Dec 72

Canada 6
Christmas/Noël

# NOVA
# NOTES

THE PROPERTY OF
THE ROYAL ASTRONOMICAL
SOCIETY OF CANADA
252 COLLEGE ST.
TORONTO 2B

HALIFAX CENTRE

44° 38' N
63° 35' W

E.H. 70
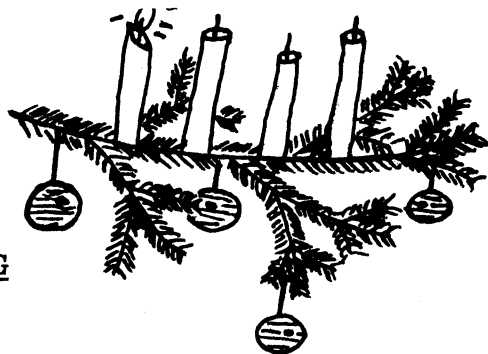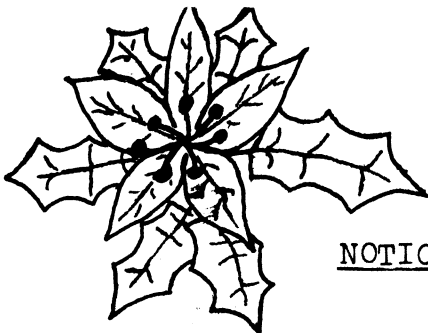
NOTICE OF MEETING
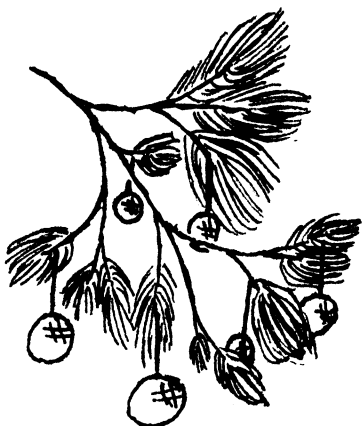
Date:        December 8, 1972

Place:       The Theatre
             Nova Scotia Museum
             1747 Summer Street
             Halifax, N.S.

Time:        8:00 P.M. sharp

Topic:       "A Tale of Two Stars;
                 4 B.C. and 1054 A.D."

Speaker:     Dr. Murray Cunningham

All members and guests are most welcome.

The Nova Notes are printed, thanks to the
        goodwill of The Nova Scotia Museum.

## Editor's Page

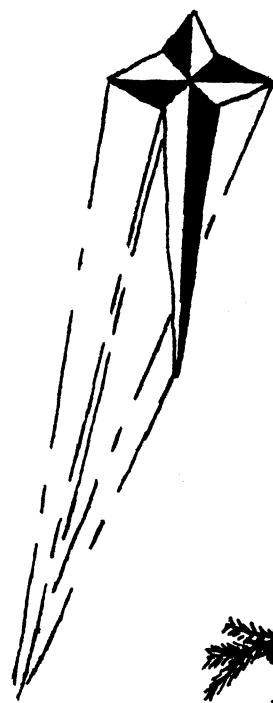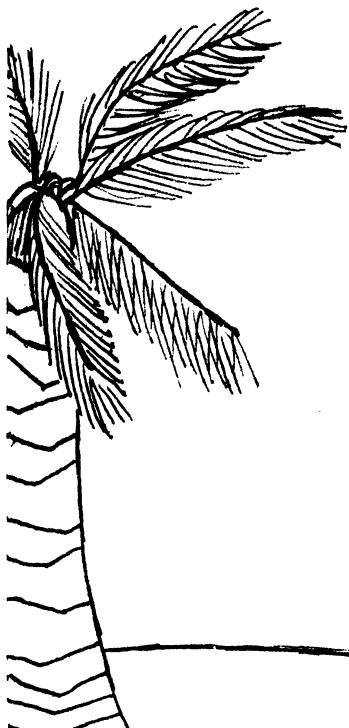By way of introduction, I'm Peter Edwards, the new editor of Nova Notes. Hopefully, Nova Notes will be out to you, no later than a week before the meeting.

