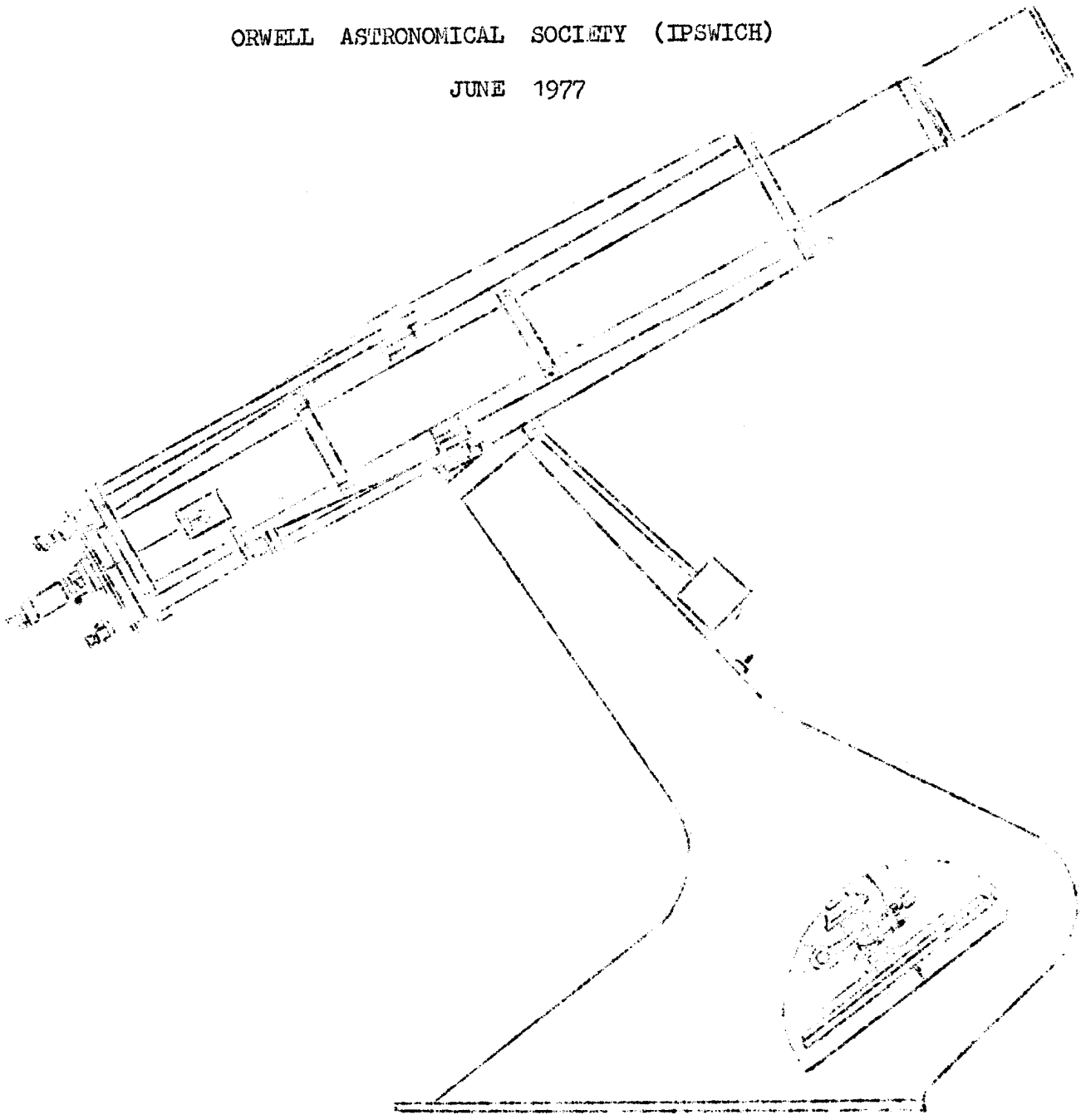
O.A.S.I.

