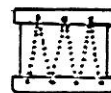
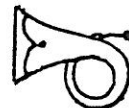
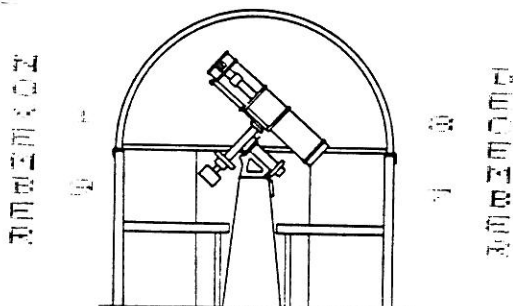


The Spectrum



elg



BUFFALO ASTRONOMICAL ASSOCIATION, INC.

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!! MEETING NOTICES !!

NOVEMBER: Our meeting on Friday, November 13, 1987 will feature Larry Josbeno, from Elmira/Corning Astronomical Association, who will enlighten us on the subject of, "Quarks", and other such peculiar phenomena. Refreshments will follow the meeting.

DECEMBER: The December 11th meeting is, of course, our annual Christmas meeting which will feature a friendly wine and cheese party in addition to Edith Geiger's candid camera slide show. Also, Carl Milazzo will be on hand with some slides featuring the "Big Telescopes". Should be a lot of fun, so be there for sure.

Ed's note: Remember that the meetings will be held at Buffalo State College, Elmwood Ave., Buffalo, N. Y. in the New Science Building.

Previews of Coming Attractions

Remember, starting with the January 8, 1988 meeting, we will be shifting our location back to the hallowed halls of the Buffalo Museum of Science. That is where all the dinosaurs have been hanging out lately, so watch your step as

you enter the building, they were mighty big eaters and had to leave in an awful hurry in December.

Our meetings for the 2nd half of the season will be like "old home week" since many of the speakers will be our own members. We schedule things this way for the winter months because of the weather and potential problems which may arise when trying to get out of town persons in and out during a storm. Al Kolodziejczak, Rowland Rupp and Jack Mack will probably be making appearances in January and March. Meanwhile Darwin Christy will grace us in February with a new presentation on Meteorites and such.

For our May dinner meeting we are trying to obtain Trudie Brown, wife of Ken Brown, from the Astronomy Section of the Rochester Academy of Science. (Ed's note:- Trudie is the editor of their newsletter, "the Rochester Astronomer.") Soooooo---make your plans early, and reserve your 2nd Fridays of each month for B.A.A. activities. See you at all the meetings.

Ken Biggie, President

NFCAAA/NIAGARA CENTRE FALL BANQUET NOV. 7, 1987
at the SKYLON TOWER in NIAGARA FALLS, CANADA
(5200 ROBINSON STREET)

The Niagara Frontier Council of Amateur Astronomical Associations will meet at the "Skylon Tower" in Niagara Falls, Canada, Saturday November 7, 1987. Parking is free as is the elevator ride to the Summit Suite Dining Room. Towering 775 feet above the Falls, this unique room creates a total dining experience for astronomers to remember fondly.

The guest speaker will be Tom Dey from the Rochester Club with his topic, "Optics for Astronomy". Cocktail Hour from 6:45PM to 8:00PM (cash bar); Dinner from 8:00PM to 9:15PM; Mr. Tom Dey, our speaker, from 9:15PM --- Prices: \$20 Can., \$16 U.S.



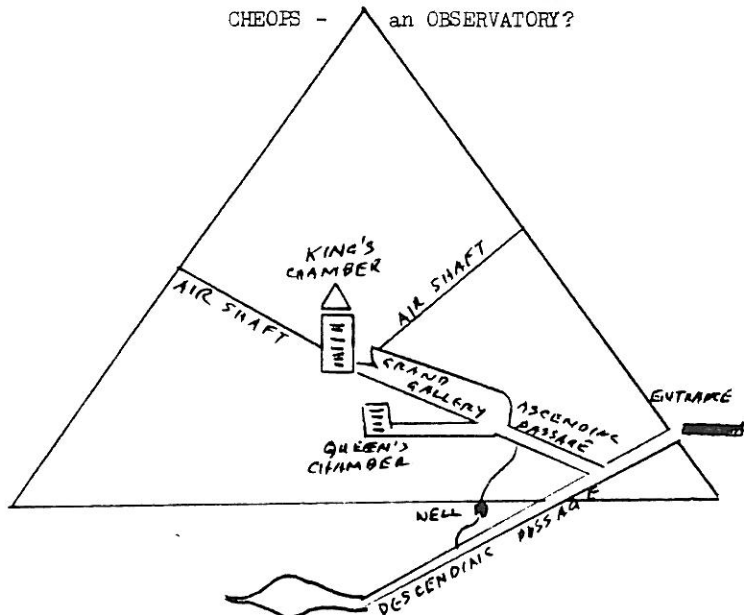
For more information, call Carl Milazzo (883-1832 or 688-2170) or Ed Lindberg (633-6725).

"SPECTRUM" DEADLINE

For the January/February 1988 issue is December 11, 1987!!



CHEOPS - an OBSERVATORY?



What do most people think of when they think of Egypt (other than solar calendars)? I would definitely say the first things that comes to mind are pyramids, especially the Great Cheops Pyramid. Its really staggering to think that it was possible to build such a huge monument without cranes, trucks and all of the other tools we have today. Cheops is constructed of more than 2,300,000 stones averaging 2.5 tons each, some weighing as much as 15 tons. The pyramid covers 13.1 acrs of desert and is found in the Nile Deltas, about 10 miles from Cairo. It is 480 feet high, 144M, and each side is just under 231M long. Was this pyramid built just as a crypt for a dead king, or did it have another purpose? Some believe Cheops is an example of an ancient Egyptian observatory.

