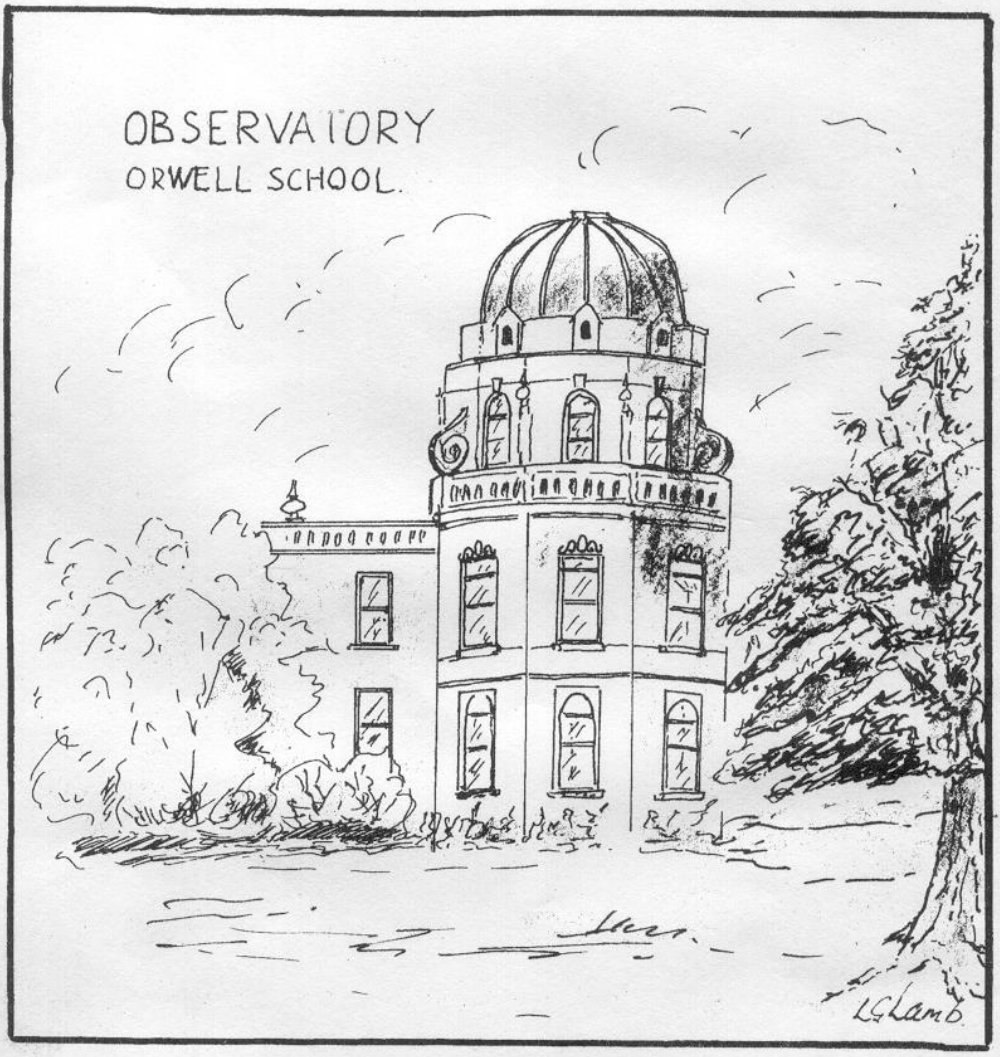
ORWELL ASTRONOMICAL SOCIETY IPSWICH

Charity No 271313

FEBRUARY 2003



Society News

1 Next Committee Meeting

The next committee meeting will be held on Saturday 15th February at 19:30 in the clubroom. This is an open meeting and any one who is interested is invited to attend.