Journal

of the

ORWELL ASTRONOMICAL SOCIETY (IPSWICH)

JUNE 1977



Editor: Mr. Mark Howe,
[redacted],
BURY ST. EDMUNDS,
Suffolk.
'Phone Bury St. Edmunds [redacted]

THE NIGHT SKY as seen from Orwell Park this month.

The large constellation Hercules is on the meridian near midnight; it is a dim constellation with no star brighter than mag. 3, but is notable for containing M13, the only naked-eye globular cluster visible from our latitudes: it may be glimpsed 2/3 of the way from zeta to eta. Below it is an even dimmer constellation, Ophiuchus, which contains part of the ecliptic; Ophiuchus is flanked on either side by the disjoint parts of Serpens, the Serpent, which in mythology has just been slain by Ophiuchus. The long, winding constellation Draco is in the zenith.

THE SUN

Sunrise is at 03h40m at the beginning of the month and again at the end. Sunset changes from 20h10m to 2030, the Sun passing from Taurus to Gemini during, the month.

THE MOON Phases

Full Moon	June 1d20h31m
Last Quarter	June 8d15h07m
New Moon	June 16d08h37m
First Quarter	June 24d12h44m

Note: perigee occurs at 15h on June 1st, i.e. only 5 hrs before Full Moon. Research indicates that TLPs (Transient Lunar Phenomena) occur more often when these two coincide, so it may be worthwhile keeping an extra eye on the Moon at that time.

Occultations

Star	Phase	Mag.	Time
2764	R	6.3	4d00h19.8m
1685	D	4.5	23d22h06.1m
2053	D	4.6	26d22h35.0m

D=disappearance, R=reappearance. Stars are listed according to Zodiacal Catalog (ZC) numbers.

THE PLANETS

Mercury may be seen as a morning star this month reaching a maximum of mag. -1.2 at the end, although, the best time to see it will be nearer the beginning of the month when its elongation is greater(see Jupiter).
Venus, also a morning star, will be 1.2°S of Mars on the 3rd when its elongation will be 45° and its magnitude -4.0.
Earth is at summer solstice on the 21st. at 1214, when daylight will last 16hrs and 10mins.
Mars passes through Pisces and Aries, still very dim at mag 1.3.
Jupiter is in conjunction with the Sun in Taurus on June 4. There is also a conjunction with Mercury on the 20th., when the planets will be only 0.1° apart.
Saturn is still in Cancer and still getting dimmer, decreasing from mag. 0.6-0.7 during the course of the month.
Neptune is at opposition on June 5, when it will be mag 7.7 and its apparent angular diameter will be 2.5".

Source: BAA Handbook 1977. Please note all times UT (=BST-1h).

* * *

Any Articles of an astronomical nature will be gratefully accepted for inclusion in the Journal. Please send them to the Editor, or direct to Roy Cheesman if after mid-month.

FROM OTHER JOURNALS

Politics - Certain equatorial nations have been laying claims on the part of the sky above them which may be occupied by a satellite in a geostationary orbit (ie. one in which a satellite makes one revolution every 24 hrs, thereby appearing stationary over a single country). The claim rests on the assertion that the gravitational pull of the ground beneath has a special influence on a satellite in such an orbit!(Nature-Times News Service).

Jupiter - Earth-based and Pioneer observations of Jupiter indicate that the Great Red Spot is indeed a cloud formation 2-5 km above the rest of the planet, formed by a deep region of convection, similar to the light Zones. A similar model can also be used to explain the smaller oval spots often seen on the planet(BAA Journal).

The Crab Nebula - A gamma-ray telescope has discovered a new line in the Crab pulsar's spectrum. The emission is due to annihilation of positrons and electrons and is radiated at 511 keV; but,it has been detected at a red-shifted value of 400 keV. From this it has been calculated that the mass of the pulsar is approximately 1.4 solar masses (since redshift depends on the magnitude of the gravitational field)-New Scientist.

BOOKS

Astronomy with Binoculars (James Muirden). A new edition of this classic book has recently been released by Faber&Faber of London. The price is £2.75 (paperback) and the book includes sky maps, prediction tables and constellation notes.

