ASTRONOTES

OTTAWA

CENTRE

R·A·S·C

LACERTA

M 52

CASSIOPEIA

M 103

CEPHE

CAMELOPARDALIS

ALGO

PERSEUS

AURIG

POLARIS

URSA MINOR

DRACO

M 82
M 81

LYNX

S

M 101

URSA MAJOR

M 97

M 51

M 94

BOOTES

CANES VENATICI

LEO MINOR

NCER

M 67

NA

M 3

M 85

LEO MAJOR

COMA BERENICES

M 100

M 96 M 95

M 90

M 99

M 66

HYDRA

M 60 M 89

M 49

ECLIPTIC

M 61

EQUATOR

SEXTANS

EQUATOR

VIRGO

ECLIPTIC

EDITORIAL

Now that Canada has announced its intention of adopting the Metric System, is it too much to be hoped that the Preparatory Commission will see the need for a simultaneous overhaul of the measurement of Time and Angle, as discussed on this page some months ago? *

Canada played a leading part in the adoption of Time Zones and Daylight Saving Time, but we seem increasingly to adopt the attitude "Let Uncle Sam work it all out and we'll take the package". This is an opportunity to play a leading part once again by adopting a system that is ahead of the world instead of a little bit behind it. Remember, Europe and the rest of the world still measure Time and Angle in the same archaic way that we do.

UT - Universal Time - is a misnomer. One of the things we are quite certain about is that there is no common time in the Universe. The instant 'now' was more than eight minutes ago on the Sun, and eons ago in the galaxies. On the other hand, you could say that 'now' will not reach the sun for eight minutes, or the galaxies for eons - it depends on whether you are 'sending' or 'receiving'. Relativity plays even more tricks which we hope to hear about soon from Dr. Sida.

GMT - Greenwich Mean Time - means what it says and should be used in preference to UT. For extreme precision, of course, ET - Ephemeris Time - now based on the atomic clocks, is a necessity.

Some of the fatuousness of our present system for Time and Angle is well brought out by the 'parsec', the 'kiloparsec', and 'megaparsec' so beloved of modern astronomers as a measure of distance in the Universe. The 'sec' has nothing to do with time, but is the angle in arcsec subtended at the object by the radius of the earth's orbit. This is not a well-determined quantity, in the first place, and the angle is not well determined even for the nearest stars. But what about 'kiloparsecs' - is the angle 'thousands of arcsec'? Not at all! The angle is a totally unmeasurable 'thousandth of an arcsec' and properly a 'milliparsec'.

* Astronotes, March, 1969.

Similarly, the 'megaparsec' should clearly be called a 'microparsec'.

But why introduce this stupid gobbledygook when there is a perfectly simple unit available? The 'light-year' is based on two quantities which are known with excellent precision - the speed of light and the duration of the year. It doesn't matter in the least what units you use to measure them. And on the scale of astronomical distances, the ratio of 3.26 between the two is inconsequential.

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OBSERVERS GROUP MEETING - FEB 7   Sylvia Wake

The meeting had approximately 35 people attending, with Rick Lavery in the chair.

The fast approaching solar eclipse was discussed by both Rick Lavery and Ken Hewitt-White. Rick read a letter from the Montreal Centre and three films were shown concerning previous solar eclipses.

Next John Conville gave a brief talk on the minor planet Hebe, before he left.

Steve Craig asked for more solar observers and also said that he can get filters if anyone wants them.

Next, Chris Martin miraculously related a chalk drawing of the human eye to variable stars, in a very informative commentary on the Purkinje Effect.

Rick Lavery commented on variable star observations and also showed some slides. Other slides by Doug Beaton included Saturn, Jupiter, and his neighbour's light, and he presented some forms for observing Saturn.

Barry Matthews told of the lunar eclipse on the morning of Feb 22nd and also explained how to tell the magnitude of the moon.

The three comets currently available were described by Vice-Chairman Hewitt-White.

Allen Miller showed a slide of the region around Orion, pointing out an amazing number of deep sky and variable objects. He also expressed a need for observations.

Before the meeting adjourned for coffee, Dr. Lossing reviewed progress on the 16-in mirror, some troubles with scratches, and new precautions to avoid them.

## COMETS, COMETS EVERYWHERE   Ken Hewitt-White

Last January your correspondent was grumbling to himself that he had not seen a single comet in seventeen months. Soon he will have his choice of three.

First there is comet Tago-Sato-Kosaka still with us high in the north-west after sunset. Positive identification was first made on January 18th and many people have been following it since. Watch Astronotes next month for a complete list of observations. We endeavour to keep a watch on it until it fades completely from view. Right now Kosaka is moving across Perseus getting down to about mag 11 by month's end. If you have made any observations, contact me so that I can write them up for this column.

