. . ROUNDUP . . ROUNDUP . .

Advertisements

This space is available free to members for advertisements (preferably, but not necessarily astronomical).

1996 Programme

This year's Programme is in preparation, and will be issued with next issue of Sagittarius. An exciting year is ahead, with two total lunar eclipses, a partial eclipse of the Sun, National Astronomy Week, and the 150th anniversary of the discovery of Neptune. There will also be several interesting talks, on topics as diverse as practical observing, meteors, and the transits of Venus. ✩

Star Watch UK

The Astronomy Section has been invited to participate in *Star Watch UK*, a survey to observe and record the brightness of the sky from all parts of the UK. The survey, which is conducted with the collaboration of nine astronomical organisations, includes both visual observations and photography. The objective is to determine the effect of light pollution.

It is based on two star maps, which are supplied: one of the Pleiades and one of Ursa Minor. The idea is to record the faintest stars visible under good conditions with no Moon, on selected nights in November and February.

Roger Chandler has been photographing the night sky as part of this project. Three specified exposures are taken with a designated slide film. The results are sent to the Royal Greenwich Observatory. ✩

Don't forget – subscriptions to La Société and the Astronomy Section are now due.

Astronomy Section Officers

Section Secretary:	Geoff Falla	724101
Honorary Treasurer:	Peter Langford	720649
Light Pollution Officer:	Ken Staples	54759

The next newsletter will be published early in March. The deadline for publication materials is 15th February.

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Sagittarius

The Newsletter of the Astronomy Section of La Société Guernesiaise

January/February 1996

Forthcoming events

Annual Business Meeting

Tuesday, 9th January

8.00 pm at the Observatory

Practical Observing

by Geoff Falla

Tuesday, 6th February

8.00 pm at the Observatory

and:

Every Tuesday evening

from 7.30 pm at the Observatory

and observing on Fridays, if clear

In this issue

A new observing programme

Latitude and the Sun's warmth

Wernher von Braun

Inside

Major articles in **bold**

Centre inserts

January/February star chart

Moon phase calendar

Annual Business Meeting

The Annual Business Meeting of the Astronomy Section will be held at the Observatory on Tuesday, the 9th January.

The agenda is as follows:-

Election of Officers.

Finances - Treasurer's Report.

Solar Mirrors - Installation.

Computer.

Workshop Area.

Public Visits to the Observatory / Observing Programme.

Sagittarius / Press Publicity.

Any Other Business. ✩

Practical Observing

On Tuesday, the 6th February, at the Observatory, Geoff Falla will give a talk on **Practical Observing.**

With the introduction of an Observing Programme (see page 3), which, it is hoped, will concentrate our efforts on what can be observed in particular sections of the sky at different times of the year, the time seems appropriate for a discussion on some practical aspects of observing.

The subject covers naked eye recognition and observing, with particular reference to the use of Setting Circles. Comments and discussion will be welcomed, relating to the observing programme, and problems which it is thought may arise, and any practical improvements which can be suggested for future consideration.

The planned Observing Programme will be discussed in more detail, together with objects which can be seen, with illustrations. ✩

How the planets formed

On the 7th November 14 members heard Frank Dowding speak about the Birth of the Solar System. He emphasised at the outset that he was not necessarily speaking the truth, because there were many different theories. However, he described the generally accepted theory.

Starting with the Big Bang, Frank rapidly went through the creation of the sub-atomic particles to the formation of stars. He showed videos of a gas cloud pictured by the Hubble Space Telescope, and a computer simulation of protostars developing from such a cloud.

Frank then described the formation of planets within the disk, as well as other solar system objects, such as asteroids and comets. He dealt in detail with each planet, explaining the differences in the inner, rocky planets, compared with the outer, gaseous ones.

Frank concluded a fascinating talk with a number of colour slides. ✩

Quiz and Supper Evening

There was just a few of us at the annual quiz and supper evening on the 5th December, but we all enjoyed the conviviality, the food and liquid sustenance, as well as Roger Chandler's excellent set of questions. Divided into subject groups (solar system, history, etc) they were both challenging and educational. No one was able to answer them all, but at the final count David Le Conte was adjudged the winner, and presented with a copy of the Larousse *Pocket Guide Astronomy* by James Muirden. ✩

A new observing programme

Starting with this issue of Sagittarius, we hope to produce a regular observing programme and Star Chart. The objective will be to learn more about Constellations which are well placed for observations at particular times of the year, and objects observable both with binoculars and moderate size telescopes. Please note that planets are not included in the Star Chart.

Each Star Chart will cover a 60 degree section of the sky, or 4 hours of Right Ascension, and will extend from the South at minus 30 degrees Declination to Polaris. In this way the whole of the observable sky can be divided into six sections. Objects of interest are marked on the Star Chart, there is a separate list of objects, including coordinates for telescopes, and an Observation Log page for keeping a record of what has been seen. Although the Star Chart and list includes many 'Messier' objects, double stars and other objects which may be more easily found, there are many other objects which have not been included. Some of these will be more of a challenge to find, but can also be included in your log of observations. An Observation Log will also be kept on the Notice Board at the Observatory so that results can be entered or compared.

Star Chart Section I covers the area of sky between 5 hours and 9 hours of Right Ascension, and includes a number of Constellations with Orion, Gemini, Auriga and Canis Major. If you would like to measure how well you are doing, try a points system such as one point for double or multiple stars, two for star clusters or nebulae within the galaxy, and three points for other galaxies observed. More detailed information about objects to be observed is available at the Observatory.

Good luck, and here's looking forward to clear skies. ✩

Geoff Falla

A table of objects for January and February, by constellation, with their types and coordinates, appears on page 9. The star chart is in the centre pages, 10 and 11, and the observing log is on page 12. These pages form the centre sheet, which can be removed for convenience.