2 Events for 2003

Lecture Meeting Friend's Meeting House, Fonnereau Road	Provisional meeting on December's eclipse	No date fixed
Astronomy Workshop	**Transit Telescopes** Presented by Bill Barton	Wednesday 5th February
AstroFest	Kensington Town Hall Hornton Street London	7th & 8th February
BAA Observers Workshop	The Institute of Astronomy Madingley Road Cambridge	Saturday 15th February 11:00 to 17:00
Lecture Meeting Friend's Meeting House, Fonnereau Road	Provisional talk by Martin Lunn	No date fixed
Astronomy Workshop	**Hertsprung Russell Star Sequences** Presented by Paddy O'Sullivan	Wednesday 5th March
First Presidential Lecture	Dr. Allan Chapman **The Victorian Amateur Tradition** At Orwell Park School	Friday 7th March 2003
Open Weekend	Very provisional Observatory only open	May be around Easter
Astronomy Workshop	**Comets, Asteroids and Impacts** Presented by Richard Lyzinski	Wednesday 2nd April
BAA Winchester Weekend	King Alfred College Winchester	Friday 25th to Sunday 27th April
Mercury Transit		Wednesday 7th May
Astronomy Workshop	**Radio Propagation** Presented buy Paul Whiting	Wednesday 7th May
Web Society Annual Meeting	Sackler Lecture Theatre Institute of Astronomy Cambridge	Saturday 17th May
BAA Exhibition Meeting	The Cavendish Laboratory Madingley Road Cambridge	Saturday 28th June
Summer Excursion	No destination yet decided	No date yet decided

Summer Barbecue	Ken Goward's garden Tuddenham	Provisional date Saturday 19th July
National Astronomy Week	No programme yet decided	23rd to 30th August
Equinox Star Party	Thetford	26th to 28th September
Christmas Meal	Provisional dates 10th or 17th December	No venue decided

3 Membership Subscription for 2003

Subscriptions for 2003 are due from 1st of January. If you have already paid please ignore this request.
The rates for 2003 are:

Junior & Concessionary	£11.00
Adult	£15.00
Family	£17.00

A renewal form was included with the January Newsletter. Return this form with your 2003 subscription, so that the society membership records can kept up to date.
Please make cheques & P.O.'s payable to the: -

ORWELL ASTRONOMICAL SOCIETY (IPSWICH)

Please return all subscriptions **with the renewal form** that was included in January's Newsletter to Martin Cook

4 FAS (Federation of Astronomical Societies) Newsletter

The FAS distributes a quarterly newsletter to all member societies. As we are classified as a large society we receive 30 copies. In recent months these Newsletters have been left at the observatory for interest members to take. This still leaves the majority of members with out access to a copy, unless they visit the observatory on a regular basis.

The FAS are now proposing that Paid Up Societies and their members can have these Newsletters emailed to them in PDF format (an Adobe Acrobat reader will be required to read these).

If this option is taken up we will receive fewer printed copies.
The FAS Newsletter co-ordinator & distributor is Dave Doc Sutton

His email address is `doc@tmslws.fsnet.co.uk`
If you do email him please mention that you are a member of the Orwell Astronomical Society

Night Sky

All times GMT

Sun

The sun will be rising approximately between 07:30 to 06:50
The sun will be setting approximately between 16:50 to 17:30

Moon

New Moon	1st Quarter	Full Moon	3rd Quarter
1st	9th	16th	23rd

Mercury Mercury will be at greatest western elongation (25) on the 4th day of the month.

Venus Venus remains a very prominent object in the pre dawn. It will rising about 2 hours before the sun this month. Magnitude –4.1.

Mars Mars will be rising a about 03:30 this month. It will be slowly brightening this month, reaching magnitude 1.1

Jupiter Jupiter will be at opposition this month on the 2nd it remains well placed for observation all night. Magnitude –2.6

Saturn Saturn remains well place to observe this month, until the early hours of the morning. It will be setting at about 03:00 by the end of the month. Magnitude –0.1

Uranus Uranus will be in conjunction with the sun on the 17th, and will not be observable this month.

Neptune Neptune will be rising at about 06:00 at the end of the month , into a brightening pre-dawn sky.

