

the Spectrum

BUFFALO ASTRONOMICAL ASSOCIATION INC.
BUFFALO MUSEUM OF SCIENCE
HUMBOLDT PARKWAY
BUFFALO NEW YORK 14211

Editor:
Ernst E. Both

NOVEMBER - DECEMBER 1971

NOVEMBER MEETING: Our third meeting of the new season (November 12, 1971, 8:00 PM, EST, Club Room, Buffalo Museum of Science) will feature a lecture by Dr. Frederick R. West entitled "Modern Large Reflecting Telescopes and Some of Their Uses." Dr. West is Assistant Professor of Astronomy at the State University College at Buffalo and Research Associate of the Museum's Kellogg Observatory. Recently Dr. West has used the large reflectors at David Dunlap Observatory and Kitt Peak National Observatory in his study of spectroscopic binaries. It is our great pleasure to welcome back our own member DR. WEST! Refreshments will be served at the conclusion of the meeting in the Museum's new lounge, followed by observations with the 8-inch, weather permitting.

*

DECEMBER MEETING: Each year we devote this meeting (December 10, 1971, 8:00 PM as above) to the more social aspects of the B.A.A. and astronomy in general. This year it will feature our treasured treasurer, Edith Geiger, in a slide review of star parties of by-gone years entitled "YOU'VE GOT TO BE KIDDING". Also on the program will be Ed and Olga Lindberg, topic to be revealed at the meeting. Following this we will have our annual X-mas party in the new Museum Lounge. COME ALL *****

*

*** THIRD ANNUAL ASTROPHOTOGRAPHY EXHIBIT *** We are again planning an annual astrophotography exhibit for the spring of 1972. All members are urged to submit as many of their photographs as possible, preferably glossy 8 x 10 prints. The following data should accompany each picture: subject matter, date, time, telescope used, exposure and film used. Needless to say, this is not a competitive exhibit - we simply wish to show what amateurs can do with their equipment. Merely because you are a beginner and feel that your pictures are not as pretty as those taken with the 200-inch does not mean you should not feel proud of them. Unlike previous years, pictures will not be returned. They will become the property of the B.A.A., to be used at some future date for a grand exhibit. Please submit your photographs to: Ernst E. Both, Curator of Astronomy, Buffalo Museum of Science, Buffalo, N.Y. 14211, BEFORE JANUARY 20, 1972. * * *

* *

*** GREAT DUST STORM ON MARS *** By Ernst E. Both

During this year's opposition Mars came closer to the Earth than at any time since 1924. Because of its eccentric orbit, Mars comes close to Earth only at intervals of 15 or 17 years. It is well known that during such perihelic approaches, when the southern hemisphere of our neighboring planet is tilted toward Earth, it undergoes fairly extensive duststorms often lasting for weeks. These usually begin after Mars passes perihelion and sometime before the southern hemisphere's summer solstice is reached, apparently due to fairly violent winds (up to 60 mph) produced by increased convection. Though violent at the beginning, these winds rapidly decrease within a day or two to about 6 miles per hour. This year (continued on last page)

* THE STAR OF BETHLEHEM - FACT OR TRADITION? * By Fred W. Price

Hardly a Christmas passes without someone asking: "What was the star of Bethlehem?" The story of the wondrous star which heralded the nativity of Christ and guided the wise men to Bethlehem has delighted Christians down the centuries. The vision of the Holy Family, shepherds, Magi, ox and ass standing round the manger with the great star of the Epiphany blazing overhead is spiritually moving and universally loved. Even the intelligent layman - let alone astronomers - cannot help but wonder about the nature of this star which reputedly "went ahead of the wise men until it stopped above the place where the child lay." Such is the assertion in the Gospel according to Saint Matthew. Curiously, this is the only one of the four Gospels in which the story of the Nativity star is related. In trying to arrive at an answer to this age-old question, it would seem reasonable to seek a natural explanation of the story. Before we can do this, three things should be ascertained - the year of the Nativity of Jesus, the time of the Nativity, and the nature of the "star."

The Year of the Nativity. We take for granted our present system of numbering the years as if they started exactly at the year of Christ's birth. For example, as everybody knows, 1971 A. D. (Anno Domini, the Year of Our Lord) means the nineteen hundred and seventy-first year after Our Lord's birth. However, things are not as simple as this. The consensus among Biblical and historical scholars is that the actual year of Christ's birth was 7 B. C. or 6 B.C. One point in favor of this is the fact that Herod, King of Judea, died in 4 B.C. The Jewish Historian Josephus unambiguously states that Herod died at Jericho after an eclipse of the Moon and a few days before the Passover feast. There is only one lunar eclipse which fits this statement and that occurred on March 13th, 4 B.C. The Passover occurred on April 12th of the same year so that Herod must have died at some time close to April 1st, 4 B.C. From the story in Saint Matthew's Gospel, Christ must have been two years old or more in 4 B.C. which indicates the year of His birth to be 7 B.C. or 6 B.C.