Educational activities

On Monday, the 27th November, the Year 6 class of the Forest School visited the Observatory and saw, with a moderate sky, the Moon, Saturn, Andromeda Galaxy, Albireo double star, and other objects.

On the same evening we had a visit from Class 10 girls of Blanchelande College. The College had previously been unsuccessful with the weather on several occasions, so everyone was pleased with the success of this visit.

Both schools sent letters of thanks, and it is likely that their visits will become annual occasions. We were surprised and delighted to receive a small contribution to our funds from Blanchelande.

Section members involved were Geoff, Roger and David.

Two boys, Graham and Ben, from Elizabeth College have started a period of tuition, under David's guidance, in Astronomy for their Duke of Edinburgh Bronze Award. Any member who would like to participate in this activity (as tutor or student) please contact David. ✩

Famous lives 12 – Wernher von Braun (1912 - 1977) by David Williams

Wernher von Braun was born in the German town of Wirsitz on 23 March 1912. Today, the town has been re-named Wyrzysk, and lies within Poland.

Von Braun was a poor pupil at school, and it appears that his poorest subjects were Maths and Physics! However, all this changed when he read a copy of Hermann Oberth's "*The Rocket into Interplanetary Space*". He was so frustrated by his inability to understand the mathematics that he determined to "do something about it".

In 1932 he graduated from the Berlin Technical Institute, and enrolled at Berlin University. He was an engineer by training, and continued his research studies into rocketry at the University, being awarded his doctorate in 1934. However, the contents of his thesis were never published fully – they being regarded as military secrets.

Progress was being made at a tremendous rate, with von Braun heading a team of researchers. By December 1934 they had recorded two successful rocket launches, which had attained altitudes in excess of 2.4 km (1.5 miles). As a result of this success he was promoted to become Technical Director of a team based at the large, but remote facility at Peenemünde on the Baltic island of Usedom.

During his time at Peenemünde, von Braun and his team developed the now legendary V2 rocket. Although the V2 was used as a means of delivering death and destruction, the engineering was superb, the technological masterpiece of its day. It was 14 metres (47 feet) long, 1.5 metres (5.5 feet) diameter, and weighed 13.5 tons at launch, including a one-ton warhead.

The propellants were a combination of liquid oxygen and a 75% ethyl alcohol/ water mixture, producing a 55,000 lb thrust. It had a range of 320 km (200 miles). It achieved altitudes of between 60 and 70 miles.

The first V2 rocket was launched against Paris in September 1944, at which point the German's technical superiority over the allies could be measured in years. Over 1000 V2s were launched at London during the last year of World War II, and, in total, over 4000 were fired at the allies.

To avoid capture by the Soviet forces, von Braun and approximately 150 of his team fled to the American lines, and surrendered to US troops. Eventually, he, his team and many components of the V2 were taken to the United States. As a result, US rocket technology was to advance at an astonishing pace. In fact, between 1946 and 1951, over 70 V2 launches were made by the United States at the White Sands facility in New Mexico.

Von Braun continued to work for the military, except that now it was the Americans and not the Germans. On the 31st January 1958 they launched Explorer 1, the first US satellite. It was during this mission that proof was found of the existence of the Van Allen radiation belts around the world.

Between 1960 and 1970 von Braun was Director of the Marshall Space Flight Center, and it was here that he was to »»

lead the team that was to develop the largest rocket launcher known to the world – the Saturn V.

The statistics of the Saturn V are awesome:-

Height:	363 ft.
Diameter:	33 ft.
Weight at launch:	6,000,000 lbs.
Thrust produced at launch by Stage One motors:	7,500,000 lb.
Fuel consumption at launch:	15 tons/sec

It was the development of this three-stage rocket that was to allow the Americans to send their men to the Moon during the Apollo Program.

In 1972 he left NASA, sensing that funding was to be restricted. He became a Vice-President of Fairchild Industries, where he remained until 1976. During 1976 he underwent surgery for cancer, but, sadly, he died early in 1977, aged 65 years.

Writing in 1971, von Braun, who had achieved greatness, both in military and peaceful projects, had this to say to his critics for the part he played during World War II:-

> *"Science, by itself, has no moral dimension. The drug which cures when taken in small doses may kill when taken in excess. The nuclear energies that produce cheap electrical power when harnessed in a reactor may kill when abruptly released in a bomb. Thus it does not make sense to ask a scientist whether his drug or his nuclear energy is 'good' or 'bad' for mankind."* [1]

Even earlier, in 1949, he had pointed out that the rocket was like the Roman god Janus – it could be used for either peaceful or war purposes. Its actual use, he said, was controlled by the sponsor of the development, not by the inventor or engineer who designed it.

Wernher von Braun will, without doubt, rank as one of the greatest scientist and engineers of the century. I believe his memorial will be the Saturn V. ✰

David Williams

Reference

1. Encyclopædia Britannica, vol. 3, p123.

Bibliography

Encyclopædia Britannica

Famous Lives

This concludes my series of 12 Famous Lives. I hope you have enjoyed it as much as I have enjoyed writing and researching it.

DW

Did you know?

1. The Germans' code name for the V2 was A-4. It was the German propaganda service that called it V2: in German, *Vergeltungswaffen Zwei*, or in English *Vengeance Weapon 2*. ***DW***

2. How many stars have a negative magnitude? Just five:-

Sirius (α Canis Majoris)	- 1.46
Canopus (α Carinae)	- 0.72
Rigil Kentaurus (α Centauri)	- 0.27
Arcturus (α Boötes)	- 0.04
and of course: *The Sun*	- 26.72

LG & DLC

Ref: *Norton's 2000.0*, by Ian Ridpath (Ed.)

