unit of time. He set out to number the days according to what he called a Julian period (more on this later). Of course, consecutively numbering days is quite simple but Scaliger needed to answer the important question: "Which date is day #1?" Since the Julian calendar was in use at the time, day #1 would logically be a January 1st. But of which year? Since some calendars used the lunar month as a unit of time, Scaliger decided that day #1 should not only be the first day of the year but also the first day of a lunar month, i.e., the day of a new moon. There are 235 lunar months in 19 years so a new moon occurs on a January 1st at 19 year intervals (a lunar cycle). This certainly cut down on the possible years available to Scaliger. Interestingly enough, I have read that January 1, 1 B.C. was such a day. If Scaliger's figures showed this to be the case, then that date might have been an appealing candidate for his day #1. [NOTE: SkyGlobe shows the new moon occurring three days earlier. Does anyone have more accurate software which can confirm or deny this?]

However, Scaliger needed a much earlier date. During his time Creation was thought to have taken place at about 3500 B.C. so day #1 had to go back at least that far. The influence of the Church also led Scaliger to incorporate the dominical cycle of 28 years into his Julian date system. This cycle begins with a leap year which begins on a Sunday. So, day #1 would be a Sunday, January 1st of a leap year and the day of a new moon. Dates with these characteristics repeat every 532 years (multiply the 19 year lunar cycle by the 28 year dominical cycle). Candidate years were 76 A.D., 457 B.C., 989 B.C., 1521 B.C., etc. The first day of one of these years would fit Scaliger's requirements, but which one?

Not wishing to be arbitrary in his decision, Scaliger incorporated yet another cycle into his system, the period of indiction. Roman law required that a census of persons and property throughout the Empire be taken periodically. About the year 300 A.D. the Roman emperor Diocletian decreed that this census should occur every 15 years and this period of indiction survived the Roman Empire right into Scaliger's time. One reason Scaliger may have chosen this cycle is that it introduced a number (15 years) which is mutually prime with 532 years. For you math buffs that means that 532 and 15 do not share any common factors. The result was a cycle which repeated every 7980 (19 x 28 x 15) years. This is called the Julian period. (I told you we would get back to it.).

What does all this mean? Well, we can look at it this way. If we used a set of three numbers (one for each of the three cycles) to label each year, there would be no year with the same set of three numbers until 7980 years had

passed. As an example, consider the first year in the period. It would be year 1 in the lunar cycle, year 1 in the dominical cycle, and year 1 in the cycle of indiction. This year would be labeled (1,1,1). Of course, the second year would be (2,2,2) and so forth. By the sixteenth year, the indiction cycle begins to repeat so year sixteen is (16,16,1). Some other examples are year 20 (1,20,5), year 29 (10,1,14), and year 533 (1,1,8). You are free to work out all of the rest to prove to yourself that the three-number sets do not repeat until you get to year 7981 which is again (1,1,1). All this also meant that Scaliger finally had his day #1. Because the Julian period is so long, Scaliger only had to go back to the beginning of the current period to get his day #1. It was January 1, 4713 B.C. which was a Sunday with a new moon and would have been the first day of the first year of an indiction cycle (had it been in effect back then). It was also a leap year.

Alas, a monkey wrench was thrown into poor Scaliger's beautiful system even before his work was published in 1583. The year before, Pope Gregory XIII formally recognized that the year was not 365.25 days long but 365.2422 days long. This marked the end of the Julian calendar upon which Scaliger had based his entire system. In order to keep the calendar in better alignment with the solar year and the seasons, the new Gregorian calendar eliminated leap years on the century marks which are not divisible by four. This means that the year 2000 A.D. will be a leap year but 2100, 2200 and 2300 will not. The Julian calendar, which had been in use for well over a thousand years, had accumulated an error of 10 days by this time and this error needed to be corrected. Of course, if you are the Pope, such a correction is quite simple. You just decree that the day after October 4, 1582 will be October 15, 1582. And that was that! All of these calendar reforms wreaked havoc on Scaliger's Julian date system. The last day of the Julian period (day 2914695) should have been December 31, 3267 A.D. but these reforms have moved that day to January 22, 3268 A.D. This means that the next Julian period will start on January 23rd not January 1st! Since Joseph Scaliger survived until the year 1609, I wonder what his reaction was to these changes to the calendar.

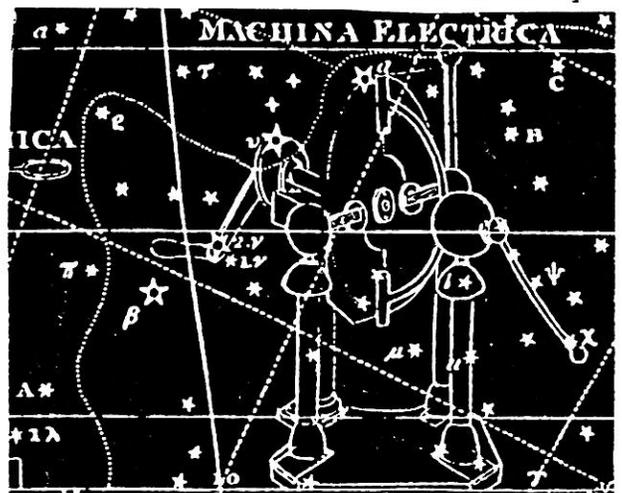


Joe Orzechowski

### MACHINA ELECTRICA

This omitted Ancient Constellation was one of Bode's in 1800. It lies south of the central portion of Cetus. Bode coined it by two other names, "Elektisir Machine" and "Machine Electrique." If you have any maps or charts of long ago, you might find it still in existence. And- if you should find any mention of this Ancient Constellation, I would appreciate any of the information you might find.