Discover the Sky with Telescope and Camera (Richard Knox). This new book costs £4.95 and according to W.E. Pennell in the BAA Journal "it should be a good choice for anyone taking the first steps." It contains a brief introduction to astronomical photography.

OTHER NEWS

The 1977 out-of-London meeting of the BAA will be held on Saturday September 17 at the Coventry Technical College, The Butts, Coventry at 2.15 pm. Further details: Mr. E.F. Nicholls, Hon. Sec., Coventry & Warwickshire A.S., [redacted], Earlsdon, Coventry, CV5 6LU.

The BAA is arranging a weekend course on "Astronomy Today" at the Wilfred Hall Observatory near Preston beginning Friday September 30. The inclusive charge will be in the region of £13 (open to people over 16 only). Further details: Dr. VV Barocas, Jeremiah Horrocks Observatory, Moor Park, Preston PR1 6AD.

CROSSWORD

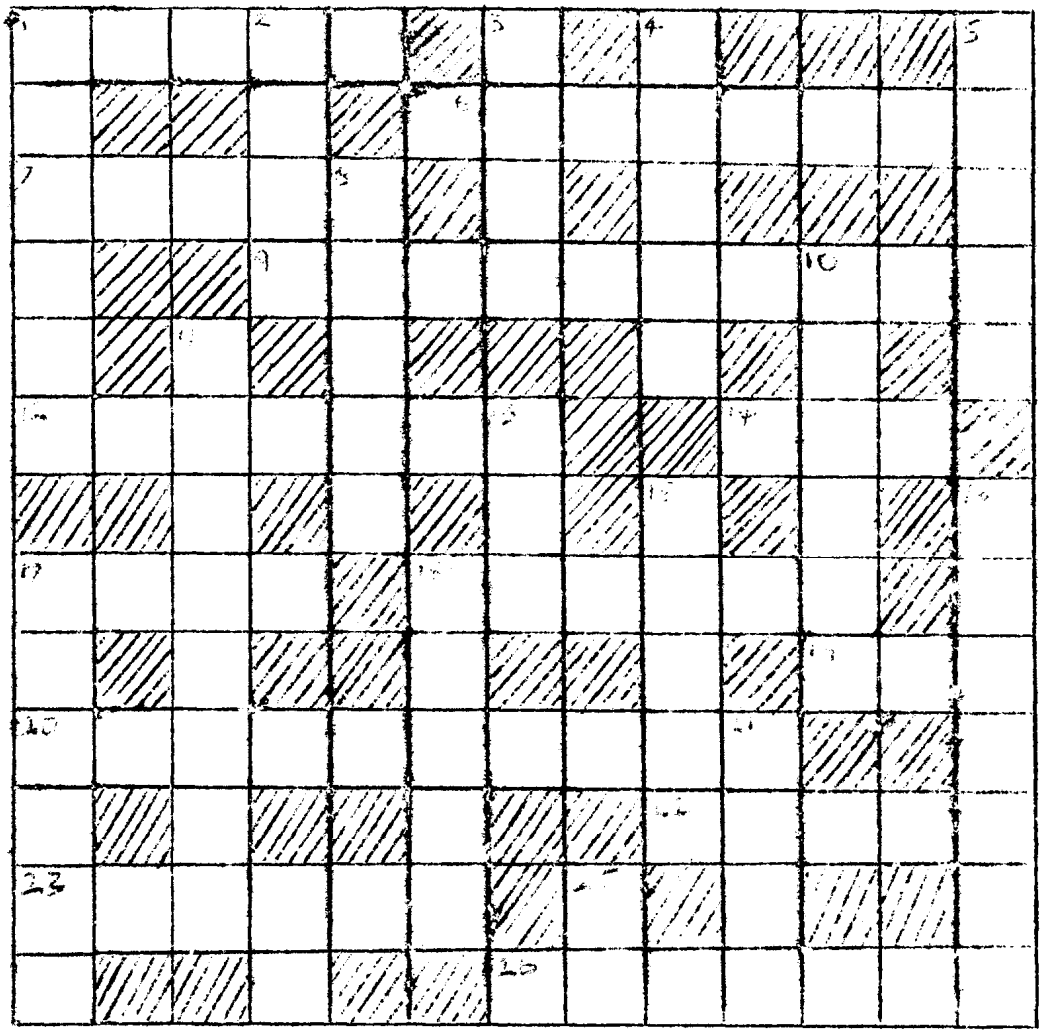
This month we have another excellent crossword compiled by Mr. P. Burt of Needham Market.