Meteor Showers

There are no prominent meteor showers visible this month

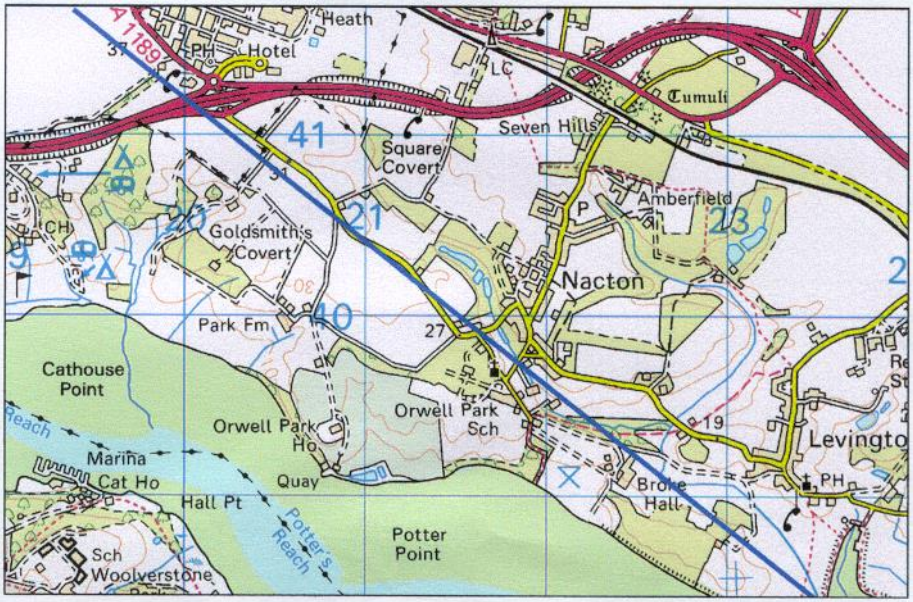
OCCULTATIONS DURING FEBRUARY

The table lists stellar occultations which occur during the month under favourable circumstances. The data relates to Orwell Park Observatory, but will be similar at nearby locations.

D / R	Date & Time (UT)	Lunar Phase	Sun Alt (°)	Star Alt (°)	Star	Mag
D	05 Feb 19:50	0.18+	-28	13	ZC 66	7.1
D	07 Feb 22:34	0.35+	-49	9	ZC 300	7.4
D	09 Feb 21:39	0.54+	-42	37	ZC 510	6.8
D	09 Feb 22:40	0.54+	-49	28	ZC 517	6.1
D	10 Feb 20:07	0.63+	-29	56	53 Tau,V1024 Tau	5.5
D	10 Feb 21:27	0.63+	-40	47	Tycho 1276-0360-1	7.1
D	10 Feb 21:35	0.63+	-41	46	ZC 642	6.8
D	11 Feb 00:06	0.64+	-52	25	Hip 20712	7.4
D	11 Feb 01:01	0.64+	-51	17	ZC 665	5.7
D	11 Feb 23:22	0.73+	-51	41	ZC 789	6.8
D	13 Feb 00:22	0.82+	-51	41	ZC 949	7.3
D	13 Feb 02:43	0.82+	-41	20	ZC 966	7.1
D	13 Feb 18:06	0.88+	-10	44	ZC 1068	7.1
D	13 Feb 18:12	0.88+	-11	45	Hip 33921	7.4
D	14 Feb 01:16	0.89+	-49	40	52 Gem	5.8
D	23 Feb 04:00	0.56-	-27	16	43 Lib,kappa Lib	4.8
R	04:26		-23	17		

On 23rd February, the Moon occults the star 41 Librae. The event appears as a graze from East Anglia with the track passing within 150m of Orwell Park Observatory. The following table summarises the circumstances of the graze and the map illustrates the track in the vicinity of the Observatory.

Date	Time (UT)	Lunar Phase	Sun Alt (°)	Star Alt (°)	Star Azi (°)	Limb	Star	Mag
23 Feb	02:30	0.57-	-39	9	139	N	41 Librae	5.4



James Appleton

Extra Observing night.

This is an evolving process which, at the time of going to press for the February newsletter, has not had the benefit of the first January session from which to make comment. The February session has however been arranged as follows:- **Monday February 24th at 8.00pm.** Subject for observation, **the constellation of Gemini**. Paddy O'Sullivan and Gerry Pilling will be taking a lead. At this stage we will be using the small telescopes, but plan to include the Tomline refractor when we have got established. Ted Sampson.

The December 4th 2002 Eclipse – Down Under

July 2000: Where shall we go for the 2002 eclipse? The choices were South Africa, specifically the extreme NE tip of the Kruger National Park or Zimbabwe (safaris, animals – sounds good), or Australia (dry desert, spiders but no bullets). The choice boiled down to one thing, the weather, and chances of cloud cover. The obvious choice was to sacrifice duration to maximise opportunity to view, ie. Australia.

The main town on the centre line was Ceduna – a 2 horse town with one community hotel. They still had vacancies but had just started to realise something special was due to happen sometime in December 2002. However in the end we decided to use Explorer Tours, as they had done well before, and indeed did a great job again this time facilitating the trip – not just for the eclipse but for all the add-ons. You cannot go to the other end of the world for just 26 seconds! 3 weeks sounds a lot better.