The pyramid itself is astronomically aligned with an amazing degree of accuracy. It's four sides point to the four points of the compass and are nearly perfect 90° angles. If diagonals were to be drawn from the pyramid to north, south, east and west the whole of the Nile Delta would be enclosed. This precision has puzzled many people throughout the ages. One such man was a mathematician by the name of John Taylor. His biggest question was why the slopes of the sides were at 51°:51' instead of a rounder number. After pondering this question for a while he discovered that the length of the base divided by twice the height equals π , the relation of the diameter of a circle to its circumference. This is like the radius of the Earth compared to its circumference at the equator. The pyramid, therefore, contains the proportions of half the globe with the base representing the equator and height, the distance from the north pole to the centre.

In 1883, an astronomer named Richard Anthony Proctor tried to explain how the pyramid would have been used as an observatory. Quite correctly he postulated that the need for an accurate calendar depended on the precise study of

the first step would have been to determine true north and then point some sort of tube at it. At that time the star closest to true north would have been Thuban in Draco. If the Egyptians had used Thuban to align the "telescope", it would point at an angle of 26°:17'.

Proctor then postulated that once the building was aligned on true north, starting below ground in the descending passage, a slot would be built pointing in the opposite direction. This slot is now called the Grand Gallery which slopes upward into the King's Chamber. The ascending passage leading to the Grand Gallery slopes at an angle of 26°:17'. Proctor believed that there must have been some type of reflector placed at the junction of the passages so that light coming down the descending passage would be reflected at the same angle up the ascending passage. A pool of water would work nicely and the stones at this point of the descending passage are harder, smoother, and more closely joined than found elsewhere in the many corridors.

Having just one 'slot' pointing at the sky had a serious disadvantage though. Obviously it would only cover the small section of the sky that it was pointing towards. To see stars below this area it would be necessary to walk up the telescope. Proctor believed this is why slots are found along the ascending passage where seats could have been placed at various levels to allow observing. To see the overhead stars one would have to remove stones from the roof of the 'telescope'. It just so happens that the roof stones in the Grand Gallery, whose walls slope inward, are individually removable.

It is obvious from the sketch that the Grand Gallery is now in the heart of the pyramid. The structure was useless as an observatory once it was completed beyond the Grand Gallery. Fortunately for the observers, this would have taken about 10 years to complete.

Probably one of the most convincing arguments for an observatory is that there have been no artifacts found inside Cheops. Looting seems unlikely since the granite plug that tightly secure the passageways were found intact. We'll probably never be quite sure if Cheops was an ancient observatory, but just imagine what it would be like to observe from inside your telescope. What a fantastic voyage that would be!

Karyn Bennett
from "Orbit" the newsletter from Hamilton.

PROFILE

George H. Scheck

George was born in Philadelphia, but the family moved to Rochester when George was still a small child. He received his early education at St. John's Evangelist School where, in about fifth or sixth grade, he became interested in astronomy and was the owner of a small telescope with which he enjoyed observing with a neighborhood friend. He studied piano and appeared in a piano recital, and played piano in the grade school orchestra.

His high school days were spent at Bishop Kearney School. In 1970 he won 5th place in the High School Chemistry Contest of the Rochester Section of the American Chemical Society which included Genesee, Livingston, Monroe, Ontario, Orleans and Wayne counties, and received the 50th edition of the Chemical Rubber Company Handbook of Chemistry and Physics. At graduation he also won a Regents Scholarship. While in high school, he was a member of the chess club and entered into competitions within the school and with clubs of other schools, winning some of the events. He also belonged to the rocketry club, played golf, and found time to be a member of a local chorus of Up With People.

In 1972 George and his parents moved from Rochester to Perry. George went to RIT and stayed on campus much of his undergraduate years. He received his Bachelor's degree in 1976 and continued at RIT in 1977-78 working on his Masters. He moved to the Boston area in late 1978.

development and support for the U.S. Government Department of Transportation Center in Cambridge. He took two courses at MIT: computation by automata, and data flow computer architecture, and transferred the credits to RIT which completed the requirements for his Masters. One of his delights as an undergraduate student at RIT was being a member of the college choir.

He returned to Perry to live with his parents in early 1982. His parents still live in Perry, and George moved to his present address in North Tonawanda in early 1984, and in that year he became employed at Bell Aerospace where he did scientific programming and engineering support.

George has a special interest in eclipses, and has had the good fortune to travel with interested groups to far away places to observe four solar eclipses. In 1972 he went to New Brunswick to see the eclipse of July 10th along with a radio astronomy group with Dr. David Meisel of the State University College at Geneseo in charge. In 1973 he took a trip with a group from Amateur Astronomy, Inc. of Cranford, New Jersey, with Roger Tuthill of Roger W. Tuthill, Inc. as leader. They viewed the June 30th eclipse from Akjoujt in Mauritania, West Africa. In 1979 a group, directed by James Gall, which was connected with a group from Boston led by George Gilbert-Smith, an exchange teacher from Great Britain, who organized the party from Boston, went to Clarkleigh, Manitoba, to see the February 26th eclipse. In 1980 another group of thirty-three people directed by George Gilbert-Smith and assistant organizer, Walter Mudgett, went to Tanzania in Africa, via Boston and London, to see the February 16th eclipse.

The following is a list of other observations made by George:

July 20, 1963 - Observed partial solar eclipse (total in parts of Alaska, Canada and Maine) from Rochester with father, using pinhole projection.

