SOCIETY NEWS

1. Field trip to observe a partial eclipse of the sun.
   A partial eclipse of the sun will be visible from Australia on April 9th. This field trip has been fully booked.
   As you read this month's newsletter two of our members, Roy Cheesman and Alan Smith, will have swanned off to the Antipodes to experience the pleasures of the Australian Outback. They will be setting a never to be beaten distance record for a society field trip, to observe this partial eclipse of the sun. Unsubstantiated rumours infer that they also expect to observe a COMET!
   We wish them a safe journey and look forward to a full report on their return.
2. At the time of writing it had not been decided whether or not the observatory would be opened to the public again, for a last chance to observe Halley's Comet at the end of the month. A decision will have been made at the committee meeting held in March. Details can be found at the **observatory.**

NIGHT SKY

Constellations (all times G.M.T.)
The spring constellations of Leo, Virgo, Bootes, Hercules, will become well placed for observation.

Sun Rises between 05.40 to 04.40
Sets between 08.30 to 19.30

Moon 1st 9th 17th 24th

Occultations

11th	ZC 457	mag. 6.5	D	20hr.6.6m
19th	" 1393	" 6.7	D	0hr.58.3m
20th	" 1596	" 7.0	D	21hr.8.4m.

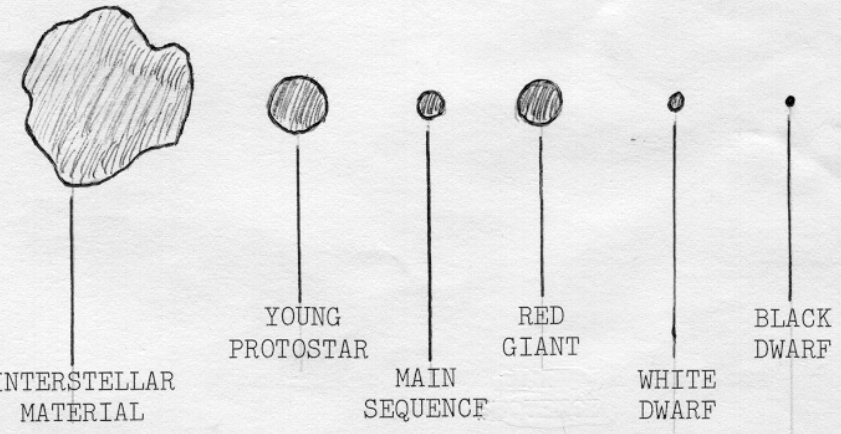
Mercury Greatest western elongation on the 13th 28° will be difficult to see in morning twilight mag.0.3
Venus Conspicuous object in evening sky, sets about 2 hours after sunset mag.-.3.9
Mars Visible in the morning sky. Rises at about 01.00 mag. -0.3
Jupiter Visible in morning sky. Rises tween 1 and 2hours before the sun during the month. mag.-2.1
Saturn Rises at 22.30 in mid month. mag.0.2
Uranus Rises at 00.00 in mid month. mag.5.8
Neptune Rises at 00.50 in mid month mag. 7.7

ASTRONOMICAL TERMS.

STELLAR EVOLUTION

Stellar Evolution is the way a star proceeds through its life cycle from 'Birth' to 'Death'.
A star of about the same mass as the Sun begins as a cloud ofInterstellar Material probably a light year in radius. Then the cloud contracts so that after a few million years it is down to about the size of the Earths orbit and has a temperature of about 2000K. When it reaches this stage it is known as a YOUNG PROTOSTAR. Then for a short time the luminosity increases to several hundred times the Suns' present value.
Next the Star contracts to the Suns' present size and brightness, whichis called the MAIN SEQUENCE and can last for 10,000 million years. The Sun is now about half-way through its Main Sequence so we don't have to start worrying for a long time.
When the core is exhausted of Hydrogen Fuel it contracts under its own weihght and the Hydrogen burning reaction spreads outwards. The luminosity increases ans it expands into a Large Luminous cool Star called a Red Giant. A Star remains a Red Giant for a comparitivly short time compared with its Main Life, about 100 million years.
As its energy becomes exhausted it will contract to form a hot highly compact object known as a WHITE DWARF and as it cools down it will turn into a non-luminous solid body which is sometimes called a BLACK DWARF.

E. Sims



Clear Skies at Orwell Park Observatory!!