Darwin Christy



6

## THAT DARN TELESCOPE

Last month Joel Stuckey offered to show us novices how our new CCD camera works, so I set out for Beaver Meadow to find out. As I arrived, Joel was taking images of Jupiter using the twelve inch telescope. At first they didn't look so hot to me, they were pretty fuzzy and looked something like a featureless egg. Then he showed me how the computer operated in different modes that created better images. Exposure times could be varied, the range of sensitivity of the CCD could be altered, and other, off-line, enhancements could be implemented. Joel showed me some images of Jupiter he had recorded and enhanced previously, and they were excellent. We certainly have a wonderful new tool (or is it toy?) at the observatory. All you have to do is learn how to use it and acquire some computer literacy.

Maybe you don't have to be that computer literate after all. With Joel's guidance I got to poke a few keys on the computer that modified the images we were taking. Ah! what power in a finger. Don't ask me to show you what I did—you'll have to ask Joel about that. I'm sure Joel would be happy to run you through the intricacies of this new technology if you ask him. He should be able to, he built most of the support electronics for the CCD himself. I looked at it and think he did a very commendable job.

Not content with images of Jupiter, we decided to try something more challenging. I opted for the Dumbbell nebula in Vulpecula—at least it was something I could find—or so I thought. Joel invited me to go at it. Eager for this opportunity to display my astronomical prowess, I set myself to the task. I quickly learned that the twelve inch at Beaver Meadow is not my six inch Criterion at home.

All I had to do was get Gamma Sagittae centered in the finder, swing the telescope four degrees north in the declination and look for M27 as I went. So, perched on the viewing ladder, I tried to peer through the finder. First problem: I had a heck of a time fitting my head between the finder eyepiece and the objective end of the guide telescope right behind it. My head is too fat. I sucked in my breath to squeeze down my head and sort of managed to glance sideways through the finder.

Wow! where did all those stars come from? Now I learned there was also a big difference between our 8x50 finder at the meadow and my dinky 6X30 finder at home. Since my head was all cockeyed I couldn't sight Gamma with my free eye while lining up through the finder. I wasn't ever sure which of those bright stars was Gamma in the first place. When I finally guessed which it was and tried to center it in the finder I got my third lesson. The finder doesn't have crosshairs!

I did my best. I swung the telescope up but couldn't find M27. I kept trying—no good. I tried a different reference star just in case I had the wrong one—no good. Then it dawned on me that maybe the nebula was too dim for me to see in the finder. So I centered (?) Gamma (?) in the finder, put an eyepiece in the main telescope and took a look (still perched on the viewing ladder). I couldn't see a darn thing. Maybe all I needed to do was focus it. What do you mean focus it?—the focuser was gone! In its place was our new motor driven focuser. Joel had to explain to me how to use it.

Nothing!! Now Joel pointed out I needed an extender tube for the eyepiece in order to make it focus. Apparently the telescope has been reconfigured and the focal plane has been moved up. Which extender to use?—there's more than one. After a couple of tries I found the right one—it seemed to be about a foot long.

Try again. By now the stars had moved, so did the telescope, but the viewing ladder remained in place. Get back down, move ladder to right location (?), climb back

up, try again. Squeeze head, guess at Gamma, guess at center, swing telescope, look for Dumbbell. Not there: Get mad!!

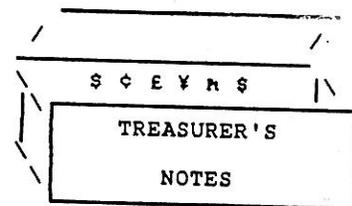
At this point Joel wisely excused himself on some pretext to help Bruce Newman with the twenty inch. Still determined to salvage what remained of my dwindling astronomical prowess, I tried to center (?) Gamma (?) once again and use the declination setting circle to make sure I swung four degrees. Went through the ritual, clambered down, set the angle, crawled back up and triumphantly looked. Nothing! Past mad!

One last hope occurred to me. Perhaps, since I had last seen M27, it had disappeared. That would explain a lot and would allow me to regain some measure of face. I went out to the twenty inch and challenged Bruce to find M27. He did! Admittedly he pattered around some in the process, but then the Dobsonian mount for the twenty inch can't even swing in declination, so he had to hunt. Enough is enough, my last hope was dashed and I went home, secure in the knowledge that now there were two dumbbells—one in Vulpecula and me.