May 30 (?) 1967 - Saw aurora from Rochester.

Observed at least two lunar eclipses in the 60's (dates uncertain).

March 7, 1970 - Observed partial solar eclipse from Rochester - eyepiece projection photo.

February 10, 1971 - Brief observations of total lunar eclipse from Rochester.

July 26, 1972 - Observed and attempted photograph of partial lunar eclipse from Perry.

December, 1973 - Probable (?) observation of Comet Kohoutek from Perry (7x50 binoculars).

December 24, 1973 - Observed partial solar eclipse during last minute Christmas shopping trip in Rochester area.

July 17, 1974 - Observed and attempted to time Venus occultation from RIT.

May 25, 1975 - Observed, photographed and assisted in photography of total lunar eclipse at RIT.

October 12, 1977 - Observed partial solar eclipse by eyepiece projection from RIT.

January 20, 1981 - Observed and photographed penumbral lunar eclipse from Brookline, Massachusetts (Boston area).

July 17, 1981 - Observed and photographed partial lunar eclipse from Boston, Massachusetts.

July 6, 1982 - Observed total lunar eclipse from Perry.

1983 - Observed Comet IRAS-Araki-Alcock from Perry (naked eye and 7x50 binoculars).

May 30, 1984 - Observed partial solar eclipse from Bell Aerospace.

1985-1986 - Observed Halley's Comet from Buffalo area and Dakota City, Nebraska, with 7x50 binoculars.

April 25, 1987 - Observed occultation of Venus (immersion only) from Waterloo, Ontario.

Besides eclipses, George is interested in naked eye observing and auroras. He has an AppleIIe computer and couples some programs on astronomical related subjects.

At RIT, he helped in the construction of their observatory and was involved in a radio telescope interferometer trying to determine the geographical location of the obser-

atory. He also did some work related to lunar occultation timing. He had met David Dunham, member of the International Occultation Timing Association, while in Mauritania, and had learned the technique from him. In 1976 he gave a lecture on lunar orbit perturbations for an RIT physics requirement.

Ice skating has been a hobby since he started skating when he was a student at RIT. He is a member of the Buffalo Skating Club and won the Piper Cup Adult Dance Progress Award for the 1986-87 skating season. He is very much interested in ice skate dancing and is still looking for a skating partner.

George has been involved in a variety of activities and has several hobbies. A very loquacious fellow, he enjoys people and greets everyone with exuberant joviality. Besides being a member of the BAA, he is also a member of the Astronomical Society of the Pacific, and finds membership in both organizations highly satisfying.

Edith L. Geiger

ASTRONOMERS FROM THE PAST

JAMES FERGUSON, who was born in Banffshire, Scotland on April 25, 1710, died November 16, 1776 in London at the age of 66. He was not in reality an astronomer but rather a physicist. In his early age when he was permitted to work, he was employed by a sheep farmer. While tending the sheep he acquired much knowledge of the celestial globe comprised of the stars. This ingenuity, being quite extraordinary, becoming known he was enabled to obtain instructions in mathematics and drawing. The art of drawing showed immense improvement that he drew miniature portraits, starting in Edinburgh in 1734. This was his 'self employment' which supported himself for over 20 years.

In 1743, he decided to go to London where he published astronomical tables and lectures. He lectured on experimental philosophy with illustrations by aid of ingenious machines and diagrams of his own creation. He was chosen a 'Fellow of the Royal Society' in 1763 without the usual fees.

Included in his works were "Astronomy explained in Sir Isaac Newton's Principles", "Young Gentleman's and Lady's Astronomy", "Introduction to Electricity" and other.

JAMES FERGUSON, who was born in Perthshire, Scotland on August 31, 1797, died on September 26, 1867 somewhere in New York State. In his early days, he was brought to New York. Upon reaching manhood, he worked as an assistant engineer with the excavation of the Erie-Barge Canal from 1817 - 1819. The three years following, he was employed as assistant surveyor to the boundary commission which was appointed to carry out the provisions of the Treaty of Ghent. Relative to this work, from 1822 - 1827, he was also an astronomical surveyor.

This pursuit of practical astronomy occupied his later life as well as making him an assistant astronomer of the United States Naval Observatory. While there, he made many discoveries of asteroids and frequently contributed to scientific magazines.

Darwin Christy

ASTROPHOTOGRAPHY SECTION

The Astro photography Section is off to a slow start. We held our first meeting on September 25th at 8:00. We were not able to try the new off-axis guider due to focusing problems, and were initially clouded out. Later in the night when it cleared up, the declination clutch assembly was slipping too much for astrophotography. So-- to make up for it we were treated to a transit of one of Jupiter's moons!

Since this first meeting various club members have rectified the initial problems and as of Saturday October 10th, the only thing you will need for prime focus will be a T-mount for your favorite camera.

rain or clear. If rain bring your photos and if clear bring your camera!

The November meeting will be a little different. On Friday, November 20th at 8:00, I'd like to hold a 'black & white' work shop at Campos Photographic Center on Niagara Falls Blvd. If you bring a black & white negative (I'll have negatives of various objects) or even a color negative and we will show you how easy it is to make black & white prints. Since Campos charges \$ 5.00 per hour per room in addition to the chemistry and paper costs, there will be some sort of fee charged. This will depend on how many pictures are printed and how many dark rooms we have to rent. So please contact me at 773-5015 to make reservations. If enough people wish to try color - you can check with me about a color seminar - the price will be in the range of \$ 30 to \$ 40 if we have enough people.