Comet Kohoutek is a twelfth magnitude glow presently riding through Cygnus. I have searched for it on several nights but without success. Low haze and high moons have made its faint nucleus impossible to detect but perihelion is slated for March 21 so it may get brighter yet. Coordinates are available for those interested.

Now for some great news; we have another two on the way. South African amateur J.C.Bennett discovered 1969i last December and the southerly object is coming up for a date with us by the end of February. Coordinates are given opposite - courtesy the Chairman. Little is known about 1969i except that it will come to perihelion on March 20 and will probably beat 2nd mag.

The newest is 1970a Daido-Fujikawa which we learned about after press-time through the courtesy of the Dominion Observatory. On Feb 7 it was reported to have at least 4° of tail and could be seen in binoculars. Coordinates are given opposite.

1969 6
'Kosaka
March

Tri

Feb.9
X

Perseus

Capella

1= 0339+44°
5= 0349+45°
9= 0359+46°
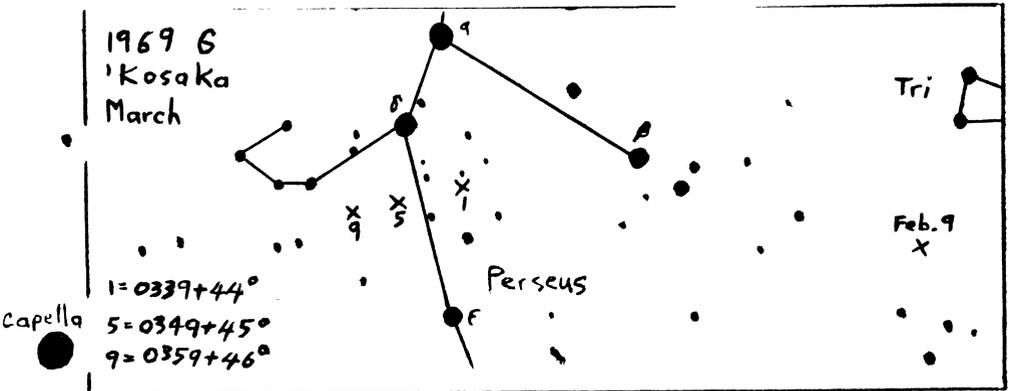
1969i Bennett

Date	RA h m	Dec ° '	Mag
Feb 18	22 55	-52 32	
23	22 45	-50 13	4.4
28	22 36	-47 12	
Mar 5	22 25	-43 06	3.1
10	22 15	-37 16	
15	22 08	-28 54	2.0
20	22 04	-17 19	
25	22 06	- 2 50	1.6
30	22 15	+12 37	
Apr 4	22 29	+26 38	2.4
9	22 48	+37 26	
14	23 09	+45 35	3.8
19	23 33	+51 32	
24	23 57	+55 53	5.1
29	00 22	+59 07	

1970a Daido-Fujikawa

Date	RA	Dec	Mag
Feb 20	22 38.0	- 3 34	
21	22 41.7	- 1 16	2.5
22	22 44.5	+ 0 49	
23	22 47.0	+ 2 43.4	4.2
28	22 57.2	+10 26	
Mar 5	23 05.3	+16 14	8.8
10	23 12.6	+20 55.1	
15	23 19.3	+24 52.5	11.2

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TELESCOPE FUND   Rick Lavery

The Telescope Fund is now approaching the $500 mark, and although this is a very good sum of money we should not stop contributing.

The mirror is approaching completion and the final considerations for the mount are being taken into account.

The Sixteen Inch desires the best you can afford. (Give)

<u>COMPUTING THE ECLIPSE</u>   Tom Tothill

For those who enjoy mathematical puzzles, the computations involved in predicting the precise details of eclipses are beauts.

We wish to know the **relevant** particulars of the eclipse at Elizabeth City, N.C., where about 15 members hope to be.

From the Astronomical Ephemeris we can find the precise time (ET) when the sun, earth, and moon line up in RA, and the corresponding Declinations of sun and moon and their hourly rates of change. Knowing the distance of the moon, we can then figure out that it is crossing the sun-earth line at a speed of 33.29 mi/min to the E and 18.12 mi/min to the N.

For members of the Flat Earth Society the problem is then very simple, for the umbra comes on to the west side of the disk at Lat -2° 00', proceeds across it smoothly at the above rates, and falls off the east edge 3h 6.3m later at Lat +55° 01'. The umbra has a constant diameter of 54 miles.

However, when we join the Spherical Earth Society the problem enlarges. The cone of the umbra, extending out 230,420 miles from the moon, now sweeps over a rotating spherical surface, so its path is no longer straight, but distorted by the different rotational rates of the various latitudes over which it passes as well as by the fact that it is falling obliquely on the surface. The umbra shadow is no longer a circle, but an ellipse varying in size, obliquity, and orientation.