ACROSS

1 - First minor planet to be discovered; 6 - Well-known star cluster; 7- prototype of the eclipsing binaries; 9- Stellar catastrophes; 12- Central point of a meteor shower; 14- The altar; 17- Triple star in Bootes; 18- Effect caused by the solar wind; 19- Prominent Spring constellation; 20- Telescope mount; 22- Astronomer who forwarded the Steady-State theory; 23- Celestial body discovered by Herscel; 26- Accurate.

DOWN

1- Constellation hit by a meteorite? 2- Minor planet which made an important approach in 1931; 3&4; Type of star; 5- Light similar in appearance to Earthshine; 8- Phases also shown by Venus; 10- Spring equinox; 11- Small Jovian satellite; 13- Gk. letter; 15- Vega is on this horizon during Winter evenings; 16- Red stars are this, temperature-wise; 17- Minor planet with greatest orbital eccentricity; 18- The first point is no longer here; 21- Unit of R.A. 24-Gk. letter; 25- Probable cause of Jovian radio emission.



EDITORIAL: Is Our Universe a Black Hole?

Popularly, the terms "black hole" and "singularity" are interchangeable; however, a definite distinction can be made between the two. A singularity is an object in which the matter is concentrated at a single mathematical point whereas a black hole is merely a region of space where the gravitational field is so great that not even light can escape. Hence a black hole can exist without a singularity , but a singularity may only be found within a black hole. Furthermore, we may make a distinction between an'ordinary'black hole and a 'relativistic' black hole; the former could have been predicted from Newton's theory of gravitation, whereas the latter demands the much more complicated General Theory of Relativity.

I intend to follow in this article the Newtonian ideas (because I have no inkling of the theory behind General Relativity) and show that our Universe must indeed be a black hole. First we must define the escape velocity, v, of a body in a gravitational field as

$$v^2 = 2GM/R$$

G= a constant
M= mass of attracting body
R= radius of " "

Our definition of a black hole demands that c, the velocity of light, must be less than the velocity of escape, ie:

$$c^2 < 2GM/R$$

Now the density of an object, ie the mass/size ratio, is

$$\rho = M/V$$

V= volume of body

$$M = \rho V$$

hence $$c^2 < 2G\rho V/R$$

But, assuming the body under consideration to be spherical,

$$V = \frac{4}{3}\pi R^3$$

$$c^2 < \frac{8\pi}{3} G \rho R^2$$

rearranging, $$\rho > \frac{3c^2}{8\pi G} \times \frac{1}{R^2}$$

we may call the 'critical density', since if a body is denser than this it will be a black hole, but if less dense it will be a 'normal' star. The equation shows that this critical density depends only on the radius of the body, all other terms on the RHS being constant. It also shows that the bigger the object is, the smaller this density needs to be for a black hole to be formed.

We have come to think of a black hole as being extremely dense since scientists usually only consider small black holes (ones which have been formed following the collapse of a star), and hence the critical density is extremely large.

If we substitute the value of the radius of the Universe in for R, the right hand side reduces to zero, since the radius is infinite and its reciprocal is therefore zero. Hence

$$\rho > 0$$

is the critical density of the universe. But we know that the density of the Universe is more than zero since there is some matter inside. Thus the Universe must be a black hole.

However, perhaps we didn't need to prove it by such a circuitous route for, if the Universe <u>weren't</u> a black hole, and light could escape from it, <u>where the hell would it go?</u>

EXOBIOLOGY pt.4

<u>Venus</u> (cont.)

On the other hand, the conditions in the upper atmosphere of Venus may be less severe. Infra-red observations show that in this region could be much less than at the surface. One could imagine microbes or even larger animals swimming around in the upper layers (buoyed up by the dense atmosphere?).

