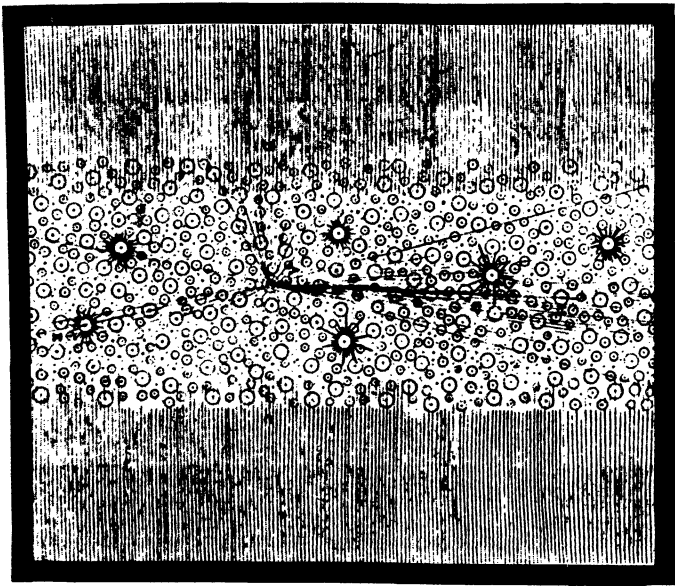


NOVA NOTES



Halifax Centre



**July-Aug 1984
Volume 15
Number 4**

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NOTICE OF MEETINGS

- Dates: July 27th - July 29th
- Place: Doctor Holden's property
Albany, Nova Scotia
(see map on page 69 for directions)
- Topic: Annual Camping/Observing Weekend

Dr. Holden has once again invited us to his property for our camping / observing weekend. Bring your telescope or binoculars and enjoy the dark skies and hospitality.

- Date: Saturday, August 11th
- Place: To be announced at a later date
- Topic: Perseid Meteor Shower Observations
Once a decision on where to hold this event has been reached, all members will be notified by mail.

About the cover: This drawing accompanied Thomas Wright's 19th century book and shows his explanation for the appearance of the Milky Way. Although he had originally thought that the the Milky Way was shaped like a disk, he later changed his mind and determined that like the Earth and other celestial objects, the Milky Way was spherical and the sun was located in the midst of a large number of stars which were contained in a thin shell between two concentric spheres.

MINUTES OF THE FEBRUARY MEETING

Executive Meeting: February 17, 1984

The following items were taken up at the executive meeting:

1. Randall Brooks reported that Roy Bishop had seen Peter Broughton, National Secretary, at the National Council meeting of Jan. 28, 1984 and that the proposed constitution sent to the National Council by the Halifax Centre had been approved in May of 1981. With the constitution approved, we can now proceed to register our Society in Nova Scotia.
2. It was decided to combine a proposed special meeting for young people with Astronomy Day, on MAY 5th and to have the whole affair at the Halifax Planetarium.
3. It was agreed that information sheets should be provided by the centre to the Nova Scotia Museum for distribution to interested members of the public. We would like to provide something aimed at 12 to 14 year olds that would help them get started and hopefully provide us with new members.
4. A proposed award by our centre for the Canada-Wide Science Fair to be held at Saint MARY's University from May 13-20 was found to be too expensive for us to comply with their request. On the brighter side, all three of our proposed judges for astronomy exhibits at the fair were accepted. They are Norman Scrimger, Dave Tindall and Randall Brooks.
5. We received a letter from the Nova Scotia chapter of the Canadian Rehabilitation Council for the Disabled asking for a listing of other community clubs and associations for a directory they are compiling.

General Meeting: February 17, 1984

Our speaker for the February meeting was Dr. George Mitchell of Saint Mary's University. He is largely interested in the theoretical aspects of astronomy and is an authority on the interstellar medium. He has studied in England, Berlin and at the Jet Propulsion Laboratory in the United States.

His talk was on the subject of comets. He explained that not much work had been done on the origin and composition of comets prior to 1950. Comets are thought to be interplanetary bodies and there is a great deal of evidence that they are not interstellar in origin, even though most of them travel along orbits which are almost impossible to distinguish between being elliptical, parabolic or hyperbolic.