D B Payne

The last two Wednesday evenings in February were clear and not having seen those faint points of light in the sky for some time ("stars" I seem to remember they are called) the Nebula and Faint Objects Section eagerly unlocked the dome room door, on that - "historic"? - night of February 19th. Having removed the various covers from the telescope, opened the dome shutter, made the decision to look at the Orion Nebula first, pointed the telescope in roughly the right direction (one seems to be able to develop a knack for finding objects through the mahogony and copper skins of the dome), the members present awaited the final positioning of the dome aperture over the end of the telescope inorder to receive those long travelled photons from M42.

But, instead of the usual rumble of the rotating dome mingling with the grunts of exertion from the member, or members, turning the dome wheel, there was a loud clunk followed by exclamations something along the lines "it won't budge! @*+$%& @"&$%*+$!!"

Following an in depth scientific investigation which took all of two minutes, it was theorised that the dome must be frozen solid (remember February had been a little on the chilly side). Such a radical hypothesis could not be contended without experimental verification and several members proceded to prove the point by inserting fingers into the drain gutter on the observatory wall. Now, being astronomers skilled in the art of precise observational technique it did not take long to gather, sift, correlate and corroborate the available data and to issue forth a preliminary report summarised as: "it's full of ice and the skirt's frozen in!!".

You can well imagine the fustration, the gloom and despair that settled on that small group of astronomers. The dome shutter was sadly closed, covers diligently replaced and the dome door closed and locked. After huddling around the electric fire in the club room with occasional mumblings like "it's never happened before, not even in 1978!", it was decided that the only possible course of action was to retire gracefully to the Pub.

On the following Wednesday evening (26th February) we were blessed with a second clear night! Of course after the weather that we had been experiencing ever scince the return of Halley's Comet the word clear has to be interpreted quite liberally. If third magnitude stars can be seen without optical aid one tends to think of it as a "good" night. On this particular "good" night there was hazy cloud with interference from the gibbous moon. However we once again eagerly unlocked the dome door hoping for a glimpse of at least some of the brighter nebulae. The dome wouldn't be still frozen solid would it? After all the snow had been thawing in the sunshine of the day. This time we decided to try turning

the dome first. once again we got that fateful "clunk" as the slop in the keyways,bearing and rack and pinion of the dome rotation mechanism was taken up - but, no rotation! After various comments, curses and mutterings Martin Cook decide: Enough is Enough!, and proceded to fetch the 2kW fan heater from the club room. This was played round the base of the dome in the region where most of the remaining ice appeared to be while two members tried to turn the dome wheel. Nobody really believed this was going work but long standing members like Martin have to be humoured, particularly when they are the committee member for maintenance. However after suprisingly few minutes of this treatment the dome turned! The problem was having got it moving did we dare stop? It was decided that if we kept the dome moving with the heat source removed we might wear a track in the ice as it refroze. An improbable theory but it worked and we could observe!

The telescope covers were removed, the dome shutter opened, telescope positioned once again for M42 and the dome rotated to the appropriate position. After final positioning of the telescope there it was in the eyepiece, the Orion Nebula glowing faintly through the hazy cloud that had by now thickened somewhat.

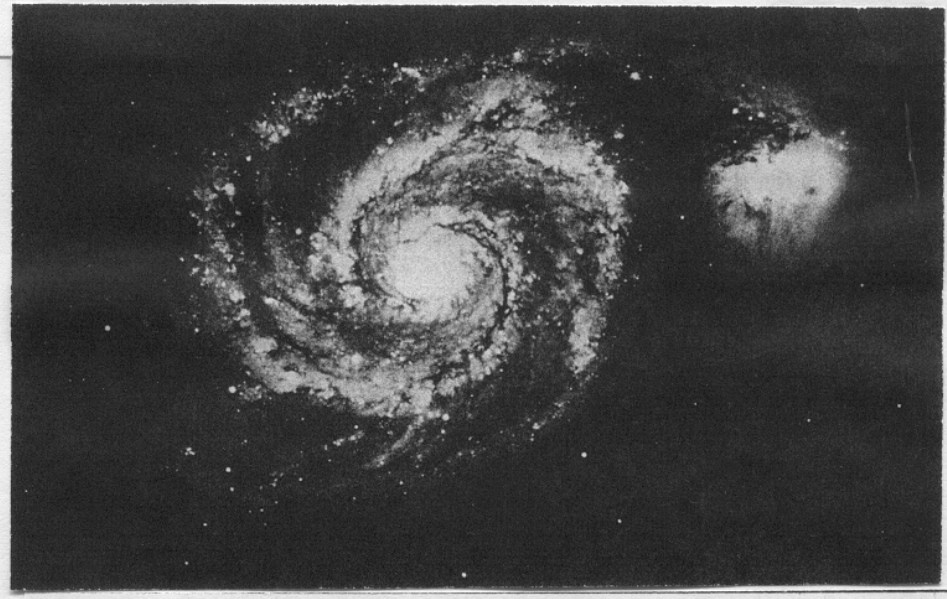
Before the thickening haze obliterated everything we decided to try to observe M46 in Puppis. After appropriate repositioning of dome (still turning) and telescope, followed by several minutes searching and consultation of star maps, M46 was found. Totally unimpressive, only the brighter members of the cluster could be seen and there was no sign at all of the embedded planetary. We moved 1.5 degrees to the west and found M47. The bright stars of this cluster could be seen glowing through the mist the many fainter stars were invisible, the haze, Felixstowe dock lights and the moon had beaten us. Once again after closing up the only thing to do was retire to the 'Ship Inn'.