There will be no meeting in December but the January meeting will be on Friday, the 22nd at 8:00 at Beaver Meadows, or possibly at my house, depending on the weather.

Daniel R. Marcus

OBSERVATORY REPORT

I am resigning as observatory director as of October 31, 1987. The observatory is now equipped for prime focus and eyepiece photography. On September 26th, the telescope was equipped with a new gasket, so it no longer slips. It was an all afternoon job, every part in the shaft had to be removed to get to the gasket. I especially thank Carl Milazzo, Gene Witkowski, Hugh Pettit, Ed Czapla & Triston Dilapo for their giving up a Sunday afternoon to help at the observatory. Many thanks to Hugh Pettit, Ed Czapla and Dan Marcus for adjusting the mirror & cleaning it. I would like to thank the members who gave up a Saturday night to do Public Nights, the same few as always. My special thanks to Hugh Pettit and Ed Czapla for being my co-directors. Please remember, the observatory is yours, so give the new directors as much help as you can.

John Yerger
Observatory Director

INSTRUMENT REPORT

The September meeting of the Instrument Section was held at Beaver Meadow on the usual fourth Friday. There were eleven T/M's present.

Dan Marcus explained the operation of the club's telescope to some prospective astrophotographers. It is important to adhere to a correct sequence of operations when preparing for photography.

It was noted that the focal plane of the objective is a little too near the tube to permit the use of all camera attachments. It is planned to move the mirror a little nearer to the eyepiece and to permit free use of all the photographic equipment.

A big part of the evening was spent enjoying the fine night sky. The evening turned into a pretty good one for deep sky observing. Many 'M' numbers and other interesting objects were picked up. Jupiter put on a good show for us. We saw a moon near the disk and noted that it was approaching the disk rather than receding. But we could not tell whether there would be an occultation or a transit. The moon turned out to be transiting. The shadow of the moon on the disk was very pretty and it was the first such observation for some of the members.

We hope that more use can be made of the fine facility. There should be much fine observing and many astrophotographs ahead.

It was decided that if the near future we would make a group visit to the Campos Photo Center on Niagara Falls Blvd. There one can rent their fine equipment and get help from their experienced personnel to make fine black & white or color prints without having to invest in a big array of

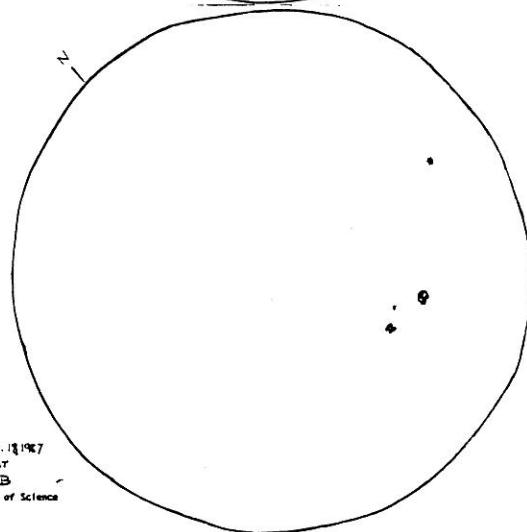
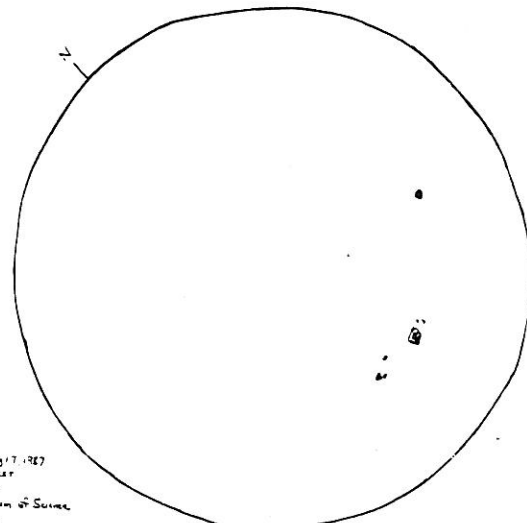
their printing at that facility.

Ed Lindberg.

KELLOGG OBSERVATORY REPORT

During July and August, the Kellogg Observatory and Solar Lab at the Buffalo Museum of Science was open for Summer Sun Shows from 11:00 am - 1:00 pm. Assistant Astronomers Dan Kujawinski and Marylou Bebak used the solar telescope, spectrograph and 8-inch refractor with the hydrogen-alpha filter to show the public sunspots, solar spectrum and solar prominences.

The summer of 1987 was a record breaker for attendance. By the end of August, a total of 3,215 visitors from 29 states and 14 countries had seen spectacular views of earth's star. Also on the increase along with attendance is the sunspot number, up from a low of 0.8 in June 1986 to 17.5 in June 1987. (Any direct correlation between the sunspot number and visitor attendance has yet to be proved however!) Also new this year is a daily observation log, including sunspot tracings (shown below).



The Kellogg Observatory opened for public nights on Friday, September 25th from dusk to 9:45 pm and will continue to be open on both Wednesday and Friday evenings during "Dinosaurs Alive!". In January 1988 public nights will continue on Fridays only. A nightly observation log is now being kept.

Marylou Bebak

VOLUNTEERS NEEDED!

SPECIAL REQUEST: The Kellogg Observatory at the Buffalo

the increased attendance (estimated at 4,000 per day) during "Dinosaurs Alive!". If you can help, you may use one of three small portable telescopes available at the Museum, or help Marilou with the 8-inch refractor. You can come on one Friday only, or more than one, for one hour or the entire night. This is also a good chance to promote local astronomy and the BAA. Interested? Call Marilou Bebak at 896-5200 days, or 627-2333 evenings and weekends. Thanks!