Comets are homogenous and consist primarily of relatively unprocessed simple chemical compounds, and are thus quite unlike planets. They are mostly a form of "dirty ice", that is ices (water, ammonia, methane) mixed with dust. By studying emission lines when a comet is near the sun, C_2 , C_3 , CN , H , OH , S_2 , H_2O , and NH_3 have been found. Although water is included in this list, it was only detected as H_2O in one comet, however, it is assumed that all of the H and OH seen comes from diassociation of water by sunlight. Radiation from the sun causes sublimation of material from the comet's surface, which forms the coma. Dust is carried away as the ice around it is sublimated. Chemical reactions occur in the coma out to 100 000 km from the nucleus, however, because of the changing density and amount of solar radiation at different distances from the nucleus, the chemical reactions which occur vary greatly.

As it is thought that the material comprising comets may be the same as what existed when the planets were formed, hence the importance of studying comets.

Ralph Fraser

CONSTITUTIONAL AMENDMENTS

The following amendment to the Constitution of the Halifax Centre has been proposed in order to keep our Constitution in line with similar provisions in the RASC Constitution. A vote on this amendment will be held in accordance with the Constitution at the September meetings of the Centre.

Article III to be amended to read:

Membership:

a) Regular, Youth and Life to remain as currently enacted

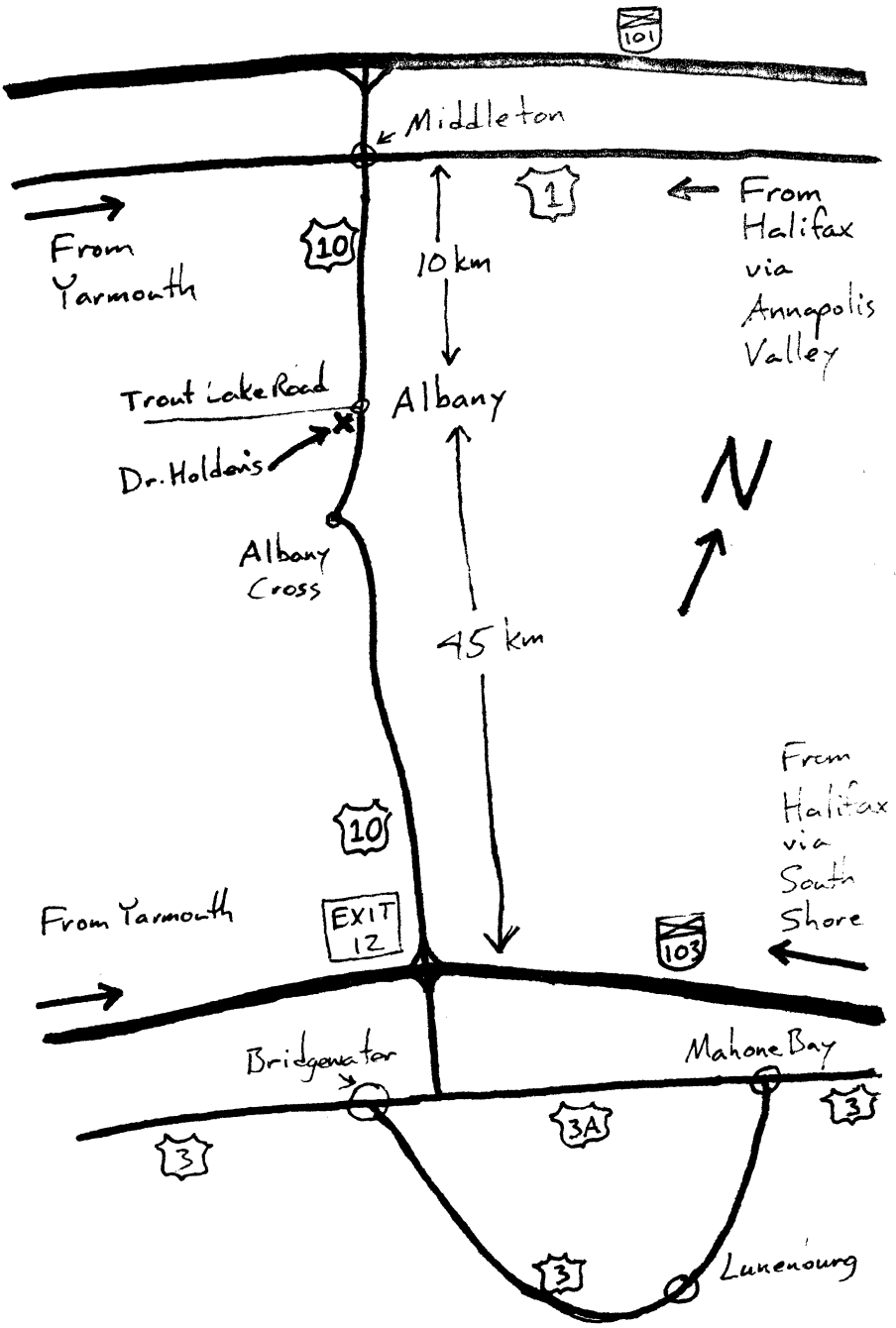
b) Associate; the Centre shall extend Associate Membership to a family member(s) of a Regular, Youth or Life Member in good standing. The fees for an Associate Member in good standing shall be as set, from time to time, by the Centre Executive