November 2002: Flying into Adelaide, via Bangkok, we got ready for the run up to the big day by visiting several vineyards in the Barossa Valley (Jacob's Creek and all that). The day before the eclipse we were issued with security bracelets, which we had to wear for 3 days, and were taken to the Woomera Restricted Area – former military area, where several rocket/satellite launches have been made. It is still restricted , but now operated by BAe and used for all sorts of secret things like weapons test, but no more rocket launches.

We were staying in the ELDO "hotel", where the European Launch Development Organisation billeted their staff in the 1960s. The rooms left a bit to be desired but were functional.

The night before the eclipse we were given an orientation lecture on eclipses – what to do and what to expect, as there were a large number of first timers. However it was still very interesting for the more experienced – there's always something to learn. Later that night we were taken by coach to a dark site, miles from the nearest artificial light, well inside the Restricted Area, and were given a conducted tour of the perfectly clear Southern night sky, Wonderful – especially the SMC, LMC and an upside down Orion, But boy was it cold. 26 degrees Centigrade by day, about 3 degrees by night. Back home by 2am. Sleep and late start for our morning at leisure on the day of the eclipse.

12 noon we got on our designated coaches and were again taken to the interior of the restricted area, which, incidentally, covers an area larger than Wales. To start the afternoon we were treated to a ride round some of the site, seeing some old launch sites, rocket test ranges, some high energy particle telescopes and the odd kangaroo. About 4 hours before the eclipse we were taken to our viewing site. BAe had done well. They had

levelled a mile long, 100 yard wide track in the middle of the outback desert and placed a ribbon fence along which we would set up our equipment. There were probably a dozen "enclosures", one set aside for each tour group. So there must have been about 2000 observers there, including Pete and Nicky, who had managed to sneak into our private area somehow!

Bearing in mind we were in the middle of the outback – nothing but red sand, some scrub bushes and the occasional emu, the facilities provided were excellent. Portaloos, the famous Ozzy barbie and a cheap bar (iced beer) – we were told to drink at least 1 litre every 2 hours, but I think they meant water! In fact there was everything you could possibly want – except a chair. The red dust got everywhere so you couldn't sit on the ground.

The shadows got longer and longer, and eventually the eclipse started, but still another hour or so before totality. The wind had been blowing all day, causing a lot of sand movement so we had to keep the cameras covered with plastic bags on their tripods until the last minute. At long last the countdown started. All 2000 people fell silent. Even the wind dropped a little. Even though the eclipse was just on sunset and hence was very low down, there was not a cloud to be seen and the sun entered totality spectacularly. But as soon as it started it finished – 26 seconds isn't very long!

Still I got some good video, shame about the photos!

After the sun set in eclipse, we all wended our way back to the ELDO for another barbie, and on with the holiday.

We seemed to have had the best location – Ceduna (who were expecting so many visitors, they installed new sewers!) had some cloud, and further North, along the Stuart Highway, they had trouble with dust storms, but everyone saw something of the eclipse. We were told that the Explorer's party in Africa missed the eclipse altogether due to cloud cover.

In the following fortnight we looked into the possibilities of the Antartic eclipse next November. A firm in Perth had hired a 747 to fly over the South Pole – but at AU$1100 for an inside seat with no window I thought this was a non-starter. Other thoughts included a 5 week boat trip from Australia , New Zealand or Argentina at around US$12000. Perhaps we'll give this one a miss, there is after all the annular eclipse in Orkney this May.

Paul Whiting

REPORT ON PLEIADES OBSERVING PROJECT

Introduction

During the winter months, the constellation Taurus is extremely prominent and is visible throughout most of the night. The constellation culminates at midnight on 1st December and it is conveniently placed for early evening observation from early November until the end of February.

Taurus is immediately recognisable to the naked eye by virtue of its three most prominent features:

- The vee-shaped star cluster, the Hyades.
- The bright, orange-red star Aldebaran at the eastern edge of the Hyades.
- The compact star cluster the Pleiades.

During early evening in the middle of winter, with Taurus high in the southern sky near culmination, Orion lies to the south and Auriga to the north-east, with Gemini to the east and Cetus to the west. The following chart shows Taurus in relation to the neighbouring constellations.

