R E G U L U S

THE NEWSLETTER OF THE

ROYAL ASTRONOMICAL SOCIETY OF CANADA - KINGSTON CENTRE

APRIL, MAY, 1981

THE SHUTTLE IS LAUNCHED - AN ERA BEGINS (APR. 12, 1981)

As this newsletter is being prepared the Space Shuttle has just been launched and as it makes its earth orbits in its first day of operation, a new era in the exploration of space is dawning. It is a significant milestone for astronomers and space scientists as the promises of the era that begins today are even more inviting and exciting than those of the era that began less than quarter of a century ago.

It was in October of 1957, that the first small artificial satellite was sent into orbit, and it was exactly twenty years ago today that the first manned space vehicle carried a human into orbit around the earth. Those two events marked the beginning of an era that saw our knowledge of the universe expand at a wild and unpredictable rate--something that was completely beyond the expectations of most people in the early 1960's.

Those two tentative steps were the ones that initiated the process which led to men exploring the terrain of the moon and bringing back rock samples from the lunar surface, the launching of unmanned craft to the inner planets and the gas giants, a robot's examination of the Martian soil, and the transmission to earth of the incredible pictures of Jupiter and Saturn and their amazing families of satellites. There have been two decades marked by an enormous knowledge explosion especially for the planetary astronomer. Auxiliary benefits have been profound,also, for the reach into space has brought new knowledge in chemistry, medicine, and the general awareness of man's universe.

We can expect that the era now beginning will fling open the doors of knowledge wider than ever and lead to discoveries we cannot now visualize, but if we allow its promise to be fully realized we can be sure it will be even more exciting than the two preceding decades. A reusable space craft like the Shuttle with its large cargo area can make into everyday occurrences ventures which previously would have been delayed or ruled out as too costly.

The Space Telescope which the Shuttle should take aloft within three years promises to be an enormous boon to astronomers. For the first time they will have a large telescope above the Earth's atmosphere, and with the resolution of which it will he capable, we can anticipate, an immediate knowledge explosion at the frontiers of cosmological research. I do not for a moment see such instruments precluding the need for telescopes below the earth's atmosphere; one can supplement the other and one type can work in areas not readily open to the other.

The Space Telescope may eventually be just one of many sophisticated instruments in space--in earth orbit, on the lunar surface, at the Lagrangian points, or beyond, and all of them within reach of a large cargo vehicle. The great asset of the Shuttle program is that it can lead to many kinds of programs for the further exploration of our solar system.

As this era begins we must remember a few things. There have been many delays in the program and there may be more in the future, but man has made a definite committment to explore his solar system as never before. Our country's investment through the building of the Manipulator Arm involves our nation's scientists in the program and assures them space on future flights, to send aloft and conduct their own experiments. Let us strive to see that this research continues and that it will be beneficial to mankind.

An all-too obvious and somewhat saddening fact of the Shuttle program is the idea that, besides the delays that it suffered, concessions were made to the military community long before the launch was scheduled. It is part of the reality of

...2

the present age that the military of many countries are looking to space as an extension of the territory over which it is possible to do what has been done on earth far too frequently for thousands of years. And so the situation came about that there is a Shuttle some of whose future program time is handed over to the military; otherwise, there might have been no Shuttle at all for many years to come.

Let us hope that the promise of this dawning age is realized in a peaceful and beneficial way; with the efforts of astronomers and many others who are speaking out as never before, it can be clearly stated to the politicians that there is a need for astronomical research and exploration of many kinds and a properly funded Shuttle Space Program can be beneficial to the people of the world. If this is carried through, there can be reason for optimism as man ventures further into the High Frontier.

AN INCREDIBLE AURORAL DOUBLE-FEATURE

On the nights of Saturday, April 11th and Sunday, April 12th, the sky was filled with an Auroral display the likes of which most people who saw it had never seen before. The two-night double-feature presented by the Aurora Borealis was the kind of sensational event that could leave a sky-gazer almost gasping with wonder and searching for superlatives with which to describe it.

Well before the end of twilight on Saturday, April 11th, and in spite of the fact that there were clouds and a haze and a bright first-quarter moon in the sky, it was obvious that an Auroral "event" was taking place. Sheets of red and white "flame" were flashing through large parts of the sky. Rays and flares were streaking up to the zenith from many directions. As the evening wore on and the twilight brightness left the sky the sheets of red and the red rays along with their white counterparts became more and more distinct. At one point three very distinct rays become three solid, scarlet-red bands, each about ten or more degrees wide and arching up from horizon to zenith--one in the north-west, one in the east-south-east and one in the north-north-east. It was an incredible display in spite of clouds, haze, and a bright moon.

On Sunday evening the display was even more spectacular. Shimmering sheets of red covered very large areas of the sky. Areas of green and yellow could be seen and flashing white rays swept from most parts of the sky as swirling auroral clouds drew crazy patterns high in the sky. At times they swung far down into the southern sky covering almost all of the heavens and at times there was far more aurora in the south--far south of the bright moon and the planets, Jupiter and Saturn--than there was in the northern sky. It is little wonder that fire halls were inundated with phone calls: the swirling, pulsating sheets of bright red made the sky itself almost appear to be "on fire".