Moving now into the Oblate Earth cult (headed by the Great Pumpkin?) we find that a given latitude is several miles farther south and several miles farther from the axis of rotation than it would be on a sphere. As we have to worry about a few miles, the move was necessary.

As I don't know how much Elizabeth City departs from the oblate earth (geoid) I was unable to move up into the Real Earth group and get the last fraction of a mile in accuracy. However, my original slide-rule calculations were refined in a computer and the final results opposite are free of arithmetic or rounding errors.

Knowing where the umbra is on the <u>disk</u> at any time, one can project it up to the surface to find the Latitude of the shadow and its longitude on a non-rotating earth,

then adjust the Longitude for the rotation of the earth in the meantime. As one climbs from the disk to the surface, the cone enlarges and at Elizabeth City will have a diameter of 79.8 miles. However, it falls obliquely on the surface because the sun altitude at mid-eclipse will be 44° 29.5', so its long axis, pointing away from the direction of the sun (Azimuth 208.8° true) will be 111.9 miles long.

But the shadow is not moving in the direction it points, so it is skewed in the belt of totality as in the sketch. The belt of totality is therefore a bit wider - 82.6 miles wide.
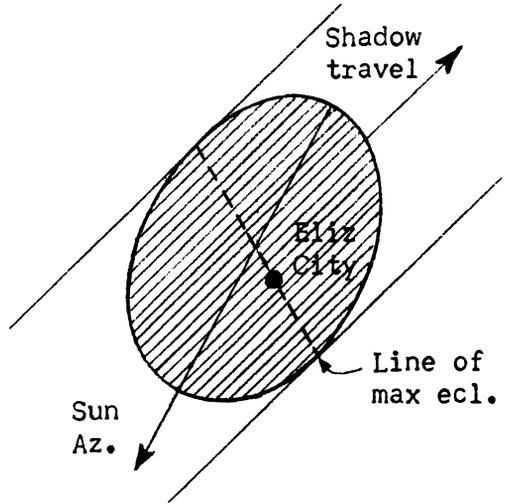
Finally, Elizabeth City is not in the centre of the belt of totality, but offset about 12 miles. How much does this reduce the Duration of Totality?

I find that we will lose only 7.7 seconds of totality, retaining 2m 47.9s.

THE STRAIGHT DOPE
At Elizabeth City

| Sun Altitude at mid-eclipse | 44° 29.5' |
| " Azimuth " | 208.8° true |

EST
h m s

Sun is due South at	12:16:00
First Contact	12:19
Totality Begins	13:34:12
Mid-Eclipse	13:35:36
Totality Ends	13:37:00
Last Contact	14:52

Of course, I may have made errors of principle which do not prevent you from believing any other tabulation you may come across. However, my figures check at every measurable point with the map in Sky & Telescope, Jan, p.29

PLANETARY NOTES   Doug Beaton

One month has come and gone again, and I hope some
of you braved the cold to fill out part of the planetary
observation sheets I handed out at the last meeting.
Saturn will prove quite interesting to do, for it poses
many difficulties in drawing methods. Saturn will be
the proving grounds where enough valuable experience
can be gained to obtain really accurate moon plots of
the next planet, Jupiter. Try to be as accurate as you
can; don't just say for example that Rhea is two rings
diameters left and one diameter up from the left edge
of the rings. Look closer and it will seem two ring
diameters left plus half the diameter of the planet's
disc. You cannot be too accurate if the moons are far
from the planet, but should they be close, errors of one
or two seconds of arc should be ideal. As you do your
first drawings, it will be necessary to get out on
several consecutive nights to familiarize yourself with
the motions of the different moons and therefore not
draw in any background stars that come into the field.
Small telescopes will usually show two moons, sometimes
four, while large scopes will almost always reveal four.

If you can find only three moons, look for the four-
th near the planet. From my own drawings I can see that
the two "same-magnitude" inner moons never cross the
planet's disc, so they should both be seen on most nights.
Every so often an outer moon will cross the field (only
seen in larger scopes). If you think it is a moon, draw
it in and try to catch it again later on. The sheets
will only allow Titan to be plotted and so these outer
moons will have to be drawn as they cross in front or
behind the planet's ring plane.

Among other things I finally received my letter
from ALPO and I hope to have copies ready for the March
meeting. If the copies are not ready a summary of the
many different planetary projects will appear in next
months Astronotes. Also, I am preparing observational
sheets for Jupiter and again if they are not ready semi-
rough drawings could always be made. Other planets
visible are Uranus and Venus. The first in the midst

of the Virgo galaxies and the second making brief ap-
pearances in the west. In mid-April, Venus forms part
of an interesting planetary configuration- a good sight
for you camera bugs, not to mention the artists of the
Observer's Group. Because of the ever-changing phases
of Venus it is an excellent object to draw so start
as soon as possible.

