R E G U L U S

THE NEWSLETTER OF THE

ROYAL ASTRONOMICAL SOCIETY OF CANADA - KINGSTON CENTRE

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OBSERVING MARS THIS MONTH

If you have any plans to observe Mars this year, now is the time to do it. Mars is now near opposition, the time when it is most favourably placed for observing and this event occurs only once every 25 or 26 months. The distance between the Earth and Mars varies enormously as the two planets orbit the sun and change in their positions with respect to each other and to the sun. Even the distance between the Earth and Mars when the red planet is at opposition varies considerably from opposition to opposition. That distance depends on where in the orbit is the point at which the opposition occurs. Mars has an orbit of considerable eccentricity. In fact, it is more elliptical an orbit than that of any of the other planets except Pluto and Mercury. When Mars reaches aphelion this month it is 249,200,000 Km. from the sun whereas at the time of its last perihelion passage on March 18th, 1979, it was 206,700,000 Km. This is a huge difference of 42,500,000 kilometers, and each time the red planet orbits the sun it varies in distance from the sun by about this amount. This time, with opposition occurring on the same day as that on which Mars reaches aphelion, we have what is very close to the most distant or most unfavourable opposition possible.

A simple comparison of the distances to the red planet can establish for us just how unfavourable an opposition it is. The distance from Earth to Mars at the current opposition is 101,350,000 km; at the last opposition in January, 1978 which was also a very unfavourable one it was 97,700,000 km, whereas at the last favourable opposition in August 1971, the distance being considered was only 56,000,000 km. The current distance then is over 1.8 times the distance at the 1971 opposition which occurred close to the time of perihelion passage - in fact, within a month of that date. Such favourable oppositions as the one we had in 1971 occur only once every 15 to 17 years. With such a vast difference in distances even at times of opposition we can see why there is such a considerable difference in the size of the planet's disk as seen in our telescopes. In 1971 the apparent diameter of the planet was 26" of arc while currently it is only 13.8" of arc. Yet even this is enormously better than the planet will be later in the year as it slips further behind the earth in its orbit and becomes a smaller and smaller disk in the sky. By the latter part of this year it will have a diameter of only slightly more than 4" of arc or less than 1/3 of its current size.

The lesson from this then is that if you wish to observe Mars, now is the time to do it. If it has been some time since you have turned your telescope to the Red Planet on a clear night, I can almost assure you that you will be very pleasantly surprized--if you do it soon.

To review some of the data presented on the orbit of Mars, here is a chart that may be useful.

Phenomena of Mars	Date	Distance from Earth	Size	Distance from Sun (Km.)
last favourable opposition	Aug. 10, 1971	56,000,000 Km.	25"	
last closest approach	Jan. 19, 1978 (69 hours before ↓)	97,720,000		
last opposition	Jan. 22, 1978	97,860,000 Km.	14.3"	
last perhielion passage	Mar. 18, 1979			206,700,000
Current aphelion	Feb. 25, 1980			249,200,000
Current opposition	Feb. 25, 1980 (6$^{hr.}$ U.T.)	101,350,000 Km.	13.8"	
Current closest approach	Feb. 26, 1980 (6$^{hr.}$ U.T.)	101,320,000 Km.		

FOR YOUR COMPENDIUM OF ESOTERIC FACTS

Here is a fact to bring out at your next Astronomer's cocktail party when someone remarks that every month most calendars list at least four and sometimes five principal lunar phases. Be especially sure to remember it when he says every month has its own full moon.

The fact is that this very month, February, 1980 has no full moon. To make it clear, I repeat: this month is one of the very rare months with no full moon.

Let us look at the facts and figures. The synodic month or the precise length of time between successive occurrences of the same phase of the moon is 29.5306 days; or twelve hours, forty-four minutes, and three seconds more than twenty-nine days. The only month of any year that can have less than the four usual principal phases of the moon, of course, is February since only it is less than the synodic period. The chances of it not being one of the principal phases, namely the full phase are not very great, those chances become very small every fourth year (in leap years) when the month is less than thirteen hours shorter than the synodic month. In other words, if the full-moon-less February is to occur there must be a full moon within about twelve and three-quarter hours before midnight local time on February 1st. That is exactly what happens this year. The full moon is on January 31st at 9:21 p.m. in the Eastern Standard Time zone or two hours and thirty-nine minutes before February begins. In Atlantic Canada the event occurred over an hour and a half before midnight and in Newfoundland over a half-hour before midnight. In other words, all of North America had a full-moon-less February.

If you mention this fact, someone is sure to say,"My calendar lists a full moon for February 1st. Why is that?" The answer is quite simple: to establish a uniform practice for dates of lunar phases, most calendars now list them according to Universal Time. The Nautical Almanacs list this full moon as occurring on February 1st at 2 hours 21 minutes Universal Time, but as all astronomers should know, midnight Universal Time, which is local midnight at the Greenwich meridian, occurs five hours before midnight in the Eastern Time zone when we are using standard time.

Just how rare is this phenomenon? -- Very. For either leap-year February or non-leap-year February, to be without a full moon we will have to wait until 1999 and then after that until 2066. Both of those are non-leap years. For the event to occur in a leap year, we will have a long wait indeed. If anyone can calculate how long that will be, please let me know.

REPORTS AND OTHER ITEMS

1. We want to congratulate Dr. Arthur Covington for the presentation that was made to him recently in Ottawa. A sundial containing a piece of antenna from one of the very first radio telescopes is to stand at the National Research Council as a tribute to the work of Dr. Covington. "Congratulations to a wonderful gentleman whom we have even had the privilege of seeing at some of our meetings." An outstanding pioneer in radio astronomy!

2. We want to thank Peter Jedicke and Tom Glinos, stalwart members of the London Centre, who came to our meeting on February 21st. Peter provided us with a genuine treat when he showed us a tape of his Cable-T.V. program and a tape and slides from his trip to southern Arizona. As well as hearing from David, we could for the first time vicariously view his home and observation site in the land of clear, steady skies.

3. News reports from the American south-west have carried stories of rains and floods. We trust they will be short in duration and hope that David can soon get back to those fantastically long successions of cloudless (or almost cloudless) days and nights.

4. The "We-Envy-You-Your Skies" story of this month goes something like this: Peter told us that one night, when he and David were observing, a tiny cloud appeared on one horizon and floated across the sky and disappeared on the opposite horizon. David's remark was: "That was the Monsoon."

5. We wish best of luck and a good trip to Angelika and Bob who will be visiting southern Arizona in March.
   Do you suppose David will build a motel to acconmodate R.A.S.C. people from Canada?
   "Isn't it fantastic to be able to visit a friend and the astronomy capital of the world, all at once?"

6. Early reports from the Eastern Hemisphere indicate that the February 16th eclipse was incredible. It may have been seen, including its partial phase, by two billion people or half the earth's population.

7. Try to keep up your observing program in spite of the chilly weather. It should not be necessary to say that planetary observing can be a special treat in the evenings in the next few months.

8. We congratulate Enrico again for being the first member of our centre to observe Mercury this month.

9. Here is a reminder that this is the best time of the year to look for Zodiacal light in the evening sky, especially if you have a good western horizon.

10. I hope to see you at the meetings on March 6th and March 20th.

Clear skies and good observing!

Leo