*** OBSERVATIONS ***

On the night of September 15th, Triston Dilapo, Jerry Morris & I observed Comet Bradfield with the 26-inch telescope located in the Boston Hills. It was low in the sky when found shortly after sunset ($\sim 15^\circ$ above the horizon). The sky was fairly transparent on that night, even near the horizon. Coordinates for the comet's location were obtained from the W. R. Brooks Observatory Comet Circular (No. 39). On that night, the comet could be found between Alpha and Delta Librae. It's magnitude was then 7.7 (as listed in the Comet Circular). The comet appeared as a round, fuzzy ball, with no evidence of a tail. I am looking forward to making more observations of Comet Bradfield as it gets brighter - predicted peak magnitude = 5.2 later this fall - and farther from the sun.

Adrienne Morris

August 30th the planetary nebula with a very prominent central star was seen, catalogued NGC 1514 in Taurus. That star is 9.4 in magnitude with a mottled nebula very low surface brightness, with a total magnitude of 11th and 2 arc minutes in size. With my jointly owned 26-inch Dobsonian and an UHC filter, the planetary looked like the ghostly image of a TV set just turned off in a darken room with a brilliant dot in the center.

NGC "1" was seen in Andromeda along with 2, 16 & 22 all of which are galaxies. The brightest is NGC 16 which is 12th magnitude and an arc minute in size; NGC 1 is $13\frac{1}{2}$ magnitude and 2 minutes in size and of low surface brightness. NGC 2 is almost stellar in size and of 14th magnitude and the most difficult is NGC 22 at 15th magnitude and $\frac{1}{4}$ arc minute in size.

Also on that night of September 20th, the Perseus galaxy cluster was seen with the 26-inch Dobsonian. About 35 galaxies seen hiding among the bright foreground of stars in our Milky Way. The easiest of them was NGC 1275 of 13th magnitude and 2 arc minutes in size having a high surface brightness hub.

Comet Brooks was seen on September 20th which is also known as 1987m. It was 13th magnitude with a slightly brighter center. What made it difficult to identify was the fact, that night, it just happened to pass across a cluster of 9 galaxies in Pisces. The brightest was NGC 518. Four nights later it was seen in a slightly different part of the sky all by itself.

Carl Milazzo

ASTRONOMICAL HAPPENINGS

SOLAR: The Sun will be reaching its southern most point on December 22nd, that point which we will again encounter shortening nights. Pluto will be in conjunction with the Sun on November 2nd as will Saturn on December 15th, Uranus on the 19th and Neptune on the 29th.

LUNAR: The phases of the Moon for November will be Full (Beaver) Moon on the 5th; Last Quarter on the 13th; New on the 21st; and First Quarter on the 27th. For December they will be Full (Hunting) Moon on the 5th; Last Quarter on the 13th; New on the 20th; and First Quarter on the 27th.

Conjunctions in November will be Jupiter on the 4th; Mars on the 18th; Venus on the 22nd; Saturn on the 22nd; Uranus on the 22nd; and Neptune on the 23rd. For December they will be Jupiter on the 1st & 28th; and Mars on the 17th.

Observations will be by spica on November 10th. PLANETARY: In November, Venus & Saturn on the 20th; Venus & Uranus on the 24th. In December, Venus & Neptune on the 3rd. Mercury will be at superior conjunction on the 23rd of December. Mercury is stationary on November 5th and is at greatest elongation (19° west) on the 13th.

METEOR SHOWERS: In November for ten days centering around the tenth, the TAURIDS will radiate from 03h 48m R.A. at $+22^\circ$ declination. It is known as a stream and produces near 10 hourly. They are slow and about medium length brightening to a reddish fourth magnitude. Their origin is Comet Temple 1866 I, although this has been disputed by some who say the comet gave birth to the Leonids. One distinguishing fact about these meteors is the hue which is reddish while the hue of the Southern Taurids is yellowish. Other meteor showers in November are the Southern Taurids on the 3rd; Cepheids on the 9th; Mu Pegasids on the 11th; Arietids on the 12th; Bielids on the 14th; Leonids on the 16th; and Andromedes on the 28th.

A short period meteor shower which is the result of Comet Blanpain from radiant 01h 00m R.A. at -55° declination are the PHOENICIDS. They occur on the 5th of December and last but 12 hours. Because of their low altitude to the south, they may not be able to be seen from our location here in Western New York. Their color is white averaging 4th magnitude, also from a good location you might be able to see as many as 50 hourly. Other meteor showers in December are the Monocerotids on the 10th as are the Chi Orionids on that date; Rho Hydrids on the 11th as are the Chi (southern) Orionids of that date; the Geminids on the 13th; Ursids on the 22nd; and the Delta Arietids and Coma Berenicids of unknown dates.