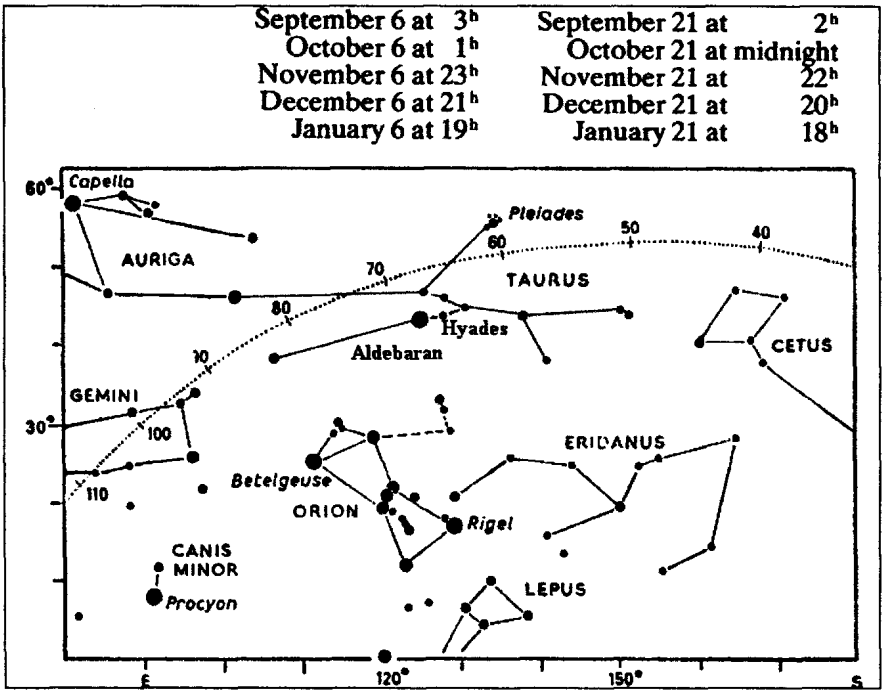


Figure 1. Taurus and its companions in the winter sky.

Taurus and its neighbours present a magnificent spectacle and a plethora of interesting objects for the amateur observer. I proposed an observing project in the November 2002

Newsletter to take advantage of the magnificent spectacle presented by Taurus and its companions in the early evening sky. The aim of the project was to determine the faintest star that could be seen in the Pleiades using the naked eye, binoculars or a telescope.

Stellar Magnitudes

A star's brightness or apparent luminosity is represented by its magnitude. The brightest star in the sky, Sirius, has magnitude –1.5 while the faintest stars visible to the naked eye are typically circa magnitude 6.0. The magnitude scale extends via higher numbers to fainter stars that are visible only via binoculars or a telescope. The magnitude scale is constructed so that a difference in magnitudes of 1.0 corresponds to a difference in brightness of 2.5; thus for example a star of magnitude 2 is 2.5 times brighter than a star of magnitude 3.

The Pleiades

The Pleiades is a cluster of some 500 stars located approximately 370 light years (ly) from Earth. Some nine stars at the centre of the cluster are visible to the naked eye under good conditions; the remainder span the range of magnitudes from just beneath naked eye visibility down to extremely faint stars visible in only the largest telescopes. The entire cluster is located within an area of space some 20 ly in diameter, although the nine bright central stars are bounded by an area only seven ly across. Nearly all the stars in the Pleiades are very young, a mere 20 million years old, compared with some 4.5 billion years for the Sun.

Mankind has recognised the Pleiades as a defined stellar grouping since ancient times. Early civilisations associated the grouping with the passage of the Sun through the vernal equinox from south to north of the ecliptic heralding the onset of spring. The Pleiades were named in mythology for Atlas and Pleione and their seven daughters. The seven daughters were supposedly the half sisters of the Hyades (offspring of Atlas and Aethra).

In modern times, professional astronomers have found the Pleiades a rich observing target. The following gives a flavour of the current state of knowledge of the Pleiades, obtained after many years of research by professional astronomers.

i) Dynamic Evolution

The Pleiades cluster has low density – circa three stars per cubic parsec on average, compared to 83 for M11 and 12 for M36. Gravitational attraction is unable to hold the Pleiades together for more than perhaps 1000 million years, and professional astronomers use computer simulations of stellar dynamics to predict the future evolution of the cluster.

ii) Stellar Evolution

The nine brightest stars in the Pleiades are all B-type giants. The largest is Alcyone, approx 1000 times as luminous as the Sun and 10 times the size. The remainder of the cluster straddles the whole extent of the Main Sequence, down to faint red dwarfs at mag 16. (By way of comparison, the Sun at the distance of the Pleiades would shine at mag 15.0 - barely visible in the Tomline Refractor!) Bright stars in the Pleiades are all spinning very fast, with surface velocities up to 150 - 300 km/sec. Such high surface velocities result in wide, blurred spectral lines as one limb approaches while the opposite limb recedes. Due to fast rotation, the stars are oblate spheroids rather than spheres. The star with the fastest rotation speed, Pleione, is rotating approximately 100 times as fast as the sun: a revolution takes only six hours!

