

ECLIPSE OF THE MOON

DECEMBER

30,

1963

PLANS & RESULTS DAVID H. LEVY



Only at
EATON'S OF CANADA

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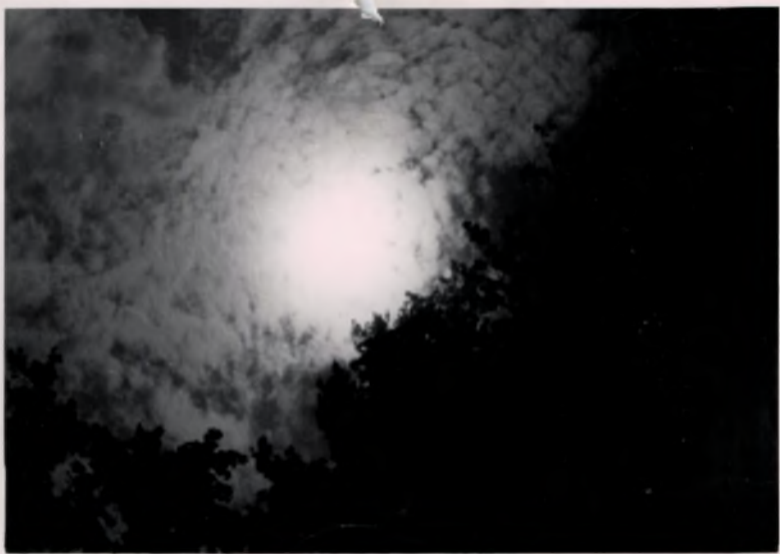
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Lunar Eclipse Planning

December 30, 1963

Timetable of Events
in PlanningStarted: December 4, 1963Written Work Started: December 12, 1963Eclipse Test held: Sunday, December 29, 1963Eclipse: December 30, 1963Analysis Completed Officially: December
30, 1963

Instruments used:

Binoculars

"Ranger" telescope

Bobby Cohen's 2.5 inch refrac

Timetable For the Eclipse

<u>Event</u>	<u>Time E. S. T. - C</u>
Centers penumbra	03:25 08.
Centers umbra	04:24 09.
Totality begins	05:27 10.
Twilight	about 05:45 - 10:
Mid-eclipse	06:07 11:0
Totality ends	06:46 11:40
Sunrise	about 07:05 - 12:0
Moonset	about 07:30 - 12:3
Moon leaves Umbra	07:49 12:4
Moon leaves Penumbra	08:48 1:13

Approximately

$\frac{1}{2}$ of the eclipse will be observed.

Information

I. ~~Just~~ of 4 eclipses in next 18 months;
Next three are: (all visible in U.S. +
Canada): -

June 24, 1964

December 19, 1964

June 14, 1965.

II. A "Solar Eclipse" will take
place on Luna Dec. 30.

III. Penumbra is indistinct.

IV. Even with unaided eye a Lunar
Eclipse is pleasing to watch.

V. "Echo" will be extremely
helpful with a 60p.
eyepiece.

Information (cont'd)

Things to look for:

(adapted)
(from Sky & Scope)

1. Coloration

hues depend on equipment used - usually brighter with unaided eye than with telescopes. Be sure to note on each descrip.

- ① Time
- ② INSTRUMENT.

Labelled sketches of color pattern are helpful.

2. Darkness of eclipse.

- differs from one eclipse to another

① Moon sometimes passes through darkest part of shadow - at other times not so.

② Evidence of actual difference from one year to next.

- ① So desired to compare this event with others.
- ② A. Danson introduced following scale of Luminosity "L" to classify eclipses.

12/24/63

Information (cont'd) - 5-

LUMINOSITY SCALE FOR
LUNAR ECLIPSES

A. DANJON

- $L=0$ Very dark eclipse, moon almost invisible, especially ~~near~~ at mid totality.
- $L=1$ Dark eclipse, gray or brownish coloration, details distinguishable only with difficulty.
- $L=2$ Deep red or rust colored eclipse, with a very dark central part in the shadow & the outer edge of umbra relatively bright.
- $L=3$ Brick-red eclipse, usually with a bright or yellow rim to the shadow.
- $L=4$ Very bright copper-red or orange eclipse, with a bluish very bright shadow rim.

Information (cont'd)

Examine moon at
outer ~~limb~~ ¹ beginning of totality
inner ~~limb~~ ² mid-totality

Either the
Naked eye,

binoculars

or a
small telescope

may be used.