A phenomenon which has been observed many times in past years is that of the Ashen Light. This is a faint, ghostly luminance that appears on the part of Venus which is not lighted by the Sun. It was once suggested that the light could be caused by numerous cities inhabited by civilized Venerians. In the light of what we now know this seems unlikely but is it not possible that a simple form of life in Venus' atmosphere could be causing this phenomenon? After all, there are bacteria on Earth which emit enough light to be photographed by. Personally, however, I believe that a more mundane explanation probably exists.

CROSSWORD ANSWERS

<u>Across</u> 1- Ceres; 2- Pleiades; 7- Algol; 9- Supernovae; 12- Radiant; 14- Ara; 17- Izar; 18- Aurora; 19- Leo; 20- Altazimuth; 22- Hoyle; 23- Uranus; 26- Correct.

<u>Down</u> 1- Crater; 2- Eros; 3- Blue; 4- Giant; 5- Ashen; 8- Lunar; 10- Vernal; 11- Adrastea; 13- Tau; 15- North; 16- Coolest; 17- Icarus; 18- Aries; 21- Hour; 24- Nu; 25- Io.

METEOR NOTES by David Barnard, Section Director.

The ETA AQUARIDS Meteor Count last month was totally washed out by heavy rain. Six members did however turn up.

This month sees the culmination of a fairly active stream, the JUNE LYRIDS, maximum on June 15th, about eight meteors per hour, Normal limits June 10th to 21st. This shower is favourable for observation this year and the stream consists of bluish meteors. Another shower which is active this month is the OPHINCHID shower but these are rather too low to be seen well. This stream has a Z.H.R. of about 6 and the declination radiant is $-35^{\circ}5'$

MINOR SHOWERS THIS MONTH, there are no minor showers this month.

DAYLIGHT SHOWERS THIS MONTH.

There are three minor showers this month and are:

1. June 8th, Epsilon Arieds, 60 meteors per hour, Normal limits May 29 to June 18th
2. June 8th Zeta Perseids 40 " " " June 1st - 16th
3. June 27th Beta Taurids 25 " " " June 24th -July 5th

METEOR COUNT

We will be holding a meteor count to observe the JUNE LYRIDS SHOWER on SATURDAY 18th JUNE meeting outside the Golf Hotel, Foxhall Road, Ipswich at 10p.m.

Do not forget to come along for a few hours.

NEWSDESK by David Barnard, [redacted], Ipswich.

HOW OLD IS THE UNIVERSE?

A new method for determining the age of the universe has arrived at an age of 10 - 15 billion years. The method calculates the element rhenium in the universe from its present abundance ratios of the various isotops of the elements. This technique uses the same principle as carbon dating. Carbon dating uses carbon-44 (relative to the stable carbon -12) in which $t\frac{1}{2}$ ($t\frac{1}{2}$ = half life) = 5000 years. The rhenium universe dating method uses rhenium -185 - $t\frac{1}{2}$ = 40 billion years. The stable isotope rhenium -185 was formed in early supernova (some 10 - 100 million years after the 'Big Bang'). The actual problem is knowing the ratio of rhenium -185 to rhenium -187.

This actual age of the universe does not add too much precision with which we know the age of the universe. Perhaps the method may be more accurate once we have a better understanding of the nuclear processes in supernova.

GAMMA RAY LINE GIVES MASS OF PULSAR IN CRAB NEBULA (M1)

X-ray telescopes has detected a spectral line in the Crab Pulsar, Mass is about 1.4 solar masses (if hypothesis is correct)

Cygnus X1 affirmed as a black hole candidate.

The possibility for a companion for the X-ray star system Cygnus X1 is now great because of observations made from Kitt Peak Orbital analysis has indicated that Cygnus X1 has an invisible component of 8.5 solar masses. There could be a third component of 1.5 solar masses, i.e. a neutron star. So this star is a top candidate for a black hole in our galaxy.

QUASARS MAY BE GIANT MAGNETS.