Proposed by R.C. Brooks
Seconded by W.P. Zukauskas

ASTEROID HOGG

A note in the Globe and Mail on Tuesday, 19 June noted that the University of Toronto has asked the International Astronomical Union to name an asteroid, discovered at the David Dunlap Observatory in 1980, for Dr Helen Sawyer Hogg.

DOCTOR HOLDEN'S PROPERTY



MISCELLANEOUS NOTICES

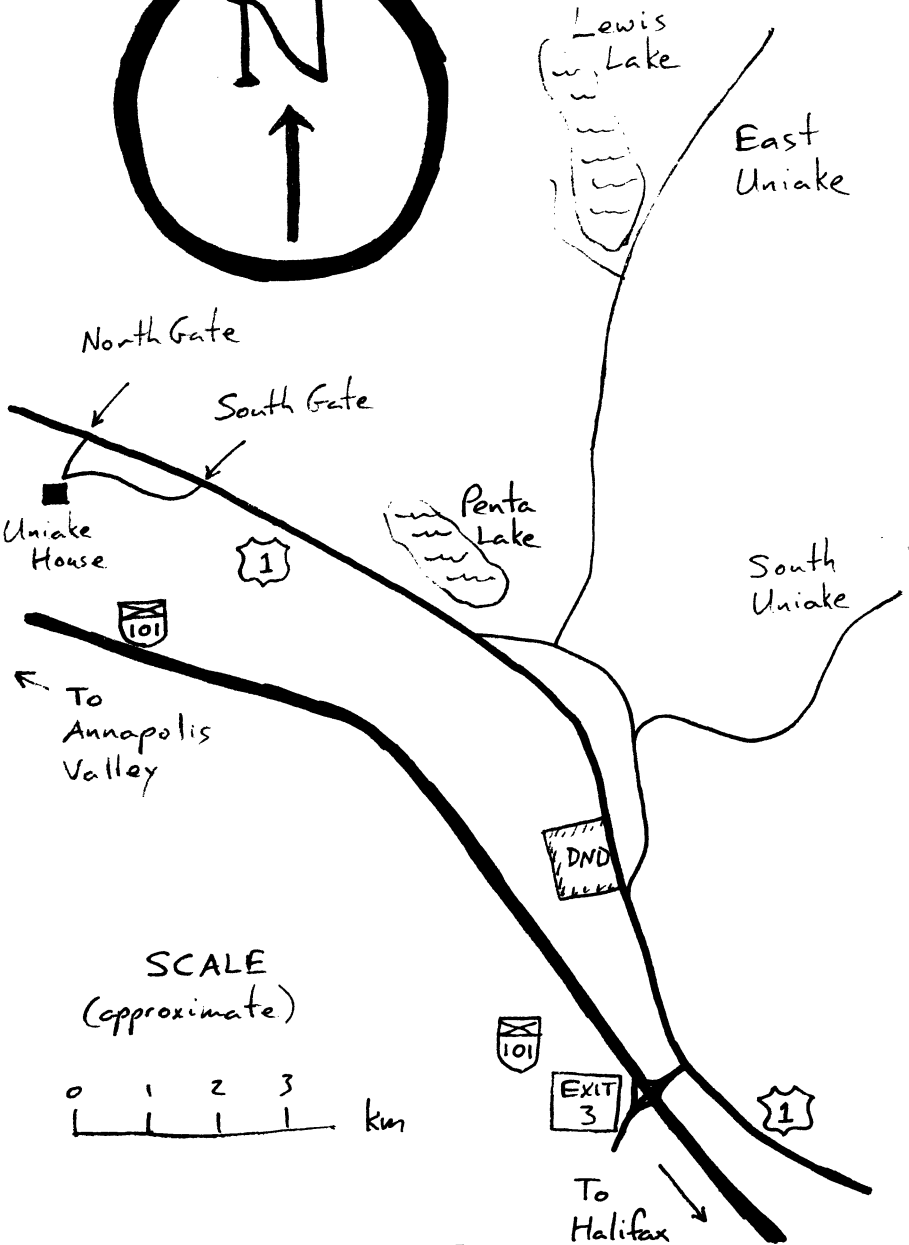
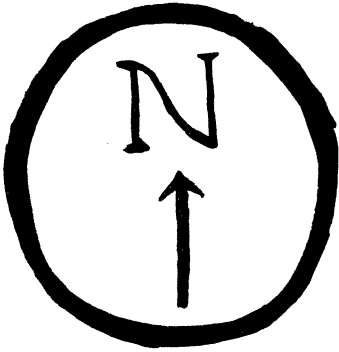
Gordon Hawkins, our observing chairman will be attending the General Assembly in Hamilton as the Halifax Centre's representative. We all hope that he has a good trip and we are looking forward to hear from him when he comes back to let us know what went on.