Be sure to
specify

3. ~~At~~ Penumbral Eclipse.

Before umbral eclipse begins
note what time we notice
penumbral shading.

During partial stages,
examine penumbral border
to the dark, umbral
shadow.

~~Penumbra width.~~

Penumbra observations
best with binoculars.

(Information cont'd)

What is the visible width of the penumbral border to the dark umbra?
(Estimate as frac. of Lunar Diameter.)

4. Enlargement of umbra.

2% (about) larger than geometry of eclipse calls for. (due to Earth Atmosphere.)

Amount of enlargement can be deduced from careful timings of when craters enter or leave ~~the~~ umbra.

Large craters

- ① Note when shadow edge first reaches ~~center~~ crater.
- ② Note when crater is just covered.
- ③ Average of two times gives moment of bisection.

Times should be recorded to 0.1 minute.

Information Concluded

Four contacts (major)

Only ~~first~~ ^(twilight) 2 in our case bec
of ~~dark~~ should be timed
also.

Writer of article will analyze timing of craters or contacts reported from "To Sky and Telescope."

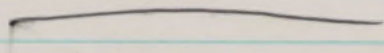
5. Sky Brightness During Eclipse

Don't do - involves variable stars which we are not too familiar with.

But you can do this -

With a small telescope watch several craters or ^{other} surface features from time to time, noting changing visibility in shadow.

6. Note occultations.



ROUGH

December 2

PLAN FOR OBSERVING
ECLIPSE OF
LUNA

- 1

December 30, 1963

- 1. See if you can notice Penumbra 03:25-04:00
- 2. Time First Contact 04:24
- 3. Time Contacts of Craters. 04:24-05:00
- 4. Time Second Contact 05:27
- 5. Time Third Contact 06:46
- 6. Notice Coloration during Eclipse. All times
- 7. Darkness at mid-eclipse Mid 06:00
- 8. Darkness at beginning of totality 05:27
- 9. Work at Crater Identification All times
- 10. Note changing visibility of surface features on Moon. All times.
- 11. Note occultations.

Note: Do as much as possible without a telescope if one isn't available.

ECLIPSE PLANNING

ECLIPSE TEST

SUNDAY, DECEMBER 29, 1963

WEATHER NOT PERMITTING

SUBJECT: ENTIRE ECLIPSE

PLAN

PERIOD OF ECLIPSE

(3:25 - 6:46 - (End of Totality))

3h. 21m.

will be shortened to 10 Minutes

TIME: 2:30 - 2:45 P.M.

PLACE: SUMMIT PARK (WEATHER PERMITTING)
OR IN ROOM.

PROCEDURE

PROCEDURE

- ✓ 1. Check Southern Horizon there. ~~1~~
- ✓ 2. Notice ~~Horizon~~ Penumbra.
- ✓ 3. 2:35 - Time first Contact.
- ✓ 4. Time Contacts of Craters.
- ✓ 5. Time Second Contact.
- ✓ 6. Note Darkness of Luna at beginning of totality.
- ✓ 7. Note Darkness at Mid Eclipse.
- ✓ 8. Notice Coloration during Eclipse.
- ✓ 9. Work at Crater Identification.
- ✓ 10. ~~2:45~~ Note occultations
- ✓ 11. Surface features of C - visibility
- ✓ 12. Time ~~with~~ ^{3rd} Contact.

TWILIGHT

+

SUNRISE

RESULTS

12

1. IS PLAN EFFECTIVE?

Affirmative

Negative

Remarks -

Since we have a telescope, it is ~~apparent that~~ quite definite that some good telescope work during the Eclipse will be feasible. So, with a few alterations and adjustments, I think this plan is O. K. without further testing.

2. Is horizon view good?

Yes

No

Remarks. Observations will be conducted at Richards Balcony where horizon and sky views are good.

Final Remarks

Eclipse Test was held in room, and is considered successful.