Moon rocket – The Saturn V by David Williams

It was while I was 'reading up' for my article on Wernher von Braun's life that I was re-introduced to the awesome statistics of the Saturn V rocket. I say "re-introduced" for as a teenager I followed the space programme avidly and knew all the statistics of Gemini, Apollo, etc inside out. Sadly, no more!

While von Braun was Director of the Marshall Space Flight Center during the 1960s he and his team worked on the designs of the future Saturn V rocket, a twentieth century wonder of the world.

The rocket consisted of three stages (see figure 1), and an instrument unit on top of these before the service and command modules. Let's look at each stage in turn.

Stage One S-Ic

Height:	138 feet
Diameter:	33 feet
Dry weight:	280,000 lbs
Fuel capacity:	4,400,000 lbs
Engines:	Five F-1 in cluster, producing 7,500,000 lbs thrust. Four of these were mounted on a 364-foot diameter ring, with the fifth mounted centrally.
Fuel consumption rate:	15 tons/second
Burn time:	2½ minutes
Propellants:	Liquid oxygen and kerosene

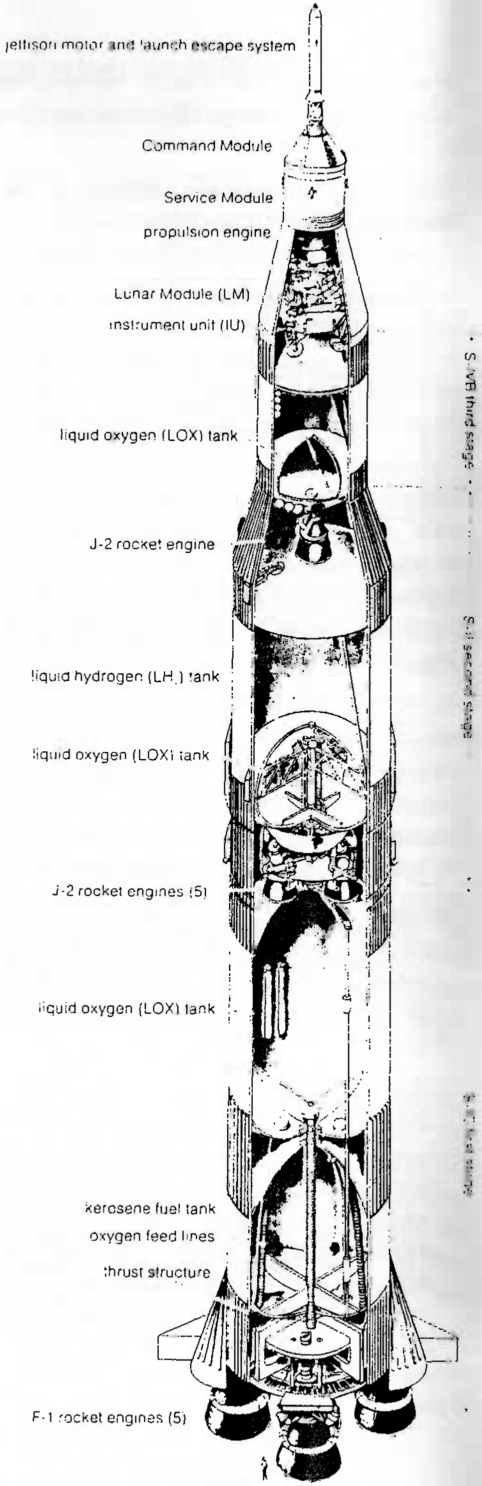


Figure 1

Stage Two S-II

Height:	81.5 feet
Diameter:	33 feet
Dry weight:	80,000 lbs
Fuel capacity:	945,000 lbs
Engines:	Five J-2 engines generating 200,000 lbs thrust.
Burn time:	6 mins 40 secs
Propellants:	Liquid oxygen and liquid hydrogen

Stage Three S-IVB

Height:	60 feet
Diameter:	22 feet
Fuel capacity:	230,000 lbs
Engine:	One J-2 engine.
Propellants:	Liquid oxygen and liquid hydrogen

Above the third stage was to be found the **Instrument Unit (IU)**. This contained the on-board guidance and control systems.

Height:	3 feet
Diameter:	21.7 feet
Weight:	4,000 lbs

The overall statistics of the Saturn V were:

Height:	363 feet
Weight:	6,000,000 lbs at launch

It was capable of launching a payload of 280,000 lbs into Earth orbit, or a 100,000 lb payload into a lunar orbit.

It remains the largest rocket launcher ever built, and is a fitting memorial to a brilliant engineer. ☆

David Williams

Reference:

Encyclopædia Britannica

Millennium projects

On the 14th November Geoff Falla represented the Astronomy Section at the Millennium Ideas Forum. David Le Conte also attended as a representative of the Board of Administration.

The purpose of the Forum was to stimulate ideas for commemorating and celebrating the Millennium. Geoff put forward the idea of a *Camera Obscura*. This is a device to focus a panoramic view onto a table. There are examples in Mont St Michel, Aberystwyth, and Edinburgh.

The idea, originally proposed to the former Ancient Monuments Committee by David, was for a camera obscura at the top of Castle Cornet, probably using the citadel.

Geoff says that these devices were first used in the 13th century, to observe eclipses of the Sun. Later, in the 17th century, portable camera obscurae were used for perspective drawing, and room-sized obscurae were built in the 19th century for popular entertainment.