This brings up another point. When is the deadline for getting one's article(s) in Nova Notes? I would ask that they be in my hands on or before the last Friday of each month. Please have them typed on 8½X11 typewriting paper, cartoons welcome, and pass it into either the information desk in the main lobby of the Nova Scotia Museum or put it in our locker in the societies room in the basement of the Museum. If there are any questions concerning this arrangement, simply corner me at the next meeting (December 8).

At this point, I would like to draw your attention to the date. Next month is January, the expiry date of our "Observer's Handbook". If you want to be up to date on the January skies, please see Peter Stokoe, our Treasurer, with your dues at the meeting. Don't forget, the handbook is mailed from Toronto after they recieve your name as a paid up member, and with Christmas mail jamming up the works, it may take a little longer in coming.

<div style="text-align: right;">

Peter Edwards
The Editor

</div>

## Minutes of Meeting November 17, 1972

## R.A.S.C., Halifax Centre

Dr. Cunningham opened the meeting at 8:00 p.m.
with the election of officers for the coming year.
Nominations were read and the floor was opened for
further nominations. Mr. Howard Freeland moved the
nominations cease, and the officers were elected by
acclamation. The new officers are:

| | |
|---|---|
| President: | Dr. Murray Cunningham |
| Vice-President: | Dr. Peter Reynolds |
| Secretary | Dr. David DuPuy |
| Treasurer: | Mr. Peter Stokoe |
| Editor Nova Notes: | Mr. Peter Edwards |
| Librarian: | Miss Margo Dunsworth |

The guest speaker was Mr. Chriss Purcell, who is a
senior at Dalhousie, majoring in Physics. The topic
was the construction of telescopes, with emphasis on
mirror grinding. A good description was given on the
grinding principles involved, with various strokes
described, and details of the Foucault test. Two
lasers had been set up and were used to indicate the
focal length of an 8-inch mirror ground by Mr. Purcell.
Numerous questions followed. It was decided that the
next meeting would be held on December 8th. The
meeting ended around 9:30 p.m.

Here is a list of books now available from our library.  We also have

many back-issues of the sky and telescope.

| | | |
|---|---|---|
| The Penguin Dictionary of Astronomy. | - | Wallenquist |
| Stars (Golden Nature Guide) | - | Zim and Baker |
| Science Projects Handbook | - | Shirley Moore (ed) |
| Skyshooting - Photography for Amateur Astronomers. | | |
| | - | Mayall |
| Amataeur Telescope Making Book I | - | Ingalls (ed) |
| The McLaughlin Planetarium | - | King |
| Lunar Atlas | - | Dinsmore (ed) |
| This is Astronomy | - | Lloyd Motz |
| This 'Iniverse of Space | - | Millman |
| A Brief Text in Astronomy | - | Skilling and Richardson. |
| Satellite of the Sun | - | Spilhaus |
| Atlas of the Heavens. | - | Antonis Becvar |

We would like to encourage all members to make use of this library.

These books are kept in the societies storage locker in the basement of

the science museum.  When borrowing a book or magazine, write its name

and your own name on the paper taped to the closet door.  Borrowers should

try to return books within a month.  Our library could be considerably

expanded if allthose kaxx having books out for more than a month brought

them in.  How about returning them at the next meeting.


(The society also has two telescopes, how about returning them someone?)

# Globular Clusters: Galactic and Extragalactic

## Dr. Rene Racine, Nov. 8$^{th}$, 4:15 p.m.

Dr. Racine's seminar, held at Dalhousie University, was attended by several members of our Society, and, I think, with profit.

He began by reviewing the importance of globular clusters in obtaining the extent of our own Galaxy. This stems from the fact that the clusters contain a type of variable star, the R R Lyrae star. Direct distance determinations of nearby RR Lyrae stars have been obtained and so their absolute magnitude is known. By simply identifying an RR Lyrae star in a globular cluster and measuring its apparent brightness, the cluster distance is obtained.

If the integrated colours (B-V) and integrated absolute magnitudes (M) of all available clusters in our Galaxy are considered, a relation is found between these properties. This means that a measurement of the colour of the cluster will yield its luminosity and its distance.