The Time of Year. We also take for granted that Christ's birthday is December 25th. In the Gospel story we are told that when the Christmas star appeared "there were shepherds out in the fields keeping watch through the night over their flock." Now December is a cold wet month in Israel and the sheep would be in corral. It seems hardly the time of year for shepherds to be staying out in the fields all night. They would more likely stay out keeping watch over the sheep during the months of February, March and April when the lambs were being born. The early Christians, who were almost outlaws in Rome, celebrated the birth of Christ at various times of year including December 25th. While they suffered persecution, this date was a good time to celebrate the Nativity because their pagan neighbours were absorbed in the feasting and merrymaking of the midwinter festival (Saturnalia) which took place around the winter solstice. By the year 350 A.D. Christians openly worshipped in Rome but continued to keep December 25th as the date for the Nativity celebrations. Few people even today realize that many of our Christmas traditions are of pagan rather than Christian origin. The general time of good will when people exchange presents, the decorating of the houses with evergreen branches, the feasting and merrymaking - as well as the date of Christmas - all originated with the pagan midwinter festival. December 25th is therefore the traditional birthday of Christ but it seems more likely that the Nativity actually occurred in the early Spring.

What was the Star? Although the Gospel story specifically refers to a "star" this need not be interpreted too literally. As well as fixed stars, objects such as comets ("hairy stars"), planets ("wandering stars") and meteors or fireballs ("falling stars") have been, and still are loosely called "stars". A meteor or fireball

explanation of the Christmas star seems very unlikely since these are short-lived phenomena. The object which guided the wise men on their long journey would have to be visible for several days at least. A comet, which would fulfill this requirement, does not seem a likely candidate either. Far from being the herald of a wondrous or happy event, a comet was most usually associated with impending catastrophe, plagues, war and pestilence by the ancients. Such a sight always aroused wonder and excitement but there are no records of a comet for the period 8 B.C. to 6 B.C. The only recorded appearances of comets anywhere near the time of the Nativity were those of Halley's comet in 11 B.C. and of a comet recorded by the Chinese in 4 B.C. These are either too early or too late for consideration.

An attractive idea is that the Bethlehem star was a supernova or "new star". Sometimes, a star appears in the sky as if from nowhere and rapidly increases in brightness becoming as bright as or even brighter than the brightest planet. It may remain visible for weeks before fading again into obscurity. There is no record of a supernova having occurred at the time of the Nativity. So spectacular is a supernova that had one been seen at the time it would most certainly have been recorded by Chinese astronomers who kept careful records of "guest stars" as they called them.

A Triple Conjunction of Jupiter and Saturn. In the year 7 B.C. there occurred a very rare and remarkable triple conjunction of the planets Jupiter and Saturn in the constellation of Pisces, the Fishes. What would this have to do with the Christmas star? In the eyes of an astrologer, a triple conjunction such as this would be an extremely potent and significant event. When we remember that the wise men (Magi or Magoi) were in all probability Persian astrologer-priests of the Zoroastrian religion, a plausible answer to the age-old question seems at last to emerge. A conjunction occurs when two or more planets appear to come very close together in the sky. Generally, the outer planets seem to wander slowly in an easterly direction against the background of the fixed stars. Sometimes, a planet seems to halt in its tracks then travels in the opposite direction for a while before stopping and again resuming its eastward motion. This apparent temporary backward (retrograde) motion results from the relative motions of the Earth and outer planets. Effectively, the faster moving Earth, in certain orbital positions, "overtakes" and passes the slower moving outer planet so that as seen from Earth the planet appears to move "backward" against the background of the stars. In the great triple conjunction of 7 B.C., Jupiter and Saturn underwent a series of movements in the sky in which they came close together and withdrew again (because of retrograde motion) in a manner which resulted in no less than three successive conjunctions in the constellation of Pisces in the space of a few months.