It was decided at the June Executive meeting to have a special issue of NOVA NOTES for the 1985 May-June issue which would be entirely to Halley's Comet. This would coincide with Astronomy Day, and we will be printing extra copies for distribution to the general public. In order to make this issue a success, and to try to get more of you involved in the centre's activities, we thought it would be a good idea for different members to do articles on different aspects of Halley's Comet. A list will appear in the next issue giving at least 10 different areas on which an article could be written. If you wish to start now, feel free to pick your own topic, however, in order to avoid duplication, please contact me first. If you don't think that you can write an article for NOVA NOTES, see the following notice.

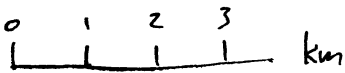
There are probably lots of you out there thinking "Gee, I'd like to write an article for NOVA NOTES but what should I write about?". Well, in order to give you practice at an article on Halley's Comet, or if you just wish to try your hand at writing, I am interested in hearing about the most unusual thing that has ever happened to you while observing. It doesn't have to be something astronomical and can be either serious or comical but send it in. So get a pen and paper and be sure to check the deadline for submissions beneath the index.

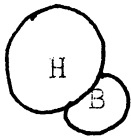
Patrick Kelly

UNIAKE HOUSE OBSERVING SITE



SCALE
(approximate)





THE LUNENBURG COUNTY ASTRONOMY CLUB

On Saturday, March 17th, the L.C.A.C. held its first public meeting of 1984 (a sort of mini astronomy day). At this meeting, Wilf Morley gave a brief talk on naked eye astronomy after which the film: "A Wisper From Space" was shown. The planned observation session was cancelled due to weather.

In spite of the weather, there was a relatively good turn out of the public.

The 1984 executive was decided upon on this same night. The offices were filled as follows: PRESIDENT-Wilf Morley; SECRETARY-Robert Martin; TREASURER-Mark Kenney; OBSERVING CHAIRMAN/LIAISON-Darrin Parker.