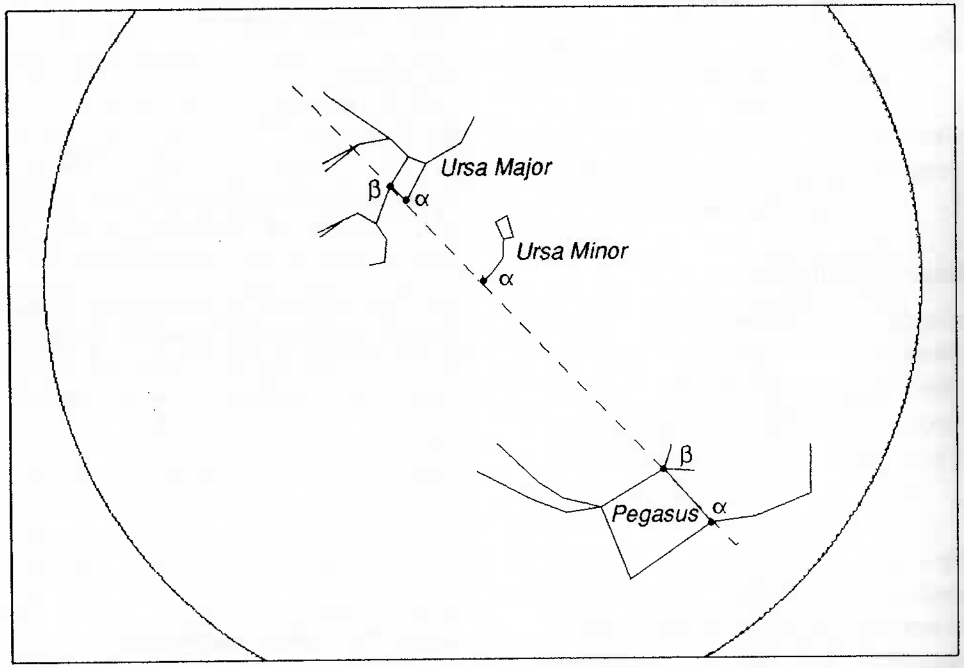
David proposed a large solar system model, with a scale the size of the entire Island, or even the Bailiwick. This idea has been used in America, where some such models have covered large areas. David's suggestion was for the model to record the relative positions of the planets and the Sun (and perhaps the Moon) at the moment of the Millennium, ie midnight on the 31st December 1999. (Yes I know that, strictly speaking it is the 31st December 2000, but everyone will be celebrating the former date).

A further idea was for a large telescope (a 16-inch computerised Meade?).

Hopefully, some of our ideas may gain support. Let us know if you have others. ☆

Did you know?

The stars α and β (Markab and Scheat) of the Great Square of Pegasus line up almost exactly with the Pole Star, α Ursa Minoris, and the pointer stars (Dubhe and Merak) in the Plough, α and β Ursa Majoris. In other words, the edge of the Plough is opposite the edge of the Great Square of Pegasus. (See diagram below.)