On the Wednesday evening of 5th March we had another clear sky, the third in succession! And this one was a good one, we could see 4th magnitude stars in the early part of the evening without binoculars! Also this was the week of the thaw after the big freeze and so there was no chance of a frozen dome.

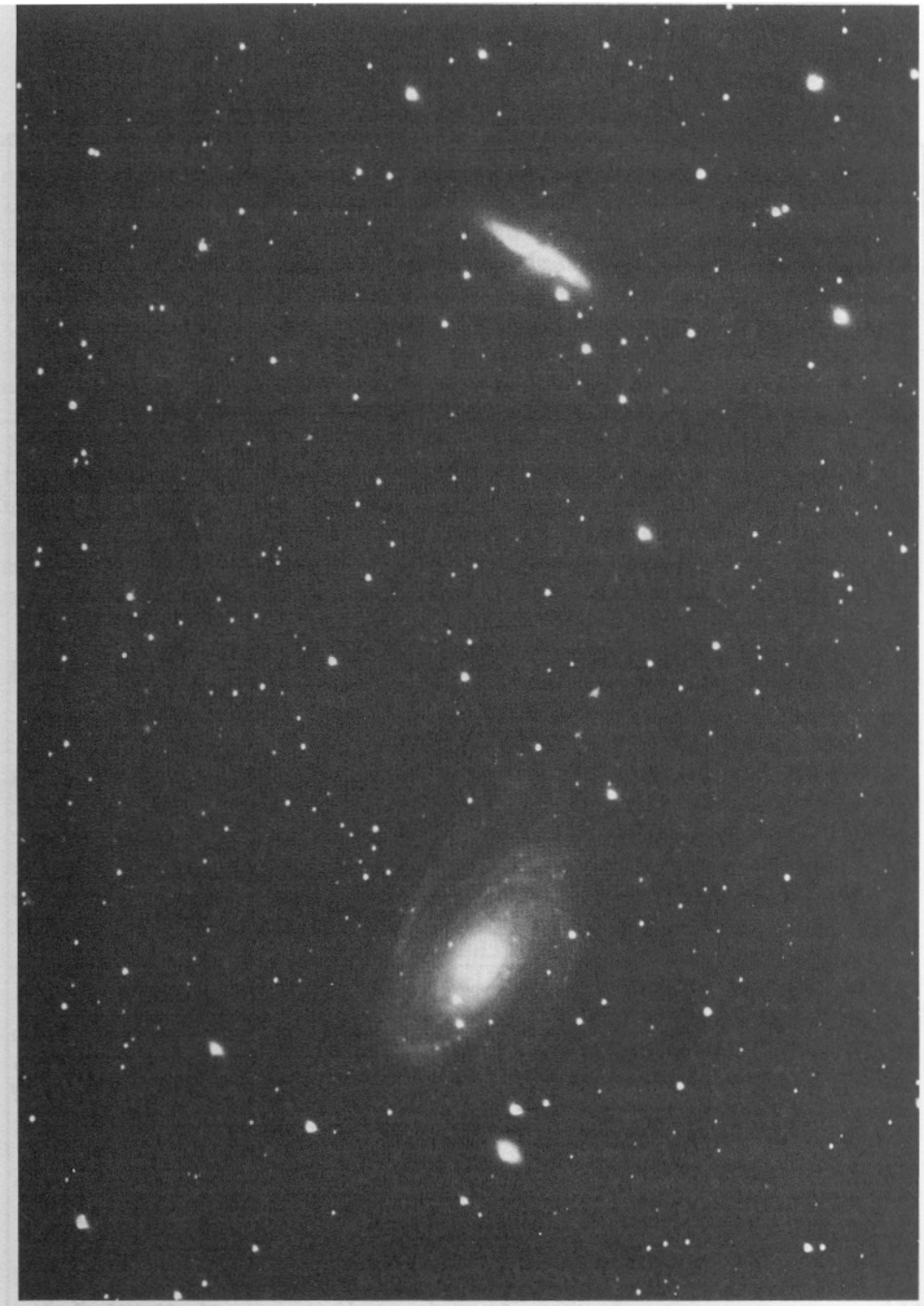
After opening up we went straight for M46. Although the seeing was infinitley better than the previous week it was still not as impressive as it should be and the planetary nebula was very difficult. This was mainly due to the mist rising over the river Orwell, rather than the hazy cloud of the previous week. After a quick look at the Orion nebula, M42, we decided to move further north where the skies were becoming much clearer (5th magnitude star were now visible)!