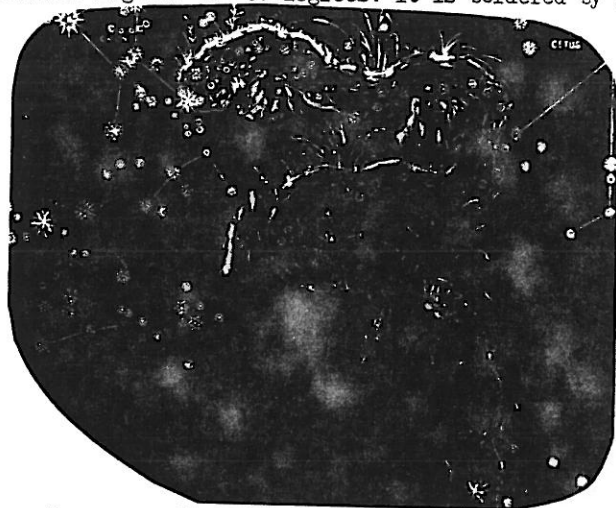
Darwin Christy

***** ERIDANUS

... The starry stream
For this a remnant of Eridanus,
That stream of tears, 'neath the God's feet is borne.
ARATOS - - -

ERIDANUS, the River Po, as well as the River Nile, the River Euphrates or the River Jordan, which ever, is referred to by Virgil as 'The King of Rivers'.

Every part thereof, lies below the Celestial Equator, from zero degrees to -60 degrees. It is bordered by many



many other constellations. On the north by Taurus; on the south by Hydrus; Horologium, Caelum, Lepus & Orion on the eastern edge; and by Phoenix, Fornax and Cetus on the west.

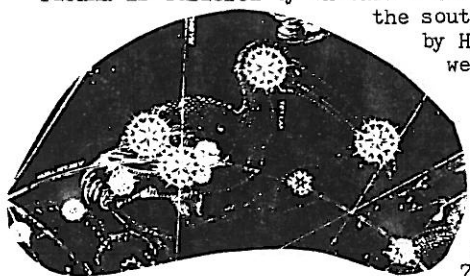
Interesting objects include galaxies I, 1953 & I, 2006, also NGC's 685, 782, 1084, 1140, 1172, 1179, 1187, 1199, 1209, 1241, 1291, 1297, 1300, 1309, 1322, 1325, 1332, 1337, 1353, 1357, 1358, 1359, 1376, 1386, 1389, 1395, 1400, 1407, 1415, 1421, 1426, 1437, 1439, 1440, 1452, 1453, 1457, 1481, 1487, 1507, 1518, 1521 & 1531. One planetary nebula NGC

Theta¹, Theta², Tau², Omicron², Omicron⁴, P, f, 15, 30, 32, 39, 51, 55 & 66. Variable stars include Epsilon, AS, BM, BR, DM(54), R, RS, RX, RY, RZ, T, UW, V, W, Y & YY.

TUCANA

TUCANA, the Toucan, is one of Bayer's inventions. Burritt also gave it a place in his charts and maps. Alfred Newton said the Avian word could be from the Guaranis' Ti (nose) and Cang (bone). Also that it was mentioned in a publication by Trevet in 1558 as from a Brazilian Indian Tribe.

Tucana is bordered by Phoenix & Grus on the north; on the south by Octans & Hydrus; by Hydrus on the east & west; also by Indus on the west. It lies much too far south for us to observe.



Objects of interest are few, Galaxies include NGC's 474, 406, & 7329. Globular

clusters are NGC 104, the famous '47 Tucanae', NGC's 330, 362 (62 Tucanae), 364 & 392, all of which lie within the Small Magellanic Cloud (SMC). A planetary nebula located at R.A. 22h 38m & dec. -57.15° is a fine object but too far below the horizon to see. Double stars are Beta¹, Beta², Beta³, Gamma, Delta, Lambda, Kappa¹, & Kappa²; also there are variable stars BS, BQ, TZ & U. If you ever happen to be in the southern hemisphere, you might take a gander at them from down below.

Darwin Christy

NEW MEMBERS

The following new members are to be welcomed:

Michael McGrath - Bruce Newman - Rick Williams - Susan Bocheaski - Gerald Vasi & Terry Cantwell

Doris Koestler

FOR SALE

Coulter's 17.5-inch Odyssey '2' Dobsonian Telescope, less primary and secondary mirrors. It does include a four wheel cart (4-inches in diameter) and a 25mm eyepiece, a deluxe dust cover, it is 3 years old having cost \$400 new now being sold for \$175. Call Carl Milazzo - 883-1832 or 688-2170. I will deliver it at no charge.

CM

WANTED

The Lockport Astronomy Association is looking for a reasonably priced 10" - 13" telescope with a portable mount. Anyone having such a telescope, please contact Bill Owens, President LAA - 7635 Arnold Dr., No. Tonawanda, 14120. Phone 692-8832.

? ! ? SPY & TELL ? ! ?

On August 20th, Carl Milazzo treated about 30 people at Tiff Farm to an evening of star gazing, showing them planets, constellations, and other objects of interest.

Dan Marcus and Al Kolodziejczak have each purchased Volume I of the new atlas Uranometria 2000.0 and are enthusiastic over the charts.

Doris and Bill Koestler are the proud grandparents of a beautiful little granddaughter, Mary Katherine Koestler, born August 29th.

John Yerger and several local artists are planning to tour other states with an exhibit of their paintings.

on the telescope: Ed Czapl, Tristan DiLapo, Gene Witkowski, Hugh Pettit, John Yerger and Carl Milazzo. They took the whole scope apart and put it back together, making some minor repairs. More work needs to be done, which they are planning to do in November.

Bill Smith exhibited his fine photographs at the Quaker Arts Festival in Orchard Park on September 19th.

On September 25th, the first night of Evening with the Stars brought about 100 people to view the heavens through the 8" refractor at the Kellogg Observatory. On hand to assist with the crowd were Marilou Bebak, Carl Milazzo and Richard Janas.

Gene Witkowski is very busy these days being a house painter.

Orrin Christy went on a 12 day business trip to Japan in September.