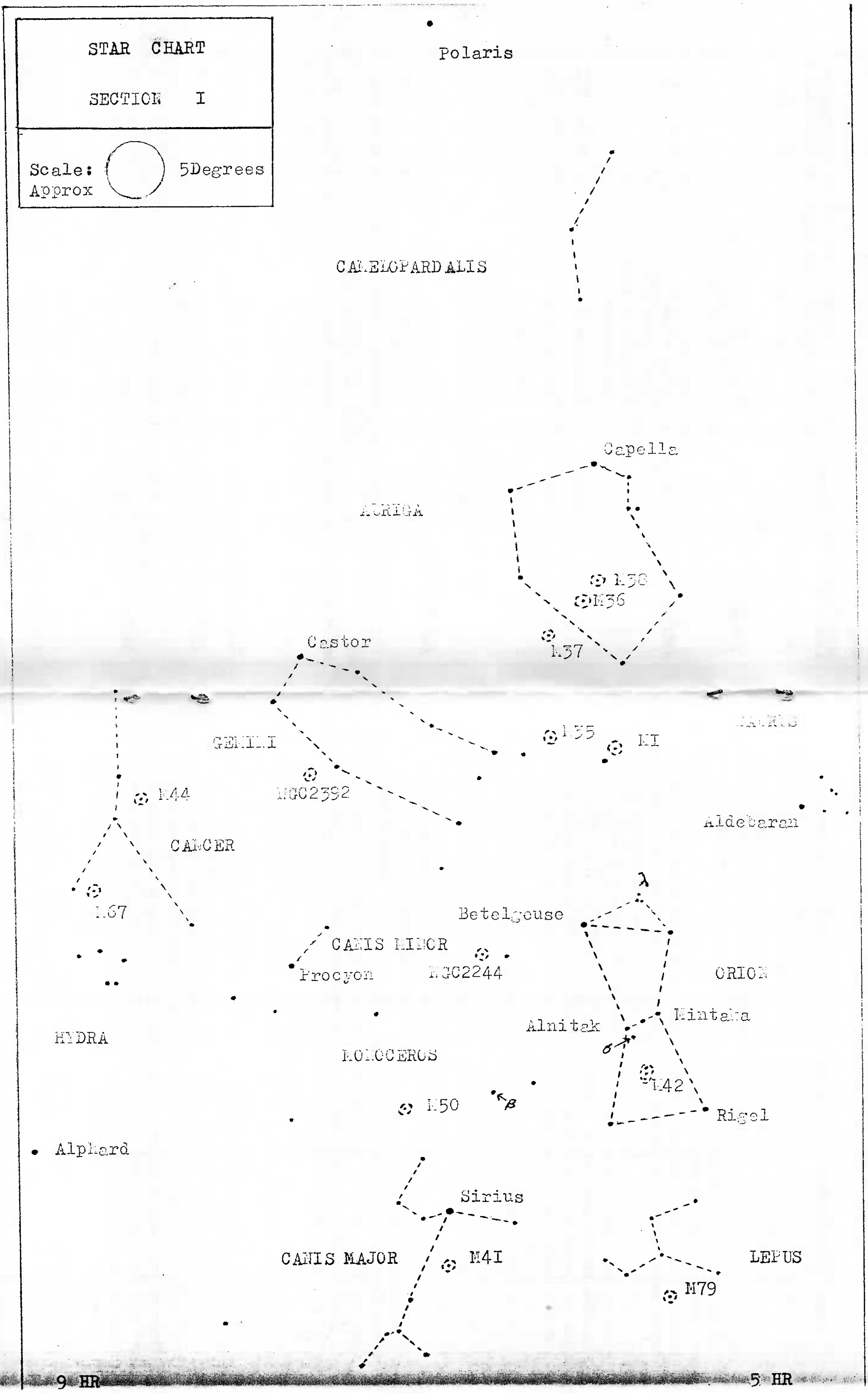
The Solar System

DW

Name of planet	Diameter in km	Average distance from Sun in million km	Number of known moons	Time taken to go around the Sun (year)	Time taken to turn on its axis (day)	Speed in orbit around the Sun in kps
Mercury	4,878	57.9	—	88 days	59 days	47.9
Venus	12,100	108	—	224.7 days	243 days	35
Earth	12,756	149.6	1	365.3 days	23 hrs 56 mins	29.8
Mars	6,790	227.9	2	687 days	24 hrs 37.5 mins	24.1
Jupiter	142,800	778	16	11.9 years	9 hrs 50,5 mins	13.1
Saturn	120,000	1,427	19	29.5 years	10 hrs 14 mins	9.6
Uranus	52,400	2,870	15	84 years	15 hrs 14 mins	6.8
Neptune	50,450	4,497	8	164.8 years	16 hrs 3 mins	5.4
Pluto	2,300	5,900	1	248.6 years	6 days 9 hrs	4.7

STAR CHART - SECTION I

Constellation	Object	Type ○○ = Should be visible with binoculars		Coordinates R A h m	Dec degs
TAURUS	M 1	Nebula/supernova remnant (*The Crab Nebula*)		05 35	+ 22.0
ORION	M 42 & M 43	Diffuse nebula (*The Orion Nebula*) & multiple star group (*The Trapezium*)	○○	05 35	- 05.5
	Beta β	Double star (*Rigel*)		05 14	- 08.2
	Sigma σ	Multiple star group		05 39	- 02.4
	Lambda λ	Double star		05 35	+ 09.9
	Delta δ	Double star (*Mintaka*)		05 32	- 00.3
	Zeta ζ	Double star (*Alnitak*)		05 41	- 02.0
GEMINI	M 35	Open cluster	○○	06 09	+ 24.3
	Castor	Double star		07 35	+ 31.9
	NGC 2392	Planetary nebula		07 29	+ 20.9
AURIGA	M 36	Open cluster	○○	05 36	+ 34.1
	M 37	Open cluster	○○	05 52	+ 32.5
	M 38	Open cluster	○○	05 29	+ 35.8
CANIS MAJOR	M 41	Open cluster	○○	06 47	- 20.7
CANCER	M 44	Open cluster (*Præsepe or Beehive*)	○○	08 40	+ 20.0
	M 67	Open cluster	○○	08 50	+ 11.8
MONOCEROS	Beta β	Triple star		06 29	- 07.0
	M 50	Open cluster	○○	07 03	- 08.3
	NGC 2244	Open cluster and nebula (*Rosette Nebula*)		06 03	+ 04.9
LEPUS	M 79	Globular cluster		05 25	- 24.5


STAR CHART
SECTION I
Scale: Approx
5Degrees
Polaris
CAMELOPARDALIS
Capella
AURIGA
M38
M36
M37
Castor
GEMINI
M35
M1
M44
NGC2392
Aldebaran
CANCER
M67
λ
Betelgeuse
CANIS MINOR
Procyon
NGC2244
ORION
HYDRA
Alnitak
Mintaka
MONOCEROS
δ
M42
M50
β
Rigel
Alphard
Sirius
CANIS MAJOR
M41
LEPUS
M79
9 HR
5 HR

STAR CHART - SECTION I OBSERVATION LOG

Date	Constellation	Object	Observation notes, etc

The relation between latitude and the Sun's warmth by Ray Schemel

Have you ever pondered over the different amounts of sunshine that fall on each part of the Earth? If so, it might seem obvious that, on average, the tropics receive the most sunshine because the Sun is high in the sky there (ie the elevation angle is large).

But what about our middle latitudes? This last summer Guernsey received record amounts of sunshine and so did much of Europe, where temperature records were often broken. In fact, if it had not been for the moderating effect of the clouds and the sea it could have been hotter here than the southern tropics.

The reason? At the Tropic of Capricorn the Sun has an elevation of 43°.1, whilst in Guernsey (latitude 49°.5) the elevation is about 64° on the 21st June. Not only that, the days are much longer, and so the potential energy received each day is considerably larger.

The amount of energy received at the Earth's surface is strongly influenced by the atmosphere and what is in it. Clouds are the most obvious component but air also attenuates sunshine. Near sunrise and sunset the Sun's rays must pass through much more air (the equivalent of nearly ten air thicknesses) and if it were not for the curvature of the Earth and the exponential decay of air density with height the Sun would not be seen at all.As an aside, this would be the situation on a large planet such as Jupiter, even if that planet did not have an opaque atmosphere.