But I'm stubborn. (Most of you don't know that.) The next night was clear at Lime Lake. I dusted off my Criterion, set it up in the streetlight illuminated field behind my cottage, eyeball aligned the axis and set about redemption. Gamma was easy to find, the telescope was easy to focus, I swung it north, and there it was. I admit it took two shots, but it wasn't even completely dark yet and M27 doesn't have particularly much surface brightness. As I said there's a difference between my Criterion and THAT DARN TELESCOPE at the meadow. Seriously though, it's what you're used to that really makes the difference. Maybe I'll have to break down and practice at Beaver Meadow a bit.



Rowland A. Rupp



SKY & TELESCOPE MAGAZINE

ASTRONOMY MAGAZINE

RASC OBSERVER'S HANDBOOK

Astronomy club discounts are available for subscriptions to the two popular magazines, SKY & TELESCOPE and ASTRONOMY; and for annual copies of the RASC OBSERVER'S HANDBOOK.

Make checks out to Buffalo Astronomical Assn.

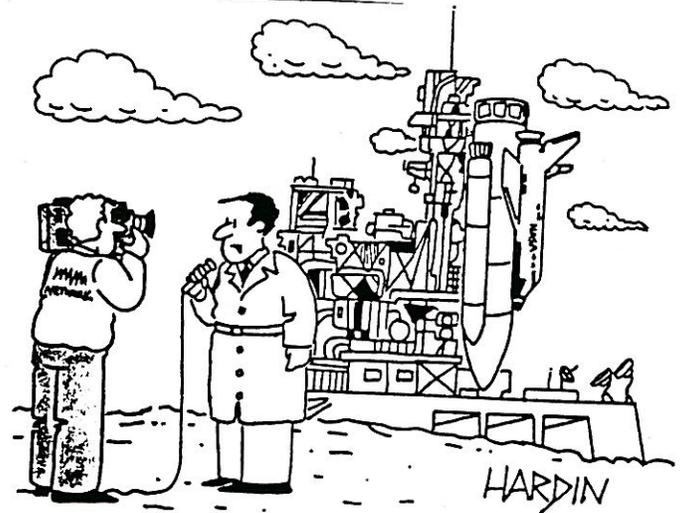
For magazines, don't procrastinate: mailing labels are made out two months in advance and processing our group order can add another month. Publishers don't overprint and keep back stock like they used to do, so you may not even be able to get a current month's issue if you are late.

SKY & TELESCOPE is \$20 a year. It renews individually around January for most of us. (If your renewal month is not January or February, please check with me first.) When S&T sends you the renewal notice, be sure to give or send this with payment to me. The end of this month (October) is the DEADLINE.

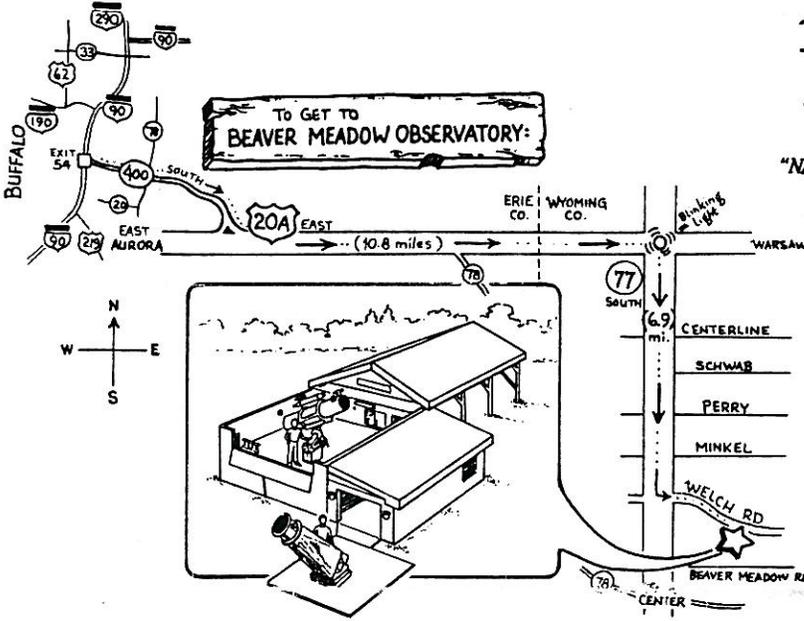
ASTRONOMY is \$18 a year or \$36 for two years. It renews annually by group list, which has already been sent in. I will send another at the end of this month for latecomers.

OBSERVER'S HANDBOOK of The Royal Astronomical Society of Canada for 1995 is US \$ 10.50 as last year (regularly \$ 15.89). Already ordered, but a couple remain. They should be here for the December meeting for pick-up.

Stephen Kramer  
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"NASA officials have announced that today's scheduled launch will be delayed due to a recently discovered technical problem."



The next issue of "the SPECTRUM" will include the constellation, "Canes Venatici", the ancient constellation, "Antarah", "Observing Meteorites Through a Microscope", a past astronomer, Jean Picard and others. In future issues will appear "Tubus Herschelli Major & Minor", "The Fish that got away", A Profile, and another astronomer from the past. PLEASE feel free to submit any astronomical article you may have and remember the due date is 12/31/94 for the JANUARY/FEBRUARY 1995 issue.

\*\*\* THE SPECTRUM \*\*\*



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