In parting, let me just encourage you to get as many
drawings as possible; keeping in mind that the more you
do, the more accurate you become.

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VARIABLE STARS   Rick Lavery

Information on X Cancri

X Cancri is noted for its distinct red colour (N3 spec-
tral type) and its irregularity (???). Its variability was
first noticed by the Italian astronomer E. Loreta. From
four years of observing he found the light curve to consist
of **waves** from 2 to 6 months in duration and 0.1 to 1.1
magnitudes in amplitude. At maximum the visual magnitude
can be anything between 5.9 and 6.5, and between 6.5 and
7.1 at minimum.

Observation Totals

Observer	December	January
Jon Buchanan	26	3
John Conville	-	9
Ken Hewitt-White	53	85 *
Rick Lavery	62	77
Chris Martin	15	63
Barry Matthews	9	24
Allen Miller	49	62
John Rowlandson (Trenton)	15	NR
Totals	229	323

NR - not received by Feb 21
* - Who let him out of the basement?

The summer variables are now well up in the midnight
sky and observers are encouraged to start making estimates
on them for the summer program.

Jon Buchanan used a 2" refractor for his 145 total last
year and deserves much credit for patience and hard work.

DEEP SKY- AURIGA   Allen Miller

At present the Deep sky program I have organized
seems to have begun quite successfully. Besides the
unconquerable Ken Hewitt White my best observer is
Rob Dick. He has given me 7 renderings of the variety
of objects in Orion and I would like to see some ob-
servers try to compete with him. The report forms and
maps are available at the Observer's Group meetings
(and their free).

The constellation that I have chosen next is
Auriga (and area) but this does not mean you have to
move on. If you wish, please continue on Orion.[*1]The
only reason I change is to keep ahead of the observers
who become too ambitious.[*1]

Moving right along it should be noted that Auriga
is literally overflowing with clusters- the best in
this case being that of the Messier catalogue.
However, there is one N.G.C. planetary nebula in
Gemini that is quite something. Judging from its
brightness, 2392 would be an easy object for a 2.4"
refractor provided enough power is used. My obser-
vation is below.

Reflector Sydney 8" f/5

Magnification 130 x

-bright central star
-very molted texture
-so bright it with-
  stood 450x magn.
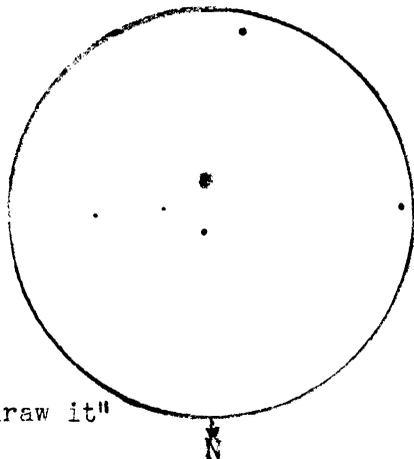
Remember! "If you can see it, draw it"
*1 joke

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*1 Whose free?   -Ed. *1

COUNCIL MEETING - FEB 20

The new Council of the Ottawa Centre met at the home of the President, Dr. A.H. Gillieson.

After the usual matters of business and a discussion of the program of speakers for 1970-71, there was agreement that some degree of publicity for meetings of the Centre would be desirable and Mr. Lavery and Mrs. Grey have the matter in hand. The Observers Group were proposing to make a film of activities for presentation at high schools and other group meetings in an effort to stimulate interest in astronomy and their allocation of funds was increased to $60 to aid this and other efforts.

An early edition of a treatise on astronomy by DeLaunay has been presented to the Centre by Mr. Blake.

It was learned that a mirror grinding machine for mirrors up to 8 inches might be available soon from DRB, on indefinite loan basis.

Dr. Legg will handle the arrangements of the Ottawa Centre in relation to the General Assembly in Edmonton May 15 - 18.

A letter from Dr. Hodgson indicated that the takeover of astronomical activities of the Observatory by NRC, effective Apr 1, would not affect the availability of the Geophysical Library for meetings of the Centre or the Observers Group, and a letter of appreciation is being sent in reply.

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At the time of going to press, Mr. Michael Dence's address to the Centre on "Apollo 11 Samples - Their Nature and Significance" was being looked forward to with great interest.

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It is understood that the March meeting of the Centre will be an address by Dr. Sida of Carleton University on relativity. Date to be announced.

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Confucius Say:

"What counts is what you do with what you have."

ASTRO NOTES

TO