Air, and the particulates it contains, does many other things: it reflects the Sun's rays back into space; it scatters light, and once it is warm it re-radiates at much longer wavelengths to give us some warmth, even when the Sun is not visible.

The Earth move in an ellipse around the Sun, which brings the two closest together in the first week of January. This has the effect of making winters slightly warmer in the northern hemisphere, other factors being equal.

Of much more importance is the daily rotation of the Earth, and its inclination angle with respect to the ecliptic. To begin with, whereas a square metre of surface normal to the Sun's rays receives a maximum power of about 1.35 kilowatts in outer space, this is reduced by what is termed the *projected area*, which is itself a function of the time of day and the inclination.

To show just how important the inclination is, if it were 90° the poles would receive 24 hours of sunshine, with the Earth vertically overhead at the North Pole on the 21st June, and at the South Pole on the 22nd December.

It should now be obvious that the Earth's inclination of 23°. 45, combined with the daily rotation, can play interesting tricks on the received Sun energy.

All these factors have been included in a small computer program, and the amount of energy reaching the Earth has been calculated with day of the year and latitude as the variables.

The various quantities that were uses are as follows:- »»

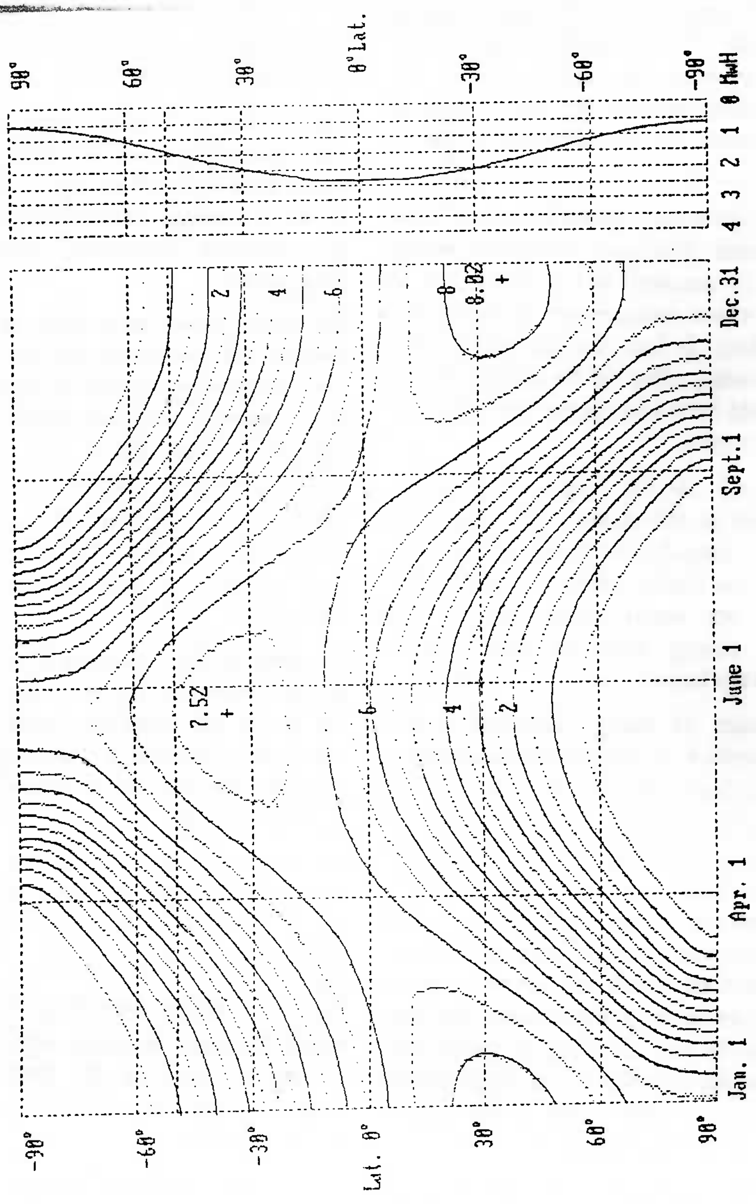


Fig. 1. Daily solar energy (in KWH) at Earth surface.