Dr. Racine has been using this approach on globular clusters in external galaxies, in order to find the distances to these galaxies.(e.g. galaxies in the Virgo cluster of galaxies). Here, of course, the clusters are not resolved into stars, but are identified as almost stellar objects with colours in the expected range. Several elliptical galaxies in Virgo have large numbers of clusters and the method works well (e.g. M87 has about 2000 clusters). Several spiral galaxies in Virgo, however, have no globular clusters observable. Since by analogy with our own galaxy, about 100 are expected, and since there is a difficulty with contamination by field stars, this may not be a great problem. This method of distance determination yields a value of the Hubble constant of 50 to 100 km/sec/Mpc.

## THE FIRST ANNUAL XMAS QUIZ ON GENERAL ASTRONOMICAL

## KNOWLEDGE.

(This quiz is based on a similar one that appeared in the newsletter of the Ottawa Centre recently.)

Section 1 (1 point for each question.)

1) Which is the largest planet in our solar system?

2) Which star can frequently be seen during the daytime?

3) Which planet is closest to the sun?

4) Which is the brightest asteroid?

5) Who is president of the R.A.S.C. Halifax Centre?

6) What sort of optical system does the 'Questar' use?

7) In which constellation would you find the 'Crab Nebula'?

8) In which constellation would you find the Pleiades?

9) What does the 'M' stand for in 'M 31'?

10) In which constellation would you find 'Betelgeuse'?

11) Which is the ringed planet?

12) Who discovered the 4 brightest moons of Jupiter?

Section 2 (2 points for each).

13) What is the connection between the following dates:-
4 B.C., 1066 A.D., 1910 A.D., 1986 A.D.

14) What is the common name of $\alpha$-Canis Minoris?

15) What is the common name of $\alpha$-Canis Majoris?

16) What is the fourth letter of the Greek alphabet?

17) In which country is the largest optical telescope?

18) To whom do we attribute the three laws of planetary motion?

19) What is the diameter of the main mirror of the 'Hale' reflector telescope, in metres?

20) How many years, to the nearest year, correspond to one cycle of solar activity?

21) What should the following remind you of:-

'Oh, Be A Fine Girl Kiss Me Right Now, ...... Slap'

**Section 3** (5 points for each.)

22) With what physical phenomenon is 'Olber's Paradox' concerned?

23) Who wrote 'De Revolutionibus Orbium Coelestium' ?

24) Who wrote' 'Principia'?

25) At whom is the following remonstrance directed:-

> When beggars die there are no comets seen,
> The heavens themselves blaze forth the death of princes.

26) What other astrophysicist do we usually mention in the same breath with 'Hertzsprung'?

27) Who discovered the expansion of the Universe?

28) Who was particularly conspicuous in failing to predict the expansion of the Universe, and as a result made the biggest mistake of his life?

**Section 4** (10 points for this question)

29) What is N.G.C. 224?

The total number of points available is 75, the answers are elsewhere in this issue of Nova Notes; you may rate yourselves as follows:-

| | |
|---|---|
| 75 points or more | Cheat. |
| 60 - 74 | Well done proffessor (sorry professor) |
| 50 - 59 | Excellent. |
| 40 - 49 | Very good. |
| 30 - 39 | Really still fairly good, about break even. |
| 20 - 29 | Fair |
| 00 - 20 | Better start coming to some of our meetings. |

## The Local Expansion of the Universe --
## The Observational Problem

Dr. Rene Racine, Nov. 8$^{th}$, 8:15 p.m.


The Nova Scotia Institute of Science held its
November meeting at St. Mary's University, followed by
the guest speaker, Dr. Racine, from Dunlap Observatory,
University of Toronto.

Dr. Racine began his talk by noting that there
are three fundamental ways of estimating the age of the
universe:  1) a meteoritic age, or the age of the "oldest
rocks" available to us, gives 9.5 x 10$^9$ years;  2) the
theory of stellar evolution, based on observations of
globular cluster stars (the oldest stars we know of),
yields an age of 12 to 14 x 10$^9$ years; and 3) the Hubble
expansion age, based on the rate at which the universe is
observed to expand, is about 10 x 10$^9$ years. The important
thing to notice here is that all three results, although
derived by completely independent methods, are "in better
agreement than we have any right to expect!" This argues
for a common origin  of material in these three methods,
and gives some confidence that the age of the universe is
approximately 12 billion years.