Though I have seen a number of great Auroral shows including the very intense and red one on April 3-4, 1979, I cannot recall seeing such intense red bands as were visible on Saturday night, and such widespread activity over almost he entire sky as was seen on Sunday night. The latter also produced more widespread reds than I have ever witnessed on one occasion,

I wonder if any sky-gazers become dizzy from swinging around so often to observe what seemed to be constantly happening in many parts of the sky. Reports have mentioned the fact that this aurora reached large areas of North America, stretching south to Louisiana and places which only extremely rarely see such phenomena. Reports also have mentioned the occurrence of a solar flare at about mid-day on Friday, April 10th. Even without an unusual flare, it is now about the time in the solar cycle when, according to recent scientific theory, Auroral activity could be expected to reach a peak, for such theory points to that time, being about a year or two following the time of sunspot maximum. The sunspot cycle reached a maximum in November 1979; the Aurora, thus, can be expected to be fairly active this year.

The second weekend of April, 1981 is sure to be remembered for some time among Aurora observers, for the double display on the 11th and 12th was magnificent.

THE HOSPITALITY OF SOUTHERN ARIZONA

Your editor recently had the great pleasure of visiting for a few days with the members of the Tucson Branch of the Kingston Centre. Any occasion on which

...3

an amateur astronomer has a chance to visit the astronomy capital of the world, with its remarkable skies and incredible facilities, is one to be savoured and long remembered, but for him to experience the hospitality of David Levy and to meet with Rik and Dolores Hill, then the occasion becomes a very, very special one.

There is now one more member of our centre who has visited the Flandrau Planetarium and heard one of David's fine presentations, has seen the clear skies of Arizona: through a number of instruments in what is perhaps the biggest amateur collection in the world, and has seen the Multiple-Mirror Telescope, and the fantastic place that is Kitt Peak National Observatory. He has experienced the kindness of Rik Hill, of Case Western University's Warner and Swasey Observatory, giving him the "royal tour" of Mayall and McMath Observatories and many other sites on the mountain-top that could be called "Astronomers' Heaven". Meeting the staff at the Flandrau was also a pleasure, as was enjoying, all too briefly, it seemed, the warm sun of the daytime and welcome starlight of night, seldom seen in Ontario in the previous two months.

Here is someone who is very grateful to David Levy and to Rik Hill and others for the hospitality and warmth of southern Arizona. It was a real treat!

FOR YOUR COMPENDIUM OF ESOTERIC FACTS

Here is a fact for you to quote the next time your friend reminds you that the date of Easter is determined each year by astronomical events. Remind him in turn that this year, Easter's date is determined by calculations involving not one but two extremes in extent of time used in the calculations.

For approximately the past sixteen centuries the date of Easter has been determined by a formula which,simply expressed,is this: it is on the first Sunday following the first full moon which occurs after the moment of the Vernal Equinox.

In this year, 1981, the sun reached the point where it appeared to cross the equator as it moved north (the time known as the Vernal Equinox) at 17:03 Universal Time on March 20th, just one hour and forty-one minutes after the time listed for the occurrence of the full moon which was listed as happening on that same day at 15:22 Universal Time. This meant that for this part of the calculation, Easter was pushed forward to occur following the next full moon which would not be until April 19th, one whole synodic month later. For this part of the calculation, the date of Easter was pushed forward the maximum extent possible. (A difference of an hour and forty-two minutes in the precise time of the occurrence of the Equinox would have put Easter back a month, to have it occurring at the earliest possible date of March 22nd.)

The second part of the calculation has the opposite kind of extreme. The Full Moon after the Equinox occurs on a Sunday--Sunday, April 19th at 7:59 Universal Time-and so the number of days employed in this part of the calculation is, of course, zero, and, obviously, the minimum number possible--hence, the opposite kind of extreme to that found in the first part of the calculation. (Incidentally it should be possible to see that if the full moon just mentioned were to fall on April 19th and that date were to fall on a Monday, the date of Easter, which would in that case be six days later--on April 25--would be the very latest date possible.)

You have, therefore, besides the fact about this year's Easter date, a second fact to quote for your friends and it is this: because of possibilities for occurrence of the Vernal Equinox and Full Moons, the date of Easter can vary from March 22nd to April 25th inclusively.

REMINDERS AND OTHER ITEMS

1. Our centre is proud to welcome Mr. Val Burati of Rockville, Maryland as a new member. Mr. Burati joins the well-known Mr. Gus Johnson, as the second member from the state of Maryland. While Mr. Johnson lives in the far western end of the state at Swanton

...4

Mr. Burati lives in the eastern region and not far from Washington, D.C. Our new member, when I last heard from him was awaiting the arrival of an Odyssey I telescope--the famous 13.1" Dobsonian from Coulter. We certainly wish him the best of luck with the new instrument and hope to hear some reports from him.