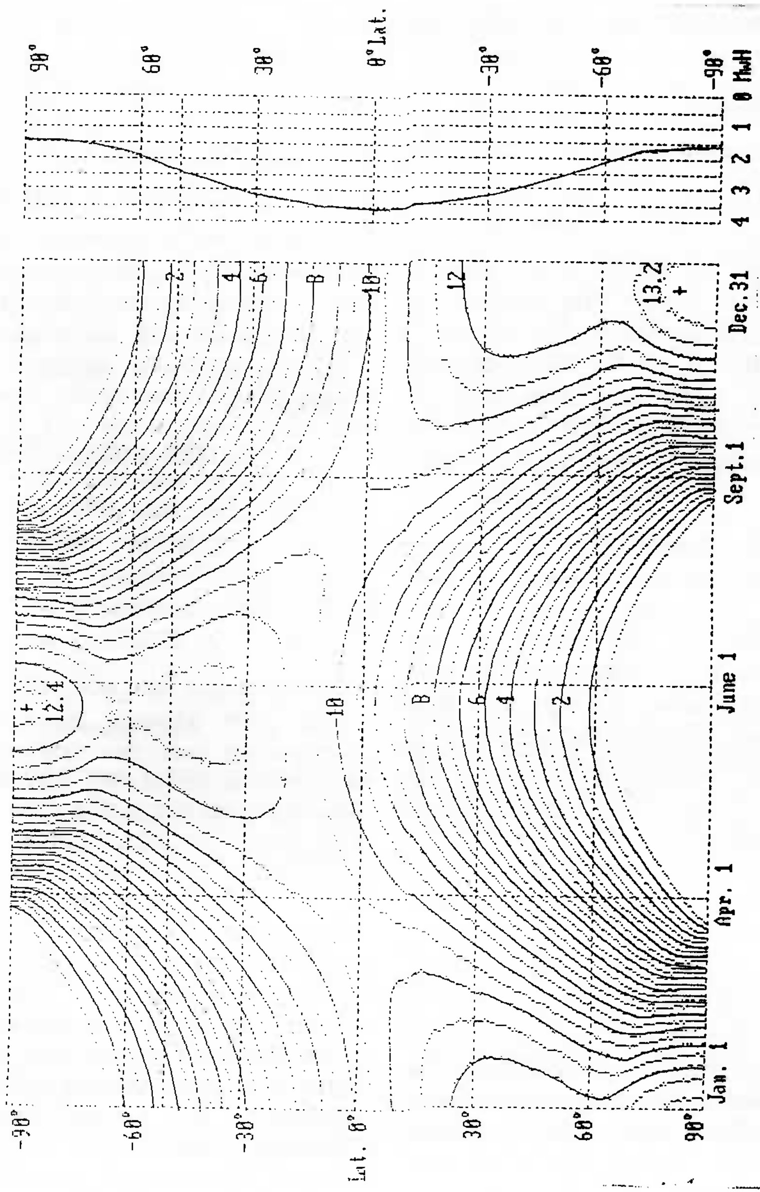


Fig. 2. Daily solar energy (in KWH) at Earth surface, no air attenuation.

Solar Constant	=	1.35 Kw/m^2 at mean Sun distance
Mean Sun distance	=	149.67 x 10^6 Km
Ellipticity	=	0.0167
Inclination	=	23°.45
Atmosphere	=	8 Km effective, exponential decay with height
Attenuation	=	x 0.75 per 8 Km effective thickness (very clear day)

The results are shown in the form of contours of constant Sun energy, but before discussing them some words of caution: they are but one factor affecting the climate, others being cloud cover, the nature of the surface (sand, for example, reflects the Sun's rays back into space quite strongly), winds and ocean currents.

Above all, remember that air acts as a blanket to prevent surface heat from radiating back into space. Also, calculations of this nature involve approximations, the most important being that the attenuation is a sort of average over the wavelength of the Sun's rays. In reality, blue light is attenuated more than ref, and near infra red is hardly affected, so the the Sun appears red at low elevation angles and the attenuation factor is not quite as simple as is assumed.

Look at Figure 1. The first surprise is that the tropical areas do not receive the most energy per day (which can be thought of as sunshine strength hours, or just Sun for short), and, indeed, their maximum is not at midsummer but around the equinox. The most Sun actually occurs at a latitude of 30° - 40°.

What is more surprising is the small difference between summer in the polar regions and winter in the tropics – in fact, if one were so disposed, one could follow the Sun all the way from the north pole to the tropics and back over a period of one year and receive a constant amount of warmth!

Notice two other points. The southern hemisphere has rather more Sun in summer than we do (because the Earth is closer to the Sun) and Guernsey, whose latitude has been shown specially, has more Sun (potentially!) than much of the winter tropics for a good three months of the year.

Attached to the right side of Figure 1 is a small graph showing the total energy received per year, this time expressed in megawatt-hours (MwH). Now we can see that the polar regions receive much less energy over the whole year, something that does make sense.

As already explained, the atmosphere has quite an effect on what we receive at the surface of the Earth. To show just how strong it is, Figure 2 is calculated in the same way as Figure 1, but without air attenuation. The contours represent quite accurately the energy above the atmosphere, which acts as a climatic "motor" for the upper atmosphere. Not only is the amount of Sun much higher, but the maxima are, for all practical purposes, at the two poles.

More to the point, life as we know it would be impossible, as the temperatures would soar. To make the point, the Moon has temperatures that range typically from minus 150°C to above 100°C.

Strangely, Figure 2 does give a reasonably accurate picture of potential Sun at the top of Mount Everest (Lat 28°), which again shows just how important the atmosphere, or in this case, the lack of it, is.

There are two planets in the solar system rather similar to the Earth: Mars and Venus. Mars has the same inclination, but is further from the Sun, has a somewhat greater ellipticity, and has a very thin atmosphere. Venus has a slightly greater inclination (32°), but is nearer to the Sun and has a very dense atmosphere.

Mars would have contours similar to Figure 2, suitably reduced in value. The high values at the poles explain why the polar caps of that planet disappear during the summer. Because there is little atmosphere, there are no moderating influences, and the temperatures have extremes unknown to Earth.

In the case of Venus, Figure 2 would be an approximation after a suitable scaling, but Figure 1 cannot be applied because direct sunlight scarcely penetrates to the surface and the atmosphere acts as a blanket. Almost all the Sun's energy is absorbed by the atmosphere and is re-radiated at longer wavelengths. The temperature at the surface reaches several hundred degrees Celsius because of this. ☆

Ray Schemel

RAS meetings

On the 8th December 1995 I attended a day of meetings at the Royal Astronomical Society. Firstly, two concurrent series of meetings were held, each lasting from 10.30 am to 3.30 pm, with a one-hour break for lunch. One series was on *meteorite research*, while the other was on *low mass star forming regions*. It was, therefore, not possible to attend all the meetings, and I had to be selective.

I heard Dr Ian Halliday of Ottawa discuss the results of photographic observations of fireballs, with special reference to the Innisfree meteorite in Canada, of which nine pieces were found. This was particularly interesting to me as the site of the meteorite fall had been pinpointed by an automatic photographic network, similar to the Prairie network which the Smithsonian Astrophysical Observatory operated when I worked for it in the 1960s.