Carl Milazzo made a 6" Dobsonian telescope for Doug Smith (not the "Cheap Gourmet"). The scope was on display at the September meeting. Doug is a new member and teaches 5th grade at the Glendale Elementary School in the Sweet Home School District.

Darwin and Ruth Christy traveled to Gettysburg and Lancaster, Pa. the third week in September. They celebrated their 44th wedding anniversary on October 14th.

Edith L. Geiger

SMALL APERTURE OBSERVING

From the Rochester Astronomer's newsletter is an interesting article on "Small Aperture Observing". It should be of interest to those who have those smaller telescopes.

In these days of deep sky, it seems that the only way to go is with a large telescope. Nothing can be farther from the truth. It may be better to say that low power is the key to great observations. For instance, nebulae such as the Rosette, the California and Barnard's Loop (around Orion) have all been seen with the naked eye plus a nebular filter. The last two are considered next to impossible through the telescope.

To get the most out of a low power telescope, its exit pupil should match the eye's aperture (7mm). For this to occur, the objective's diameter (in mm) should be 7 times the magnification. 7x50 and 11x80 binoculars are an almost perfect match, along with 36x254 (a 10" aperture). Let us wander up through objective size to see what can be accomplished.

At 7mm aperture, at 1x magnification, we have the naked eye, a remarkable wide field instrument, very well suited for meteor watching and eclipse gawking. Any more magnification and the Great Rift in the Milky Way through Cygnus and Aquila disappears, the face on the Moon changes... Why not try and draw the apparent outline of the Milky Way, say while watching the Perseids or the Geminids? How many star clusters can you see? Next Spring or Fall, try and locate the zodiacal light, scattered by dust grains in the plane of the solar system. Binoculars are of no help whatsoever!

By hooking up an eyepiece to my 135mm telescope lens, I created a 4x mini-scope. The fields along the galaxy are almost indescribable, nebulousity everywhere, the North American and Gamma Cygni regions are just breathtaking. When one attaches a nebular filter to this aperture of 28mm (4x7mm) one can dig out such objects as the Helix planetary nebula, even the sprawling IC 1396 complex up in Cepheus. In fact, any magnification over 20x will be too much for IC 1396, it's simply too big. Dozens of open clusters are visible in Cassiopeia and Sagittarius, while plenty more can be found by a diligent searcher.

The most common form of the low power telescope is the standard pair of 7x50 binoculars. Next time you are using some, don't just scan the sky and just think 'that's nice', make a drawing! You may not discover Kemble's Cascade (found by Lucian Kemble of the Calgary Centre), but you can be assured that as a binocular observer, you may be one of

...the telescope. Therefore, in order for the observer to look through it, the telescope must be supported much higher off the ground. A tall mounting is inherently more unstable than a short one.

I can only begin to mention what one can see through an aperture of 60-80mm. Small telescopes or telephoto lenses, when equipped with an eyepiece that yields about 10x, can uncover open clusters and nebulae not even on the NGC or IC lists! I spent two nights floating through the star-fields of Cassiopeia and Perseus, not having time to go farther, with a 76mm refractor. I could identify King and Harvard clusters, even a couple of NGC ones that were too big to be seen in my 12.5"!

The main trouble with refractors of the 60mm kind, is that they only supply eyepieces that yield 50x-400x, 120x being the maximum to use on a 60mm scope. One really needs an eyepiece like the Meade 28mm orthoscopic -- its field is even bigger than some 400mm Kellners I've seen. Those of you good with your hands might want to make an adapter out of wood to hold a camera lens, say 50mm, at the eyepiece holder, and a counterweight at the objective end. It's really worth a try!

Sadly, not enough decent observing takes place at low power. If you have been worrying about where to put a 16" monster, just think what an advantage a carry-around scope is. Moreover, it's likely that you already have the parts for one. Be one of the very few who can catch the most awesome views of the sky on a piece of paper, and appreciate it.

Alister Ling
...in Astronomy London
Newsletter of the Royal Astronomical Society
of Canada, London Centre.

* * * * *

REFRACTORS - VS - REFLECTORS

Today, the amateur astronomer has a wide choice of telescope sizes. Refractors range in size from two to ten inches while reflectors start at three inches and are available in sizes up to twenty-nine inches. In the case of both refractors and reflectors, the larger the telescope, the more one can see with it. The size of the telescope, however, is not the only consideration. Each optical design has both positive and negative attributes.

Portability is an important consideration when buying a telescope. The amateur astronomer must be able to carry the telescope in and out of the house. Also, a telescope that will fit in the car is a bonus; light pollution in many cities is so bad that in order to see faint objects one must drive out into the countryside. Therefore, portable telescopes are neither too long to fit in a car nor too heavy to carry around. Most refractors have an 'f;' ratio of about f:15. This means that a four inch refractor is the practical upper limit if one wishes to maintain portability with a refractor. Beyond four inches, refractors begin to get too long and too heavy. The most common f-ratio for reflectors is between f:4 and f:10. Generally speaking, small reflectors have f-ratios of between f:4 and f:15, and for large reflectors f:8 and f:10. This means that it is possible to have a relatively large aperture, short reflector. An upper limit on portability, therefore, is a 10" f:6 reflector, or a 12.5" f:4 reflector. Thus, reflectors can generally be purchased in larger sizes than refractors and still maintain their portability. Beyond the above mentioned sizes both refractors and reflectors are generally not very portable and are ideally mounted in an observatory.