Quasars may be energised by massive rotating magnets. Two Russian physicists point out that certain quasars show a cyclic behaviour that is explained by a rotating nuclei. Although massive 'spirals' are not new to extragalactic theory, evidence for them is now apparently stronger than ever. These two physicists claim that the N-type galaxy 3C 371 has a period of 163 days and an amptitude of over a magnitude (250%) and that the Seyfert Galaxy NGC 4151 fluctuates over a time scale of 130 days.

NEWSDESK continued

QUARKS CANNOT STABILISE COLLAPSING STARS.

Can Quarks provide enough pressure tohalve the collapse of a dying star and thus frustrate the implosion of a black hole? This question is answered by two physicists from Texas. They think that quark stars may well exist.

Advances in particle physics and general relativity now make it possible to predict how matter composed entirely of the basic constituents called quarks will behave. The models indicate that densities exceeding 7×10^{19} kg $m^{3}m^{-1}$ per cubic meter. A phase transition switches the matter from baryons to huge 6 GeV quarks. These particles can exert a degeneracy pressure, rather like a gas of electrons or nuitrons.

Massive quark stars must probably be unstable. Any radial disturbance will feed on itself and send the star crashing into its own gravitational well to make a black hole.

HERSCHEL SAW RINGS AROUND URANUS IN 1787.

The recent observations of Uranus' ring system may have been seen long ago by Herschel, but more likely due to faulty optics as on 4th February 1797 Herschel wrote in his log book 'no appearance of any ring'. But then Herschel thought that Uranus was not round - a sort of double ring . Then he rotated the mirror by 90°, he still saw the ring. The ring did not move - he again turned the mirror of the telescope. Then he had a new mirror made for his telescope and the ring disappeared. He observed the planet again in 1794 and again in 1795 for the ring but to no avail.

BAR SWEEPS THE GALAXY CLEAN.

The old stars near the centre of the galaxy are supposed to be arranged into a short bar, like a miniture barred spiral galaxy. This short stellar bar sweeps dust and gas from the area between the galactic centre and the surrounding ring to the very core of the galaxy, like a cosmic vacuum cleaner. As the bar rotates, the shock waves at its leading edge forces interstellar material towards the galaxy's core. Shocks at the other end of the bar force other gas to spiral slowly outwards. This seems to be true.

BOOKS IN JUNE.

'Pulsars' by F.G. Smith (Cambridge Universal Press) Price £9.50

This book is about the original discovery of Pulsars and radio observations in general.

'DISCOVER THE SKY WITH TELESCOPE AND CAMERA' by R. Knox (R.Morgan) price £4.95

'THE SOLAR PLANETS' by V.A. Firsoff (David and Charles) price £3.95

This books tells of recent space probes by the famous planetary-lunar observer. Emphasis on inner solar system, largely a personal view and controversial.

'SCIENTIFIC AMERICAN' (pick of the month)

Volume of the solar system (Scientific American Press) This book is of excellant value (no details on price yet)

'TIME, SPACE AND THINGS' by B.K. Ridley published by Penguin priced at £1.75

Physics and the universe in simple structures.

ORWELL ASTRONOMICAL SOCIETY'S NEWS.

STAMPED ADDRESSED ENVELOPES:

Please note that those members who receive their Journals by post that when more stamps are required that they should send stamps only to cover Journals. Please do not send stamped envelopes as the Society has a large supply of envelopes and that by posting envelopes this increases the postage required by you to send the envelopes to R.M. Cheesman. This little memo is because last month he had to pay excess postage on two occassions of 30p to the postman.

CAMBRIDGE TRIP ON SATURDAY 28th May.

We are sorry that so short notice was given to members about the trip to Cambridge but we did not hear from Dr. Dewhirst until 11th May. Full details of the visit will be in next month's Journal.

PROPOSED TRIP TO SCIENCE MUSEUM LONDON.

In conjunction with the Ipswich Geological Group we propose having a trip to London on SATURDAY 1st OCTOBER, 1977 to the Science Museum and other places in London of astronomical interest. At the moment cost is unknown but anyone interested in coming to London either to the museums or to fill the bus up for a day out should contact Mr. R.M. Cheesman, [redacted], Ipswich as soon as possible so that we can make the arrangements.