Final Plan for Observation of the December 30 Total Lunar Eclipse

December 29, 1963

<u>Times-EST-UT</u>	<u>Steps</u>	<u>Directions</u>
03:25-04:25 EST 08:25-09:24 UT	1.	See if you can notice Penumbra. Time you first notice it <u>08:41</u> U.T. Remarks <u>Caused a gradual darkening of "top" side of</u>
04:24 E.S.T. 09:24 U.T.	2.	Time First Contact. <u>09:25</u> Time <u>09:24</u> U.T.
04:24 E.S.T. 05:27 E.S.T. +5UT	3.	Time Contacts of Craters. (Use rough Paper for recording times) <u>Too cold - Telescope fogged</u>
05:27 E.S.T. 10:27 U.T.	4.	Time Second Contact. Time <u>10:31:15</u> U.T.
5:27-5:30 EST 10:27-10:30 UT	5.	Note Luminosity at beginning of Totality. L equals <u>0</u> .
06:07 EST 11:07 UT	6.	Notice and Record Darkness at Mid-Eclipse. L equals <u>0</u> .
All during the Observing Session	7.	Take Photographs. Number taken: (Cross out) <u>1 2 3 4 5 6 7 8 9 10 11 12</u> over 12.....
All during Eclipse	8.	Notice and record Coloration during Eclipse. <u>Penumbra - Copper color - Umbra Colorless - slight copper in shadow</u>
All during Obs. Session	9.	Work at Crater Identification as part of 'Luna II.' <u>Telescope fogged</u>
	10.	Note and Time Occultations. Ingress A (<u>4:50</u>) — Egress A () — Ingress B () — Egress B () — <u>— if possible.</u>
All during Eclipse	11.	Note changing visibility of surface features on Luna. <u>Pretty well went into total darkness as they disappeared.</u>

FINAL NOTES

At 3:15 P.M. on December 29, 1963, the forecast is:

Variable Cloudiness with a few Snowflurries tonight

Tomorrow Sunny with Cloudy Periods — Continuing Cold

Low Tonight -5

High Tomorrow t10

Present Temperature t6.

So, as usual, the weather prospects are not very favourable.

They were better this morning, but the usual Eclipse Forecast seems to persist and this eclipse seems to be no exception.

However, the Solar Eclipse was the same way, but it was nevertheless highly successful. So we must keep our fingers crossed, and maybe things ~~will~~ turn out all right.

Best of luck!

PLANNING

COMPLETED

3:23 P.M.

Dec. 29

GOOD LUCK!!!

ECLIPSE ANALYSIS

Weather: Clear (very clear all
through eclipse)

Cold (very cold -
temp was -8 down
- easily -15
where we were

Amount of program fulfilled:

11 steps.

8 were fulfilled.

7 positively successful -

Photography uncertain.

Summary of Step-by-step analysis of Plan for Eclipse.

The plan was carried out very nicely as eight of the eleven steps were carried out. It, at the time, was not expected that we would notice third contact. We thought we would quit at mid totality. However, the eclipse was very plainly visible far after that point, and we missed timing third contact by about two minutes or so. This was due largely to the fact that during totality, for part of the time, we were inside. For three minutes there was a minor power failure in the room we occupied. This lasted for three minutes. The clock was not adjusted promptly, and because of the hour we were probably tired enough to forget about it and went out at about third contact time---by the clock that had stopped. But that really didn't matter too much.

We observed the eclipse until the Moon set at about 07:40 A.M. This was far beyond the 06:07 we anticipated as being our time for quitting. We observed the eclipse slightly more than one and one-half hours (to be exact, one hour and thirty-five minutes) more than anticipated.

The plan was extremely successful. It made the observation of the eclipse much more fun as it kept us busy for most of the time. And during Totality we came in to get warmed up.

Apparently, then, the eclipse was a smashing success.

THE STORY OF THE ECLIPSE

This eclipse, in one way, took more planning than the Solar Eclipse of July 20, 1963. This is because some planning was started in Denver, Colo., for observing the Eclipse there. ^{postcard} A ~~letter~~ was even sent to Sky and Telescope Magazine asking for the Circumstances of the Eclipse. They answered it a letter giving all of the statistics. Thus planning was unofficially started.

I went so far as to try to get permission to go out to view the eclipse. The parties asked said that it would probably be all right. The parties were the houseparents.

And then I found out that I was going home.

So eclipse plans for Denver had to be "dumped." Right Away. We had to ~~start~~ worrying about how cold it would be in Denver on the morning of the eclipse (This had caused some concern), and instead start worrying about how cold it would be in Montreal on the morning of the eclipse. (As it turned out, it was definitely wor- worrying about).

Getting readjusted to Montreal life isn't an easy thing. Something had to suffer. Among other things, the Lunar Eclipse certainly did. It ^{was} the fourth day of the same month of the eclipse before things officially got going. Officially.