2. While visiting at the Flandrau Planetarium I had the pleasure of meeting Mike McGee, a colleague of David's. I hope that by the time of the next newsletter, the technicalities can be completed and we can announce that we have another member of the Kingston Centre - Tuscon Branch.
3. We congratulate David Levy on the publication of a fine article on comet-hunting in The Strolling Astronomer - The Journal of the Association of Lunar and Planetary Observers.
4. We also congratulate our Treasurer, Jeff Fret, on recently winning second prize in the Kingston Science Fair and first prize in the Frontenac County Science Fair. The entries were Jeff's project on Stellar Spectroscopy. Good work, Jeff! A fine achievement!
5. Since the last newsletter our plans have solidified for Astronomy Day, May 9th, 1981. Our centre will be putting on a Mall Display at the Frontenac Mall on the Bath Road. If weather permits we will hold a Public Star Night with telescopes set up near Murney Tower near the lakeshore at the south end of MacDonald Park.
   We hope to have a good many items on display at the mall and to have quite a few members present.
6. It is now time to reach your decision or finalize your plans about the General Assembly of the R.A.S.C. in Victoria, June 26th to 29th. It promises to be an excellent event. If you are interested in obtaining a registration form or a form for exhibits or a paper presentation, please let me or Angelika know as soon as possible.
   Let us know also if you are interested in submitting a piece of astronomical writing for the annual competition for the Simon Newcomb Award. Details are available.
7. We extend wishes for the very best of luck to the members of our centre's Tucson Branch who are acting as hosts and organizers of the 70th Spring Meeting of the A.A.V.S.O. (American Association of Variable Star Observers). Dolores and Rik Hill, and David Levy have done a great deal of planning for this event which takes place April 22nd to 25th. V.S.O.ers (Variable Star Observers) fortunate enough to attend will have a chance to hear paper sessions and tour Kitt Peak, Mount Hopkins and the Multiple-Mirror Telescope, Flandrau Planetarium, and the Lunar And Planetary Labs, and as a special treat they have been promised a Star Party at David Levy's Home For Wayward Telescopes.
   Again, best of luck to Dolores, Rik, and David! Don't forget to enjoy the meeting!
8. There are a number of events to plan for in your observing schedule in the upcoming weeks:
   1/ There is a favourable elongation of Mercury in May. The fleeting planet should be visible for about the last three weeks of the month and the first two weeks of June. Be sure to look low in the western sky after sunset and to record the number of dates on which you were able to see it. See if you can record more sightings than I had during the favourable elongation of June 1980. I look forward to hearing your numbers both before and after the date of Greatest Elongation which is May 26th.
   2/ We are approaching the best tine of this year for viewing or photographing the most distant planets of our solar system. Uranus, Neptune, and Pluto all reach opposition within approximately a two month period. If you wish to test your ability and that of a medium or large-aperture telescope you might be interested in trying to spot Pluto which reaches opposition at 0^{hr} U.T. on April 13th. Be prepared for the considerable challenge of an object at Magnitude 13.7. Uranus at magnitude 5.8 as in a much different situation--an object that under superb conditions might even be visible to the naked eye and certainly should be an interesting object in binoculars or a telescope. This greenish planet is at opposition on May 19th at 4^{hr} U.T. Throughout the next few months you should

...5

look for it just north-west of the star Lambda Librae, at the eastern end of the constellation Libra. Neptune which comes to opposition on June 14th and is at magnitude 7.7 may be slightly harder to spot over the next few months than you would expect because of its situation among the many stars of the Milky Way. However, with a persistent effort and a good star map, Uranus should be clearly visible in a medium-sized telescope. It is close to the star 58 Ophiuchi.

3/ Weather permitting, the night of May 13-14th should provide an excellent chance for those who want to demonstrate to friends the movement of the moon relative to bright objects in the sky. On that night you may see the moon move past the planets Jupiter and Saturn. In the evening at 11:00 p.m., E.D.T., the eight-day-old Moon passes 3° north of Jupiter and six hours later it skims by Saturn just 1.8° north of the ringed planet. The configurations of these objects should be interesting to both see and photograph that night.

4/ There are two meteor showers that may well be worth observing. The Lyrids reach their peak on the night of April 22-23 and you may be able to catch a few bright ones before the moon rises. The moon should be no problem for the η Aquarid shower which is variously listed to reach its peak on either May 3rd or May 4th. The moon is close to new and viewing throughout the night should be possible.

9. Remember the dates of upcoming meetings: (1) April 24th, (2) May 8th (featuring a slide show entitled "The Observatories on Kitt Peak") , (3) May 22nd, (4) June 12th, (5) June 26th.

   One of these meetings will probably also have a slide show on the "Aurora of April 11th and 12th". If you can bring me some additional slides showing your photography of that event, I would appreciate it. The place is Ellis Hall, Room 222 and the time is 8:00 p.m. See you there!

10. Send all your correspondence to this address:

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Box 141, Station A,
Kingston, Ontario K7M 6R1

CLEAR SPRING SKIES!

GOOD OBSERVING!

Leo Enright.