First stop was M65 and M66 in Leo, two moderately bright spiral galaxies 1/3 degrees apart making a fine pair together in the 10inch refractor. Two fairly easy NGC objects close to M65 @ M66 were next on the list. NGC 3628 an edge on spiral forms a triangle just over 1/2 degree to the north and NGC 3593 another fairly edge on spiral lies less than one degree almost directly to the west of the Messier pair. By now the seeing was becoming quite excellent (at least compared with anthing we had experienced for several months).
Next on the agenda was a quick look at the "Beehive" cluster in Cancer. M44 was a clear naked eye object now and a spectacular sight in binoculars. Unfortunately because of the somewhat restricted field of view, it is not a particularly spectacular object in the 10inch refractor. We moved on towards the zenith and one of the most rewarding sights of the whole evening, the "Whirlpool Galaxy" M51. Definite spiral structure could be seen and even some hint of the spiral arm crossing 'over' to the satellite galaxy NGC 5195 could be discerned. After every one present had feasted their eyes on this object we completed the evenings observations with views of M81 and M82. These were very bright objects with M81 appearing to fill almost half the field of view in the 10inch, while M82 was spectacular with some of the irregular dust lanes of this peculiar galaxy clearly visible.

After one of the best Wednesday evenings at the observatory for a long time we were to late to go to the Pub but it was well worth it.



SPIRAL GALAXY M51. The Whirlpool Galaxy, photographed with the 200-inch reflector at Palomar Observatory.



GALAXIES M81 and M82 in URSA MAJOR. The upper object is M82 and the bright star near the bottom is the double Σ1386. Lowell Observatory 13-inch telescope photograph.

A HISTORY OF ASTRONOMY

PART 2

NEIL TAYLOR

Greek Astronomy

Greek astronmy was undoubtably based upon the ideas and observations of theBabylonians, but Greek philosophy resulted in many schools of thought rather than a single unified view. There were many prominent Greek astronomers, and only a very few can be outlined here.

Eudoxus of Cnidus (400-350 BC) produced the first detailed system to try and account for the observed motions of the Sun, Moon and stars. The wandering stars (Planets) were also accounted for in his thoughts. Eudoxus was a pupil of Plato, who was a strong proponent of the isea of a perfect heaven, where only circular mothion could occur (the circle being the perfect shape). Eudoxus determined from his own observations though that the motions could not be modelled in simle circular paths, and so he proposed that a nest of non-solid spheres existed with the axis of each of the outer spheres set in the surface of inner spheres. His model required 27 spheres, one for the stars, 3 each for the Sun and moon, and 4 each for each of the 5 planets known at that time. Callipus (370-300 BC) added a further 7 spheres to the model but the greatest boost to the idea was given when Aristotle (384-322 BC) adopted and extended the concept. Aristotle added an additional 22 spheres, and whereas Eudoxus had suggested the spheres were non-physical mathematical devices, Aristotle envisaged them as being solid crystaline spheres. Aristotles influence on astronamical thought was such that this idea was not seriously challenged until the time of Tycho Brahe (1580's).