It was also interesting to learn that some of the meteorites had suffered cracks from previous collisions in space. The objects were found to fragment as high as 50-60 km, the light extinguishing at an altitude of 30 km. Their entry velocities were of the order of 18 km per second, and those that struck the Earth as meteorites did so about two minutes after the fireball.

Between 1970 and 1985 as many as 1000 fireballs were photographed by the Canadian network. They were typically seen at about 6.00 pm, with perihelion points close to the Earth's orbit.

One of the objects recovered by the team was a ten-inch titanium sphere from a Russian Cosmos satellite. This had been reported as a UFO, with some people saying that it responded when they flashed their headlights at it!

Professor I P Williams of Queen Mary and Westfield College, London, spoke further on the Innisfree meteorite. During his talk he pointed out that the position of Jupiter had been known only to about one second of arc in 200 years of observations. In 28 million years this would amount to an error of 30°, so it was difficult to analyse the effects of Jupiter on the long-term orbits of meteoroids.

Dr M K Wallis of the University of Wales, Cardiff, who works with Professor C Wickramasinghe on the controversial theory about life emanating from space, gave a talk on the possibility that meteorite impacts on the Earth could eject material which could escape from the Earth, and that life on such material could colonise other bodies in the solar system.

He gave figures showing that bacteria could survive at a considerable range of temperature and pressure. Impacts with velocities in the region 20-30 km/second would eject millions of cubic metres of material, which could go into orbits which cross those of Venus or Mars.

He had calculated that the Venus-crossing orbits would be easiest to achieve, therefore making a secondary impact with Venus dynamically easy. However, the survivability would be low. By contrast, although it would be more difficult to have secondary impacts of Earth-ejected material on Mars, the survival rate would be high.

He concluded by quoting Malesh (1988): "*We should no longer be looking at planets as biologically isolated.*"

One of the most interesting talks was by Dr J Murray of the Open University. He had analysed grooves which appear on Phobos, one of the two moons of Mars, and had concluded that they had been caused by material ejected from Mars by meteorite impacts. Material ejected from Mars at a velocity of 4 km/second would cross Phobos's orbit. He pointed out that of all the satellites in the solar system, Phobos is the closest to its parent planet, in relation to its size.

In the other, concurrent meeting, about low mass star forming regions, Professor T Ray of the Department of Industry and Science spoke on imaging of young stellar objects by the Hubble Space Telescope. He concentrated on the detailed analysis of jets in Herbig-Haro objects (small, bright nebulae).

These two meetings were followed by the "Ordinary Meeting", with five interesting talks. Professor George Isaak spoke on global solar oscillations, describing the Sun as the "Rosetta Stone" of stellar physics and cosmology. He concluded that the solar standard model was not exactly correct, and that the Sun should be aged by 15%. This would mean that our ideas of cosmological evolution are not sound.

Dr Sarah Russell talked about interstellar grains in meteorites, including the formation of diamonds.

These meetings coincided with the 200th anniversary of the first meteorite recognised in Britain, the Wold Cottage meteorite, which landed in Yorkshire on the 13th December 1795. A fascinating, and amusing, illustrated talk was given on the characters associated with this meteorite, which included Sir Joseph Banks and Lady Hamilton.

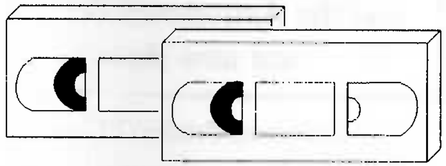
Professor D Winch of Sydney talked about the Oersted satellite, which is to be launched to study the Earth's magnetic field. »»

The final talk was by Dr Michael Edmonds of Cardiff, on the *face of Betelgeuse*. He questioned the veracity of speckle interferometric images which show hot spots on the surface of the star. He used the 4.2-metre William Herschel telescope in the Canaries, taking about 1000 CCD observations in a single night. His conclusion was that Betelgeuse has a single spot some 1000 times hotter than most of the disc.

An interesting day was concluded by a glass of wine at the RAS headquarters. ✩

David Le Conte

Videos



Don't forget that we have a number of videos available for rent by members (£1.00 for two weeks).

Two new videos are available:-

The Making of a Monument *22 mins*

This video, made by the Guernsey Educational Technology and Resources Unit (GETRU), covers the development of the Liberation Monument, from its concept to its completion and unveiling. It includes the significant part played by the Astronomy Section.

Liberation *55 mins*

GETRU also made this video, which includes footage of the Liberation Monument. It covers Guernsey's liberation celebrations, accompanied only by music, without commentary.

The other videos available are:-

The Man Who Colours Stars *50 mins*

The life and work of David Malin, the world's top astrophotographer.

Christmas Star *50 mins*

Theories about the star of Bethlehem.

The Universe *30 mins*

A NASA film about the solar system, star birth, galaxies, black holes, etc.

The Voyager Missions *30 mins*

The Voyager spacecrafts' visits to Jupiter, Saturn, Uranus and Neptune.

The Dream is Alive *37 mins*

A window seat on the Space Shuttle, shot by astronauts. Spectacular IMAX images.

For All Mankind *77 mins*

NASA footage of the manned Moon flights. ✩

National Astronomy Week

NAW'96 has been announced, to take place from the 21st to the 28th September. It marks the 150th anniversary of the discovery of Neptune, but it also coincides with a total eclipse of the Moon, and Saturn at opposition. Jupiter will be visible in the evening, with Mars and Venus as morning objects.

The Astronomy Section is planning a series of events for NAW'96, some of them open to the public.

NAW'96 will also be campaigning against poor quality telescopes and binoculars.

The next NAW will be in August 1999 – the total eclipse of the Sun. ✩