As announced at the last meeting of the Halifax centre, there has been a change of format out here in Lunenburg County. The meetings of the L.C.A.C. are now being held every third Saturday of each month at 7:30 pm. These meetings however, are more or less rap sessions and planning meetigs. The meet-

ings designed especially for the public (mini astronomy days) are held on the third Saturday of March, June, October, and December.

The L.C.A.C. is off to a good start in 1984. Our March meeting was a success with many looking forward to an evening of star gazing later this spring. The official number of members is now at 15.

Remember our next "mini astronomy day" is the third Saturday in June and everyone is invited. Also remember there will be an observation session every clear Saturday evening behind the Desbrisay Museum in Bridgewater this summer between June and August (inclusive). These will begin at dusk (see NOVA NOTES last issue).

Good Observing to All...

Darrin Parker
(observing chairman LCAC)

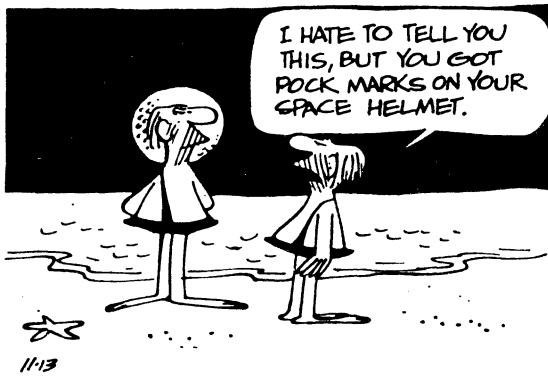
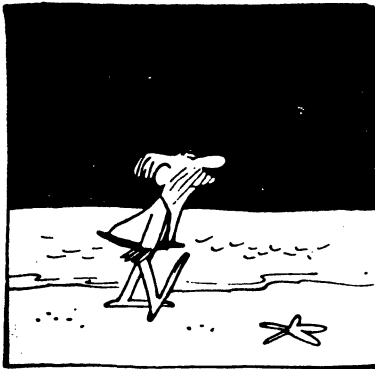
WHAT IS R136a ?

=====

R136a is the name given to the bright central object of the Tarantula Nebula (30 Doradus) in the Large Magellanic Cloud. The Tarantula Nebula is one of the largest ionized hydrogen (HII) regions known. To maintain its state of ionization a source of approximately 5×10^{51} ionizing photons per second is required. The main source of ionizing photons is believed to be R136a.

In terms of conventional objects what could R136a be? A reasonable guess would be a compact cluster of very hot young stars. The spectrum of R136a at ultraviolet and optical wavelengths is characteristic of a combination of an O3III star and a WN star (Wolf-Rayet, nitrogen sequence). The number of stars required to produce the observed energy output is about 30 O3's and 15 WN's for a total of about 45 stars. This sounds fine until one is confronted with the results of recent speckle interferometric work which places an upper limit on the diameter of R136a of 0.005 parsecs (1000 AU). The 30 O type stars alone have a mass of approximately $2000 M_{\odot}$ and when this is confined to a sphere of diameter 0.005 pc the resulting density is an incredible $3 \times 10^{10} M_{\odot}/pc$. Compare this with the density of the centre of our Galaxy $3 \times 10^7 M_{\odot}/pc$. The cluster would be a thousand times more dense than the densest part of our Galaxy.

One measure of the lifetime of a cluster of stars is the reference relaxation time. This quantity depends on the number of stars, their average mass, and the radius of the cluster. For a typical open cluster the relaxation time is of the order of 200 million years but for the R136a cluster it is around 60 years. In other words if R136a were a cluster it could only exist for a very short time. It is not very likely that R136a is a cluster of hot young stars.



Reprinted from " B.C. Dip in Road "

A number of astronomers have suggested that R136a may in fact be a single supermassive star. Calculations show that to produce the observed energy output a single hydrogen-burning star would have to have a mass of approximately $2000 M_{\odot}$. Such a star would have a radius 50 times that of the Sun and a surface temperature of around 70,000 K (Sun's temp. = 6000 K). It's total energy output per second would be about 60 million times the Sun's output.