SOCIETY'S NEWS continued by R.M. Cheesman.

OPEN COMMITTEE MEETING

On Wednesday 29th June at 7.30p.m. we are holding an Open Committee Meeting at the Observatory which will be followed by an astronomical 'talk in'. All members are invited to discuss the Society and plans for the future. Please come along and air your views on the Society and help to suggest things to make the Society run smoother to get more people involved.

BIRDS NEST.

In the transit room in the Observatory we have a birds nest with four eggs. Every year we have birds trying to build nests somewhere in the observatory (generally in very inconvenient places.) As this nest is in the transit room we have let it stay. More news of mother bird and family next month!

WORK AT THE OBSERVATORY.

As the nights are now pulling out the amount of astronomical studies at the Observatory will be limited but some members will continue to run their nights at the Observatory for Solar Work and for redecorating the Observatory. As you know, every year we set some time aside for this massive task and we hope that as many members will continue to come to the Observatory (in their old cloths) to help.

WEEK LONG METEOR COUNT

As reported in last month's Journal Mr. N. Gage, [redacted], Felixstowe, 'phone Felixstowe, and Mr. D. Barnard, [redacted], Ipswich, 'phone Ipswich [redacted] and many members have shown interest. If you would like to go to this meteor count or would like further information please contact either Mr. Gage or Mr. Barnard. The week for this count is week commencing 23rd July. If any member has a TENT which they could borrow for this week they would greatly appreciate it.

DUPLICATOR:

The Society has just purchased a 'new' second hand ink duplicator which will be left in the Observatory. Please do not touch it. The Society now has two duplicators, an ink duplicator for the Journal and a 'Banda' spirit duplicator for printing posters.

FOR SALE

8¾" aluminized mirror and matching 1.4" diagonal. Gives good performance up to 200x.

give away price of only £45.

For further details please contact Mr. M.J. Harlow, [redacted]
Felixstowe, Telephone Felixstowe [redacted].

R.M. CHEESMAN'S OFFICE TELEPHONE NUMBER.

Please note that those members who contact the Chairman at work should not ring that number after Friday 17th June as he is moving into another office. The new number will be published in next month's Journal.

DO NOT FORGET THE METEOR COUNT

on SATURDAY 18th JUNE to observe the JUNE LYRIDS.

Meet outside the Golf Hotel, Foxhall Road, Ipswich

at 10p.m.

for further details please contact the Director:

Mr. D. Barnard
[redacted],
IPSWICH
telephone Ipswich [redacted]

ORWELL ASTRONOMICAL SOCIETY (IPSWICH)

programme for JUNE 1977

AT ORWELL PARK OBSERVATORY, NACTON

MONDAYS from 8.p.m. General Observations Section
Director Mr. N. Gage, [redacted], Felixstowe, Tel.Felixstowe [redacted]
and Mr. S. Flory, [redacted], Ipswich Tel. Ipswich [redacted]

13th June
20th "
27th "
4th July

WEDNESDAYS from 7p.m. Solar, Lunar & Planetary Section
Director Mr. R.M. Cheesman, [redacted], Ipswich

1st June
8th "
15th "
29th "

THURSDAYS from 8p.m. Double Stars Section
Director Mr. D. Bearcroft, [redacted], Ipswich, Tel Ipswich [redacted]

9th June
23rd "

FRIDAYS from 8p.m. Variable Stars Section
Director Mr. R.S. Manning, [redacted], Ipswich, Tel. Ipswich [redacted]
and Mr. M. Siggers, [redacted], Ipswich

10th June
24th "

OPEN COMMITTEE MEETING

There will be an Open Committee meeting at the Observatory on WEDNESDAY 29th JUNE starting at 7.30p.m. followed by an astronomical 'talk in' All members welcome.

METEOR SECTION director Mr. D. Barnard, [redacted], Ipswich 'tel Ipswich [redacted].

JUNE LYRID METEOR COUNT on SATURDAY 18th JUNE

Meet outside the Golf Hotel, Foxhall Roa , Ipswich at 10p.m. irrespective of weather conditions.