Another consideration when acquiring a telescope is the stability of the telescope mount. A telescope mount which is unstable will vibrate more easily than a stable mount. The effect of such vibration is very apparent when looking through a telescope eyepiece - the image shakes. On a reflector, the eyepiece is on the upper end of the telescope tube. Therefore, the mounting for the telescope can be very low to the ground and, as a consequence, stable. Contrast the reflector eyepiece location with the eyepiece location of a refractor. On a refractor, the eyepiece is on the back

of the telescope. Therefore, in order for the observer to look through it, the telescope must be supported much higher off the ground. A tall mounting is inherently more unstable than a short one.

Refractors and reflectors also require different amount of maintenance. Refractors require very little maintenance while reflectors require it regularly. Because the cell containing the objective lens is firmly fixed to the telescope tube, refractors rarely need optical adjustment. The only real maintenance a refractor requires is an occasional cleaning. Reflectors, on the other hand, do require relatively frequent optical adjustment. This adjustment, although simple, is required to keep the mirrors aligned. As well as being cleaned periodically, the mirrors of a reflector need to be removed and recoated because every five or so years the aluminum surface on them deteriorates.

Refractors and reflectors also differ, because of their design, in terms of what an observer can see when he looks through them. Refractors and reflectors also react differently to temperature changes. Refractors, because they have a closed tube, will perform well when taken from a warm house to a cold backyard. Because air in the tube cannot react with the outside air, thermal mixing of warm and cold air is minimal. Therefore, a change in temperature does not greatly affect image quality. Reflectors, on the other hand do not have enclosed tubes. Therefore, a change in temperature will noticeably affect the image one observes. For example, the primary mirror in a reflector reacts slowly to changes in temperature. A 6" mirror can take 20 minutes to reach the outdoor temperature. While the mirror cools it will be radiating heat, causing thermal convection within the telescope. Thermal convection creates bubbly images. A reflector, in other words, will not perform optimally until all its parts have reached ambient temperature.

Refractors and reflectors also differ (as mentioned earlier) in terms of the amount of colour they introduce to astronomical objects. A reflector does not have any chromatic aberration. The reflector images are colourless. Most refractors, in spite of their two lens objective, still produce a residual colour fringe around bright objects such as the moon and planets. The residual colour, coupled with their slow photographic speed (f:15) makes the refractor completely unsuited to astrophotography. The photographically faster, colourless reflectors are almost always used to take pictures. The detail one can see through a telescope also varies, depending on whether one is looking through a refractor or a reflector. Theoretically, refractors and reflectors of equal aperture will have equal resolving power (the ability to show fine detail). But this is not the case. A reflector, because of its extra mirror, has slightly less resolving power than a refractor of equal aperture.

Another difference between refractors and reflectors is their suitability for observing different types of astronomical phenomena. Generally speaking, refractors are best suited for observing the Sun, Moon, planets and double stars. Reflectors, however, are better suited for comets, variable stars and deep-sky objects. These differences are really a result of the typical f-ratios found in refractors and reflectors. The large f-ratios of refractors produce large-scale images and narrow fields of view, while the smaller f-ratios of reflectors produce small-scale images and wide fields of view. Your choice of telescope, in part, depends upon what type of objects you are most interested in looking at.

Although the above mentioned differences between refractors and reflectors will influence a given amateur astronomer one way or the other when he buys a telescope, the most significant difference between a refractor and a reflector is the price. Refractors cost considerably more than reflectors. The reason is the optics. Reflectors have only two optical surfaces; refractors have four. The price of the telescope's optics alone demonstrates the difference. A 6" Jaegers refractor objective is priced at \$ 795.00 while a 6" Telescopic reflector mirror set costs \$ 150.00. In terms of inches per dollar, the reflector is

give up some of the advantages of a refractor in order to purchase a much larger reflector.

Dale Armstrong
from Astronomy London via the Whirlpool,
both NFCAA members.

SPACE TELESCOPE

The deadline for amateur astronomers to submit proposals for observing time on NASA's Hubble Space Telescope has been extended from 1987 to June 1988, Stephen J. Edberg, Chairman of the Hubble Space Telescope Amateur Astronomer Working Group, announced today.

Linking the deadline to the resumption of Space Shuttle operations, now scheduled for June 1988, will give amateur astronomers extra time to submit their proposals, he explained.

Edberg said that "response from the amateur astronomer community on this project has been enthusiastic. We've received more than 450 inquiries about the amateur astronomer participation project, and the proposals we are getting show lots of imagination." Adding that although he could not disclose any specifics about the amateur proposals already submitted, Edberg did say he thought those proposals were "very creative, covering many fields of astronomical interest."

Amateur astronomers were invited to compete for 2 or 3 hours observing time annually on NASA's Hubble Telescope last year by NASA officials and Space Telescope Science Institute's Director, Riccardo Giacconi. Giacconi believes serious amateur astronomers "deserve a chance to use the most powerful of astronomical instruments," and emphasized the "it is likely amateur projects will yield important contributions to the field and amateurs would ask refreshing new questions".

ing time on Hubble Space Telescope should be sent to: American Association of Variable Star Observers, 25 Birch St., Cambridge, Mass., 02138.

The association is one of seven amateur astronomical organizations that make up the Hubble Space Telescope Amateur Astronomers Working Group. The others are: Association of Lunar and Planetary Observers, Astronomical League, Independent Space Research Group, International Amateur-Professional Photoelectric Photometry, International Occultation Timing Association and Western Amateur astronomers.

The Hubble Space Telescope is a cooperative international project of NASA and the European Space Agency. The Space Telescope Science Institute is operated for NASA by the Association of Universities for Research in Astronomy, Inc. The institute is located on the Johns Hopkins University campus in Baltimore, Md.

Submitted by Marilou Bebak

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