From these numbers one can see why many astronomers are reluctant to take the supermassive star suggestion seriously. According to classical stellar structure theory it is very difficult for stars more massive than $\sim 100 M_{\odot}$ to form and such stars would be unstable against pulsation. But more recent stellar models have shown that rotation can stabilize a supermassive star against pulsation and that they can form if certain assumptions are made about the protostellar material.

According to these new models the formation of supermassive stars may be possible. Such an object could theoretically account for all the observations obtained so far. There is however some debate, as a result of the speckle interferometry, over the number of objects comprising R136a. This may indicate that R136a is a small group of supermassive stars. Much work needs to be done and is being done to determine the structure of R136a and other similar objects in nearby giant HII regions. It will be interesting to follow the progress of this work over the next few years.

Bill Allwright

Further Readings:

For a brief summary of the cluster/supermassive star debate see, Sky and Telescope, Feb. 1984, p.134.

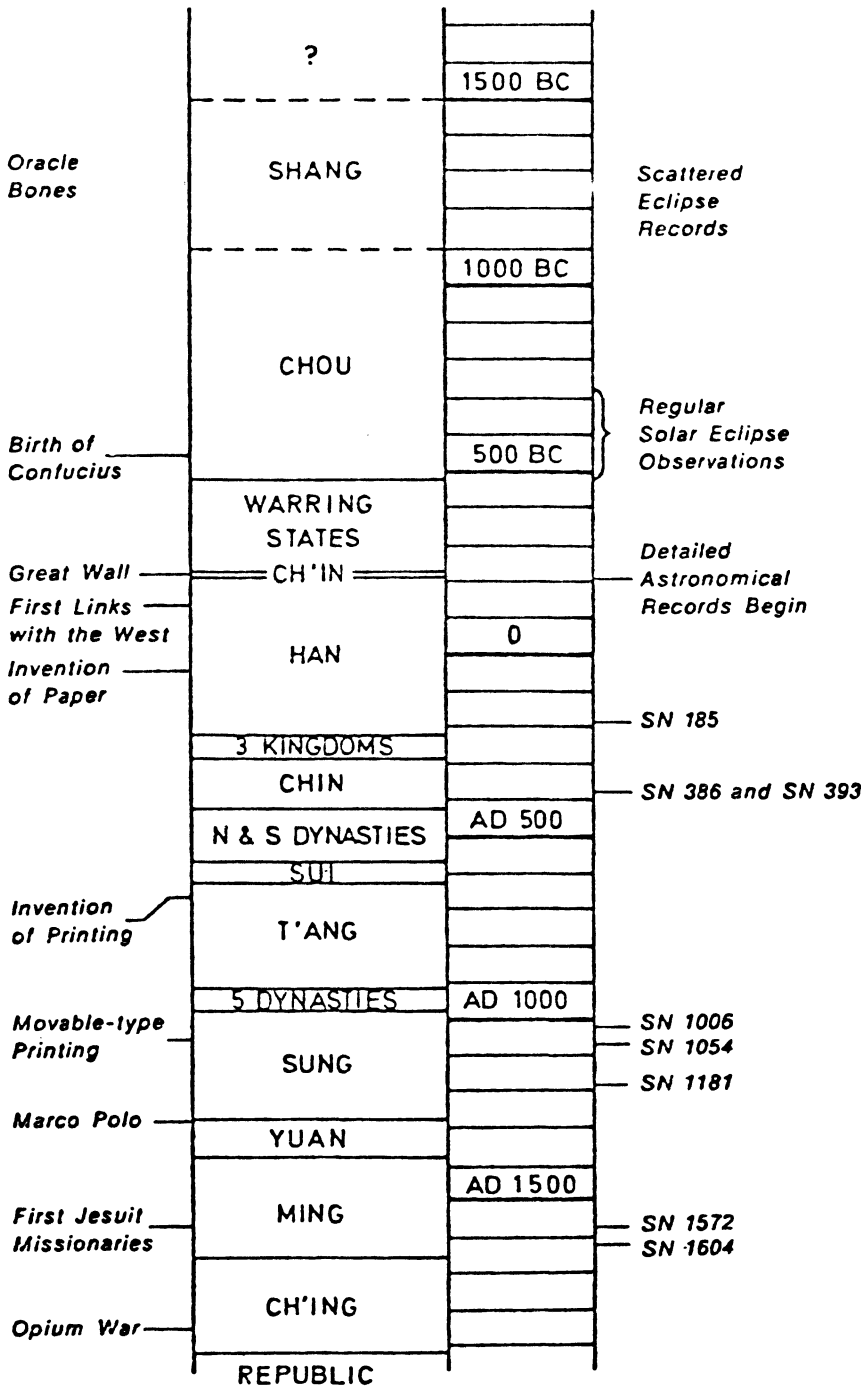
For an indepth review of the research completed to mid-1983 see, Savage B. D., et.al., Astrophysical Journal, 1983 October 15, Volume 273, p.597.