Although Aristotle's view of the Universe was incorrect he did make other advances in Astronomy, notably his conviction that both the earth and Moon were spheres and that the phases of the Moon are due merely to our orientation with respect to Sun and Moon.

The first serious attempts to determine the relative sizes of the Earth, Sun, and Moon were made and Aristarchus of Samos (prominent 280-264 BC), who, by measuring the size of the Earths shadow at Lunar eclipses, arrived at the conclusion that the Moon was 1/3rd and the Sun 7 times larger than the Earth. This lead Aristarchus to reason that as the Sun is the larger body, the Earth moved around the Sun rather than vice-versa. Regretably, this Heliocentric view was rejected by many of Aristarchus's contempories. The idea that both Earth and Moon are spheres was popular however, and the first recorded attempt to obtain absolute value for the size of the Earth was performed by Eratosthenes of Cyrene(276-194 BC), probably around 240 BC. Eratosthenes experiment was to measure the altitude of the Sun from two different sites on the same day of the year. He knew the date on which the Sun appeared to be directly overhead at the town of Syene (Now in Egypt near Aswan) and at the same time and date the following year he measured the altitude of the Sunat the city of Alexandria. The difference he founds was 7 degrees and he argued correctly that there the circumference of the world was therefore 50 times the distance between the two sites. He knew the distance between Syne and Alexandria as 5,000 'stadia' and hence the World had a circumference of 250,000stadia. Modern archaeological evidence puts the value of a 'stadium' at about 1/10th of a mile and hence Eratosthenes value of 25,000 miles was very close to the true value. Eraotosthenes work was superseeded by that of Poseidonius (135-50 BC) who by duplicating the experiment arrived at a considerably smaller value, which was later accepted by Columbus !

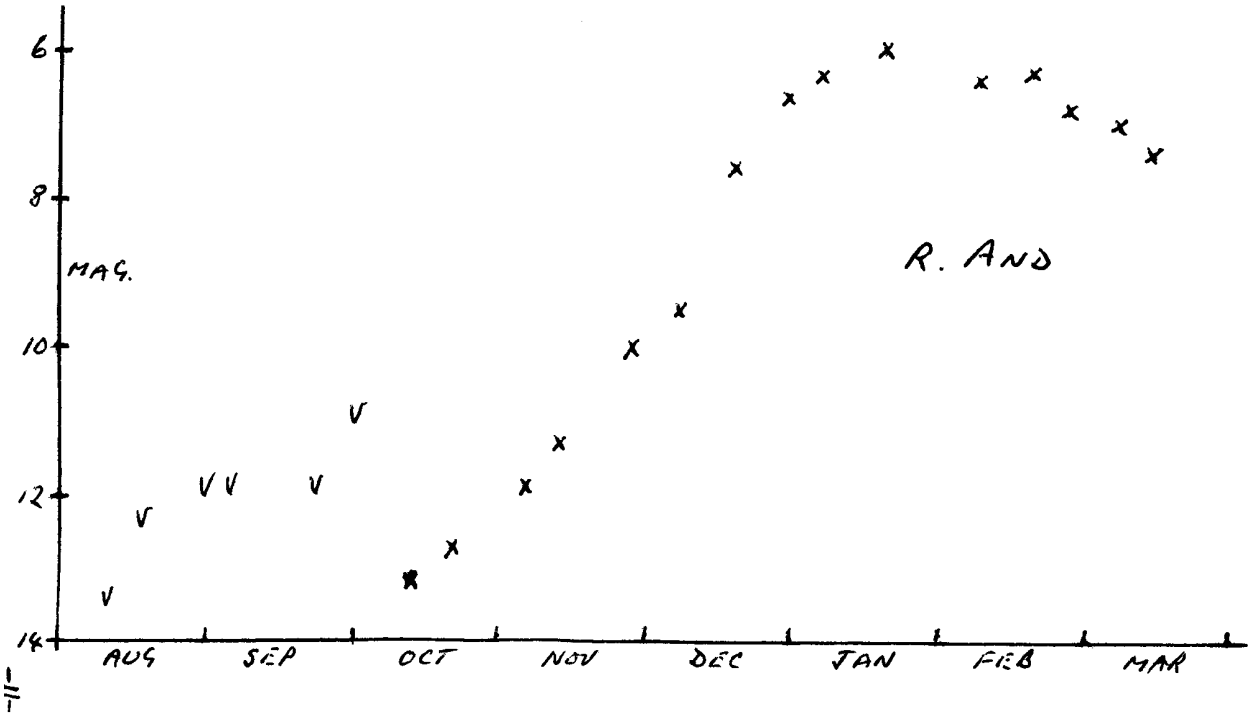
Progress in determining the arrangement of the heavens was continued by Apollonius of Perga (260-190 BC), a mathematician who argued the motion of the heavens could be described in terms of circles and 'Epicycles'. Apollonius studied and named the ellipse, parabola, and hyperbola, but did not apply these shapes to the heavens.