But before written work could be started, the month was already almost half over. And even then, we had to worry about school and planning proceeded at a light pace until only about a week before the eclipse.

I tried to keep this set of plans and results as similar as possible to those of the recent Solar Eclipse, but that had to be done from memory as the plans were still being shipped from Denver. My telescope and the rest of my belongings have not yet arrived, and it is eclipse day today, ~~December~~ 30, 1963, about a month and a half since my arrival home. So I had to do without my telescope for this eclipse, and used Bobby Cohen's.

Plans reached a peak the weekend before the eclipse. An eclipse test was planned for the day before the eclipse, and it proved very successful. This was the only test conducted for this eclipse, and apparently that was all that was necessary.

I was very nervous the night before the eclipse. This was the first time ~~when~~ I showed any nervousness whatsoever for the eclipse, and I didn't retire until about eleven o'clock. I fell asleep finally at two-thirty. I awoke at about Three for the Eclipse. I woke Bobby Cohen, who had slept here. We got dressed and went outside. It was clear, certainly. Very clear. But it was extremely cold and a biting wind was blowing from the West -- the direction ~~where~~ the Eclipse was visible from.

At four we went downstairs to let John Cohen inside. We went back up to Richard's balcony. At a time soon after first contact, Garry came out for about ten minutes, and Richard did too.

The eclipse was fantastic. Every ten minutes or so we went in for five minutes to warm up. It was Cold. Very cold. At the time we thought it was five below. We found out later that it was eight below downtown. That would mean ten below where we were. And it was slightly warmer when we heard the temperature than when the totality started. So we estimate a low of minus 15.

As totality came on, and the crescent waned, the excitement increased. The crescent turned into a flatter shape. Soon nothing was visible but a line of light. The line diminished in ~~length~~ ~~width~~, length, and soon it looked like a bright star, then a faint star. Then it looked like a little blob of haze and then disappeared. It was fantastic. We went in and warmed up. At about six we went out again, for a little while, to examine the Moon at mid totality. I knew exactly where it was, but nothing was there.

At about three-fourths partial eclipse, I had a brainstorm. Why freeze my hands off? (You see, they almost did whenever I took my gloves off to jot down some notes). So I went inside, got my tape recorder out, plugged it in in the Balcony plug, turned it on, and recorded whenever necessary. I consider it a good idea. Actually this had been tested at the Perseids, just last summer in the Rockies, with a small battery-operated tape recorder. I think a tape recorder makes things a lot easier in this work, and definitely more fun.

We went outside just a bit late for third contact. We saw the Eclipsed Moon appear as a thin, flat crescent and Dawn had already started. We observed it, with some breaks to go in and to warm up, until it set at about 7:43.

I am very pleased with the results. It was very cold, but it was very clear, and I thank the Almighty for giving us such good luck on this Total eclipse of the moon. This is my fourth eclipse, and the second one that I planned carefully. A great debt is owed to my dear brother Richard, who helped us out as much



Penumbral
Stage;
slight shading.



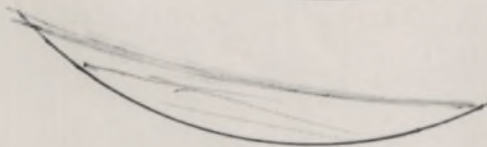
~~Early~~ Umbral
Stage;
Eclipse well
progressed.



Slightly after
mid-partial
umbral
stage



Shortly after that



Near Totality.

~~→~~ Total Second Contact.

Totality about 1.5 minutes
away.

as he could. He even went downstairs and brought us up refreshments after the partial phase was over, during totality.

I wish to thank Bobby Cohen and John Cohen for helping me in the eclipse plan as we worked together as a team. I also want to show my appreciation to my brother Gerry, who ~~didn't~~ found it very hard to get up at four o'clock in the morning as he didn't get to sleep until late ~~that~~ night, but got up anyway because he said he would, and because he was interested. I want to show appreciation to my father, and mother for helping out in the preparations as much as they could. Father went so far as to offer a lift to the observation site, should it be chosen to be far away from the house and should a ride be necessary.

And so ends the work on this eclipse, officially. Unofficially, of course, I may be analysing this eclipse forever. This is the first eclipse that I saw that was completely unobstructed by clouds, and it is termed an overwhelming success.

ECLIPSE ANALYSIS COMPLETED

4:40 P.M. December 30, 1963