ANCIENT CHINESE ASTRONOMICAL RECORDS
AND THEIR PLACE IN MODERN ASTRONOMY

As a member of the Halifax Centre, R.A. S.C. I have been quite aware of the fact that there are many more astronomical events than one usually has immediate knowledge of. However certain ancient people who made regular practice of studying the night sky to try and understand its changing composition quickly came to realize that some phenomena, to be interpreted as good or bad omens, could be predicted to appear with some accuracy.

This required a careful keeping of records and the ancient Chinese did just that. Although archaeological evidence is sketchy before 200 BC, it is very detailed after that period. All dynastic astronomical records were kept by civil servants who took great care in maintaining accuracy. From the Han dynasty (202 BC to AD 220) it is not unusual to find astronomical records of solar eclipses, comets, novae, planetary conjunctions, occultations of stars and planets by the moon, lunar eclipses, aurorae, sightings of Venus in daylight and even sunspot activity. It is also quite common to find that when recording events like a solar eclipse, the early Chinese astronomers were able to include in their records such details as the right ascension of the sun to the nearest degree which although not extremely accurate was nevertheless good enough for predictive purposes. After all if you are looking for a good omen it nice to know when and where to look.

These efforts required individuals with a sincere desire to study the starry sky and also the application of mathematics and some sort of technology. It must be remembered that virtually all of these observations of an astronomical nature were for the study and prediction of celestial omens.



Major events - Dynasties - Astronomical events

There was then a strong incentive for accuracy of measurement and recording since that would allow for more precise predictions. Accuracy was also important for more personal reasons because an incorrect foretelling of an event like an eclipse could cause one to lose his head, and many were lost.

The people of the orient took a more philosophical view of astronomy and held to that attitude much longer than some western societies. In China astrology was practised and officially condoned as recently as the late 19th century. It was the nature of the use of astronomical data that resulted in a practise of astrology and although the astronomical observations were detailed enough and reasonably accurate, little attempt was made at scientific application. In the western world astronomy as a science had made significant advances beyond the observation and recording stage.

Even then, these early Chinese records, despite their low degree of positional accuracy, are extremely helpful in building an historical record of astronomical events, like eclipses. Modern optical observations cover only about 1/10th of total observation time so these early observations assume a great importance and their contributions become very valuable. Since there are still many records to be investigated we can assume that there is still a lot of information that can be added to our present astronomical knowledge.

Peter Steffin

Bibliography

Stephenson, F.R. and Clark, D.H.
"Ancient Astronomical Records from the Orient,"
Sky and Telescope,
February 1977, pages 84-91.

HALLEY'S COMET

Halley's Comet will pass through the inner part of the Solar System in less than two years. This exciting event is now the subject of much activity and planning. The comet itself was recovered very near the predicted location with the 5 m telescope at the Hale Observatory on Palomar Mountain on October 16, 1982. It was then over 11 times the Earth's average distance from the Sun, more distant than the planet Saturn and so faint that only the largest telescopes with the best detectors could hope to find it. This established a new record for the most distant recovery of a comet.

In April 1984, a year and a half after its recovery, the comet is about 6.4 times the Earth's distance from the Sun, or halfway between Saturn's and Jupiter's distance and its velocity will have increased to 16 kilometers per second.