The celestial drama began to unfold in 8 B.C. During that year it was apparent to watchers of the sky that Jupiter and Saturn were approaching a conjunction and that this would occur in Pisces, which to the astrologers had great significance since the constellation of Pisces was referred to as the House of the Hebrews; no doubt the Magi were familiar with Jewish Messianic expectations. The prophet Isaiah in particular had predicted the coming of a great king whose reign would never end and who would establish a world of peace. A conjunction of Jupiter, the royal planet, and Saturn, the protective star of Israel in the constellation of Pisces which the Jews considered to have Messianic significance was therefore a momentous sign in the heavens. Moreover, the astrologers knew that this would be the first of three closely spaced conjunctions. So compelling was the symbolism that it sent the Magi on their journey to Judea to pay homage to the new born king and to present their gifts. The chronicle of events of this unusual celestial display appears to have been as follows: Early April, 7 B.C.: Jupiter moved from Aquarius into Pisces and approached Saturn; April 12th: Jupiter and Saturn separated about eight degrees in longitude and visible just before sunrise low in the east; May 29th: First Conjunction, Jupiter slightly less than one degree north of Saturn, both planets visible for two hours before sunrise; Early July: Both planets

slowed down in easterly motion then stopped briefly; July 8th: Saturn began retrograde motion; July 16th: Jupiter retrograded and pursued Saturn; October 3rd: Second Conjunction with Jupiter one degree north of Saturn, the planets directly overhead at midnight; Early November: Jupiter's westward motion slowed up, with eastward motion resumed on November 10th. Saturn ceased its retrograde motion on November 20th; Late November: The Magi arrived at Jerusalem and spoke to Herod, who consulted with chief priests and scribes and learned of the prophecy of Micah 700 years before; December 4th: Third Conjunction, Jupiter again one degree north of Saturn. The Magi travelled south on the Hebron road to Bethlehem. The two planets were almost directly ahead of them in the early evening sky.

Two further questions answered? This explanation of the star of Bethlehem provides plausible answers to at least two other puzzling facts. First, the east to west drift of the planetary phenomena was in the direction the Magi would have to travel in order to reach Bethlehem and this may well have given rise to the story of the leading quality of the star. Another puzzle is why Herod and the Jews do not appear to have seen the "star". The Jews were monotheistic and did not regard the planets as deities. Astrology was unknown to them. Hence their lack of concern about what was going on in the sky. For the Magi, however, the spectacle had tremendous significance and they may have interpreted this as the sign for which they had been waiting.

That the triple planetary conjunction of the year 7 B.C. gave rise to the story of the Christmas star seems very convincing and has the ring of truth. This idea is supported by astronomical facts and astrological theories and is therefore intellectually satisfying. One wonders why Saint Matthew referred to a star when in fact there were two (Jupiter and Saturn) separated by an apparent distance equal to two full moon diameters. Should he not have referred to the "stars" of Bethlehem? The word star is derived from the word "aster" and a pattern of stars is referred to as an "asterism". This could be loosely applied to a planetary pattern of the type we have been discussing. Perhaps the true original phrase may have been the "asterism of Bethlehem" which later may have been corrupted into "star". There are still people who believe that the true star of Bethlehem was a purely supernatural phenomenon and so it may have been. Who can tell?

REFERENCES: "Star of Bethlehem," by R. K. Marshall (Morehead Planetarium, Chapel Hill, North Carolina); "A Star of Wonder," by R. S. Knapp (Morehead Planetarium); "The Christmas Star," by H. C. King (Royal Ontario Museum, Toronto, Canada).

* * *

* * SPY AND TELL * * Bob Burdick is recovering well from a recent heart attack. He is in room 143, Our Lady of Victory Hospital, Lackawanna; I am sure Bob would like to hear from his fellow members - all of us hope for a very speedy recovery, Bob! Not satisfied with having recently finished a superb 12.5-inch Cassegrain, Bob was busily working on a 10-inch Maksutov. * * * Walt Whyman spent all of August touring the country. Taking the southern route to California, he and Mrs. Whyman returned via the northern states with Walt spending 4 days in a hospital (he is fully recovered and feeling fine now); only observatory visited was the Lick, where they gave Walt the "grand tour" (five minutes worth! - next time visit the Kellogg Observatory - there we'll at least let you touch the instruments, Walt!) * * * Walt Semerau spent a couple of days at his former place of employment - Union Carbide (Linde Division, now in Terrytown, N.Y.); he was invited to speak about his solar work and treated there the way he should be - like a king. * * * Darwin Christy successfully ground and polished his 12.5-inch mirror into an f/6 (76 inch focal length) system. Plans call for a split ring-type mount. * * * Orrin Christy is expected to leave the Armed Service two months earlier than expected (February 24, 1972). He had hoped to be home as early as December, but apparently that hope will not be fulfilled. Sorry you have to miss our