Perhaps the greatest of all the ancient Greek Astronomers was Hipparchus of Nicaea (prominent 146-127 BC) amongst whose notable achievements were his accurate measurement (within 6 minutes) of the length of the year, and his rejection of a simple circular, or combination of circular motions, orbit for the path of the sun across the sky. Hipparchus showed that the Suns motion could be represented by assuming its path about the Earth was an off centred circle which he termed an'eccentric.' He rejected the idea of crystalline orbs proposed by Aristotle in favour of Apollinu's mathematical devices. His greatest work was the compilation of a catalogueof 850 stars, completed in 129 BC, during which time he designed the basis of a magnitude system used today and deduced from his own and earlier observations the effect of the 26000year period of 'Precession'. By sudying the 'SAROS' he was also able to make considerable advances in eclipse prediction.

The last of the great Greek philosophers was Ptolmey (Claudius Ptolemaeus) (100-178 AD). Ptolemy was an Alexandrian Geographer and Astromomer whose greatest contribution to Astronomy was his book "The Mathematical Collection" which was later known to the Arabs as "Megistee" (Greek for the 'great one') which was later corrupted to the 'Almagest'. In this book Ptolemy extended Hipparchus's catalogue and presented an extension to the Apollonius model of the Universe by introducing more epicycles and 'deferents'. Ptolemy listed 48'constellations', some of which were based on those described by the Babylonians, with others representing Greek mythological heroes and gods. 12 of the 48 however had a much earlier origin; these were the signs of the Zodiac, or "Zodiakos Kyklos" - the circle of animals.

VARIABLE STAR OBSERVATIONS by Mike Nicholls

The light curve shown below is that of R Andromedae from August 1985 to March 1986. It shows a typical maximum of this long period variable, with a steeper rise than fall. The Vs shown in August and September indicate that the star was not seen and the brightness was below this value, probably at magnitude 14 or 15. The period is about 409 days but this can vary slightly.
Observations were made using an 8" reflector and 10x50 binoculars.



PROGRAMME FOR APRIL

MONDAYS from 8pm — DOUBLE STAR & PLANETS SECTION
7, 14, 21, 28 — Mr N Taylor, [redacted], Farmlands, Trimley — Tel:Fel. [redacted]
Mr T Gillan, [redacted], Felixstowe — Tel:Fel.
Miss M Edwards, [redacted], Felixstowe — Tel:Fel.

TUESDAYS from 7pm — GENERAL OBSERVATION SECTION
1, 8, 15, 22, 29 — Mr N Gage, [redacted], Trimley — Tel: Fel
Mr R Newman, [redacted], Felixstowe — Tel: Fel
Mr J King, [redacted], Felixstowe — Tel: Fel

WEDNESDAYS from 8pm — NEBULEA & FAINT OBJECTS SECTION
2, 9, 16, 23, 30 — Mr M Cook, [redacted], Ipswich — Tel: Ips.
Mr D Payne, [redacted], Wickham Market. — Tel:W.Mkt [redacted]

FRIDAYS from 8pm — GENERAL OBSERVATION SECTION
4, 18 — Mr R A Lobbett, [redacted], Felixstowe. — Tel:Fel.
Mr J Hood, [redacted], Ipswich. — Tel:Ips.
Mr M Harlow, [redacted], Felixstowe — Tel:Fel. [redacted]

1986 COMMITTEE

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VICE CHAIRMAN	R Cheesman	[redacted], Corringham, Essex SS17 9BU	Work: Extn
SECRETARY	R Gooding	[redacted], Ipswich IP1 6AE	Work: Home:
TREASURER	M Nicholls	[redacted], Capel St. Mary, Ipswich, IP9 2EX	Work: Home:
MEMBERSHIP SEC. /P.R.O	D Barnard	[redacted], Ipswich, IP4 5PP	Work: Home:
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