Several large telescopes have been monitoring the comet since its recovery keeping track of its position, its apparent brightness and since late 1983, recording its spectrum. These early observations will be used to determine at what point the volatile material from the comet's nucleus begins to evaporate and forms the coma. One of the major goals of the research into the present return of Halley's Comet is to learn more about the physics and chemistry of this gaseous material as it escapes from the nucleus. Recent examinations of the observations made at the previous approach in 1910 raise the interesting possibility that the brightness may have been underestimated due to difficulties in measuring all of the light from a diffuse object relatively close to the Earth. This may mean that the coming apparition, (late 1985 and early 1986), will

be brighter than early predictions - most welcome news for those observers planning to watch the comet with binoculars or with the naked eye.

Halley's Comet will be observed intensively by ground-based telescopes, from Earth orbit and by space missions that will fly past the comet at a very high velocity. Astronomers throughout the world are cooperating to insure that the best use is made of observing facilities. The International Halley Watch (IHW) is coordinating plans in each of seven specialized types of observation. The IHW has teams of Discipline Specialists in the seven areas and world-wide networks of observers to keep the comet under continuous observation during periods of special importance called Halley Watch Days. An important test of the system was conducted during March 1984 using a lesser object, Comet Crommelin, as a target.

Final decisions on the space missions have now been made. Launch dates for the three flyby missions, which involve five vehicles, are scheduled between December 1984 and July 1985. Information on these missions and the experiments to be conducted from satellites above the Earth will be given in the next Bulletin of this series.

Prepared by the National Museum of Science and Technology

I do not define time, space, place and motion, as being well known to all.

- Isaac Newton, "Principia"

THE WEBB SOCIETY

Many of you will be familiar with the Webb Society's Observers's Handbook series (which of course is to be distinguished from the RASC's "Bible" of the same title) but you may not be so familiar with the Webb Society's purpose and activities. The Society, founded in 1967, is named in honour of the Rev. Thomas W. Webb (1807-1885), an eminent amateur astronomer whose classic *Celestial Objects for Common Telescopes* has been an inspiration to several generations of amateur observers.

The main purpose of the Society is to encourage the amateur observation of double stars and 'deep-sky' objects such as star clusters and nebulae, and to provide a forum for observers to communicate and publish the results of their work. Observational activities of the Society are coordinated in various sections each under the control of a director with wide experience in the particular field: Double Stars, R.W. Argyle, FRAS; Nebulae and Clusters, E.S. Barker, FRAS; and Galaxies, R.J. McInnerny.

Results of the Society's work are published in its Quarterly Journal. It contains features and articles (many by members who are professional astronomers) of outstanding quality and interest. All members are encouraged to contribute and are given guidance as to how to present the results of their work. At present members are active in some sixteen countries. An Annual General Meeting is held (usually in London) and gives members an opportunity to meet and discuss common interests. The occasion is enlivened by the presentation of papers of outstanding interest and by donation of the notable Webb Society Award given annually for the best new contribution

to the Quarterly Journal.

One of the initial aims of the Society has been to produce a series of observer's manuals that do justice to the equipment available to amateur astronomers today and to fields not adequately dealt with by other organizations. Five volumes have been published which provide greater scope for the observer to exploit his equipment to the limit and to tackle the challenging difficulties of new fields of observation with confidence of success. Society members receive a special discount when ordering these volumes.

Although this is a British organization, it has a North American arm and membership enquiries can be sent to Ronald J. Morales, 1440 S. Marmora, Tucson, Arizona, 85713. Annual fees are \$9.50 US (ie. approx \$13 Cdn).

The above has been paraphrased or copied directly from the Webb Society's membership circular.

ANALOGUE

by Karen Ravn

Infinitesimal are we
when measured in a galaxy
that reaches over light-year lengths,
and bursts with megatonal strengths,
where time gone by and time to come
are reckoned by millennium.

But measure where our dreams can take us,
how powerful our will can make us,
how everlasting love can be ...
then infinite, it seems are we.



Reprinted from " B.C. Right On ! "

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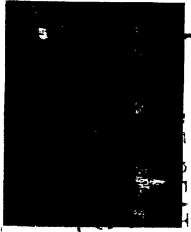
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