X-mas party, Orrin (perhaps we can save you a piece of the cake). * * * Tom Dessert is going to have an unbelievable phone bill. He's been calling telescope makers from coast to coast collecting facts about 10-inch telescopes, one of which he's planning to purchase. His instructions to his wife: "When that phone bill comes, I don't want any arguments! Just say nothing and pay it!" * * * We understand that John Riggs is at UB majoring in biology, but can't get any biology subjects into his schedule. He is still hunting NGC objects and recently managed to "stumble into" the Perseus cluster of galaxies! * * * Rick Janas, Bob Kartyas, Kermit Schlitzer and Warren Steinberg took a trip to Toronto where they enjoyed a visit to the David Dunlap Observatory and the McLaughlin Planetarium. * * * Here is a goodie! At last the Newstead dome has an aluminum asbestos fiber coating which is water tight. Now, instead of soaking into the dome, the water runs off the dome and comes up underneath it. * * * Rick Janas lost his boomerang at Newstead. NO REWARD if found - keep it! Incidentally, we may be losing Rick himself in the near future - he's been accepted as a VISTA volunteer. * * * What's this I hear about you speeding, Lillian? * * * DUES ARE DUE * * *

*

* OBSERVING SECTION PLANS * By John Riggs

On September 24, 1971, the new observing section held an organizational meeting to discuss future plans. It was decided that on every clear Friday and/or Saturday night an observing session will be held at Newstead Observatory. If it appears that the selected night will be clear, members will receive final confirmation by telephone late that afternoon - anyone wishing to bring along his telescope is invited and urged to do so.

It was also decided that the section will meet on the fourth Friday of every month at 9:00 PM in the Museum's Roosevelt Room (rather than 8:30 PM as was previously announced); this will give those members who wish to attend the meeting of the Instrument Section (which meets at 7:30 PM on the same night) more time to look at mirrors and discuss equipment. Topics at the regular meetings will be highly varied and largely determined by the members present at the meeting. The recurrent main theme will be the various aspects of amateur observing on a non-scientific level.

*

* A PIECE OF GLASS * By A. W. Everest (submitted by Darwin Christy)

He labored late into the night -

At early morn' his task resumed to fashion thus a disk of glass

Into a subtle curve, not deep, but measured only by the shades of light
From a simple pinhole, made in foil,

Revealing to his practised eye imperfections infinitesimal;

Until at last his skill produced a curve so true, the mind of man
Could not discern the wavering of a breath.

"Just a piece of glass," 'twas said,

But in that simple disk

The heavenly host of Suns and Stars, yea, Universes,
Revealed their glory in the sky for man to ponder - and adore!

*

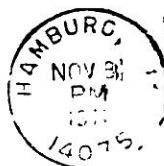
Mars reached perihelion on September 8, while the southern summer solstice occurred about a month later (October 10).

The dust storm apparently started around September 23 as a bright yellowish area in the region of Noachis, covering Pandora Fretum and stretching toward the south pole. The only feature brighter than this cloud was the small, white, southern polar cap. As the "storm" progressed west and southward, it gradually covered Sinus Sabaeus, Sinus Meridiani, Mare Erythraeum and Sinus Margaritifer, all appearing greatly reduced in intensity. By September 29 the cloud, consisting of several individual patches of unequal brightness, covered more than 200° in longitude, from east of Hellas to Lacus Solis. On the following day it covered the small southern polar cap so that it "disappeared". During the first few days of October it continued to spread both in longitude and latitude, crossing the equator as a dull "dust haze" and beginning to reduce the intensity of dark features located in the northern hemisphere. Sinus Sabaeus appeared completely covered around October 6 and the most prominent dark feature on the Martian disk, the Syrtis Major, was seen greatly reduced in intensity - a pale ghost of its normal self. For the first time since September 30 the south polar cap became vaguely visible on October 9, surrounded by a bright hood.

Since the first week in October, the "storm" has slowly subsided, although most dark areas are still quite vague and appear "washed out". Apparently the "cloud" has given way to a fairly planet-wide dust haze which obliterates most of the finer detail. Another yellow cloud may be expected to develop around the middle of December, according to G. De Vaucouleurs. Between now and then we may expect to observe much continuing cloud and haze activity, although if you missed this beautiful storm, you'll have to wait until the mid-1980's before you get another opportunity similar to this. (References: personal observations, and IAU Circulars 2358, 2359, 2364.)

*

Buffalo Astronomical Association, Inc.
c/o Buffalo Museum of Science
Humboldt Park
Buffalo, N.Y. 14211



F I R S T C L A S S

Mr. & Mrs. Carroll Geiger
P.O. Box 23
Orchard Park, N. Y. 14127