The contribution of the Hubble expansion (of
galaxies) to this problem of determining the age of the
universe is as follows.  If a big bang occurred, then
those galaxies which were "thrown out" with the greatest
velocity would now be the most distant.  Therefore, the
radial velocities of galaxies are proportional to their
distances, or velocity = H x distance, where H is the
Hubble constant.  The units of H are km/sec per Mpc  ( a

Mega-parsec is about 3262000 light years). Note that 1/H gives units of time, or the time elapsed since the explosion. Hence, if we can determine H from observations (possible, in principle, but difficult in practice), then 1/H gives the age of the universe.

The widely accepted value of H = 100 km/sec/Mpc yields 10 billion years (75 km/sec/Mpc is becoming rather fashionable these days). One uncertainty: if the mean density of the universe is large enough, then the overall expansion will eventually be halted, and the universe will begin to contract; this is generally called an oscillating universe, and if this occurred, the present Hubble expansion time would only give us the age of this current expansion.

\* \* \* \* \* \* \*

THE BURKE - GAFFNEY OBSERVATORY at St. Mary's University wishes to extend an invitation to the public, and especially members of the R.A.S.C., to visit the Observatory. A tour is held every Saturday evening at 7 p.m., meeting in Room 152 of the Academic Building. R.A.S.C. members interested in special projects, e.g. planetary photography with 35mm cameras, should contact Dr. David L. DuPuy.

COSMOLOGY OF YER UNIVERSAL   By "Charlie Farquharson"

From Charlie Farquharson's History of Canada by Don Harron

McGraw-Hill Ryerson Ltd.   $5.95

Of course yer Earth, she's jist part of yer universal. That's the hole rang-dang-doo rolled into one - yer Spiro Nebulous, yer asteroids, yer Big Dippy, and the rest of your heavenly constellapations.

Now even the scientificks and asterologists don't seem to agree on how this hole rig got a shove fer to git it started. There's some as says yer Universal never got begun at all. They say she's allus bin there in yer solid state, and it's there she's goin' to stay through yer light years and yer dark.

On the other hand, there's some scientifics as says the hole thing started with a ring-tailed snorter of a spondiferous decombustin'. In other words, things got off to a Big Bang and the intire proceedin's bin goin' down hill ever since.

Now there you have yer two different theces to play with. You can b'leeve in yer solid state if you like, but I'm kinda parshul to yer Big Bang.

## Have you Read ?

SCIENTIFIC AMERICAN Nov. 1972

There is a small note on page 52 that should discourage any of you that still want to visit VENUS. The atmosphere is so thick that it would take an hour to parashute to the surface. When you got there the temperature would be $470^{o}$ C.  The pressure 90 atmospheres. Distinguishing night from day would be difficult. The atmosphere is 97% $CO_2$ and 0.1% $O_2$. Now do you want to go?

Murray Cunningham

Answers to first annual Xmas Quiz.

1) Jupiter 2) The Sun 3) Mercury 4) Vesta 5) Dr. Cuningham
6) either Maksutov or Cassegrainian or Maksutov-Cassegrainian
7) Taurus 8) Taurus 9) Messier (anyone
will get one point. 'thousand' subtract two points, one person did when I
tried out this quiz) 10) Orion 11) Saturn 12) Galileo
13) Famous appearances of Halleys comet, may have been the star
of Bethlehem and is certainly portrayed on the Bayeux Tapestry.
14) Procyon 15) Sirius 16) $\delta$ - delta 17) U.S.S.R. (220 inches)
18) Kepler 19) 5 metres (no points for 200 inches) 20) 11.2
years exactly, 11 or 12 will get you your points. 21) A mnemonic
to remember the sequence of stellar spectral classes.
22) The darkness of the night sky, or the finiteness of the universe.
23) Copernicus 24) Isaac Newton 25) Julius Caesar. (His wife
is making a strong recommendation, on the basis of a sooth sayers
advice, that he does not go to the senate that day.)
26) Russell. (As in the Hertzsprung-Russell diagram)
27) Hubble 28) Albert Einstein 29) The Andromeda Nebula(actually
its a galaxy not a nebula at all.)