Pleione is in fact a very unstable star. In addition to its high rotation speed, it is a variable star with a range of ~0.5 magnitudes, occasionally ejecting shells of material. Pleione suffered an outburst in 1938, coinciding with a drop in brightness by ~0.5 magnitudes thought to be associated with absorption of light by a shell of ejecta. Another outburst occurred in 1972. Pleione is perhaps the lost Pleiad of legend?

iii) Flash Stars

The Pleiades contains several red dwarf variable stars which are subject to sudden, irregular 'flash' outbursts varying from one - four magnitudes and durations from several minutes to around three hours. All such stars are faint: magnitudes 13 – 17. Astronomers discovered seven such stars in the early 1960s. Current theories suggest that these stars are still undergoing gravitational contraction and are not yet stable.

iv) White Dwarfs

The Pleiades contains several white dwarfs. This poses a significant problem of stellar evolution: how can white dwarfs exist in such a young star cluster? (The Pleiades is thought to be only some 20 million years old.) There are several white dwarfs so it is likely that they are original cluster members and not captured field stars (in any case, capture does not work effectively in a loose open cluster such as the Pleiades). From the theory of stellar evolution, the white dwarfs cannot have masses above about 1.4 solar masses (the Chandrasekhar limit), as they would collapse due to their own gravitation if they were more massive. But stars with such low mass evolve so slowly that it takes them billions of years to evolve into dwarfs, not the 20 million year age of the Pleiades. The only possible explanation seems to be that these dwarf stars were once massive so that they evolved fast, but due to

some reason (perhaps strong stellar winds, mass loss to close neighbours, or fast rotation) they lost the greatest part of their mass bringing the cores of the original stars below the Chandrasekhar limit to permit entry into the stable white dwarf state in which they are now observed.

v) Brown Dwarfs

Observations of the Pleiades since 1995 have revealed several candidates for an exotic type of star, or starlike body, the so-called brown dwarf. These hitherto hypothetical objects are thought to have a mass intermediate between that of giant planets (like Jupiter) and small stars. (Theories of stellar structure indicate that the smallest stars, i.e. bodies that produce energy by fusion at some point in their lifetime, must have at least about six - seven percent of one solar mass, i.e. 60 to 70 Jupiter masses). Therefore brown dwarfs should have 10 to about 60 times the mass of Jupiter. They are visible in infrared light, have a diameter of up to that of Jupiter (143,000 km) and a density 10 to 100 times that of Jupiter, as their much stronger gravity compresses them.

vi) Nebulosity

The nine bright central stars of the Pleiades are surrounded by a faint, wispy nebulosity. It is caused by interstellar dust shining by reflected starlight – the stars and nebulosity have the same spectrum. The nebulosity has a delicate blue colour, caused by reflecting the light of the stars and also because of preferential scattering of blue light by the tiny interstellar particles of the nebula. The brightest portion of the nebula occurs around Merope. The nebula and cluster just happen to be crossing one another: their radial velocities differ by relative velocity of 11 km/sec. Nebulosity around Merope was first noticed by Prof W Temple in 1859 using a 4" refractor – he compared the nebulosity to *breath on a mirror*. However, the nebula is very difficult to see and indeed it is frequently impossible to see even with a very large telescope unless observing from an exceptionally dark-sky location.

For amateur astronomers, the challenge in observing the Pleiades is to determine the visibility of particular stars within the cluster, to observe occultations (the Pleiades lies close to the ecliptic and thus is subject to occasional occultations by the Moon and planets) or simply to enjoy the spectacle that the cluster offers.

Visibility Of Stars In The Pleiades

There are 20 stars in the Pleiades which an observer could, in principle, glimpse with the naked eye under ideal conditions (using the generally accepted limit of naked eye visibility under ideal conditions as magnitude 6.5). However, conditions are seldom ideal (especially under UK skies!) and glare from the brighter stars in the cluster obscures the fainter stars. In practical terms, only the nine brightest stars are typically

visible by naked eye to experienced UK observers under good conditions - the following table lists them.

Star	Magnitude
Alcyone	2.8
Atlas	3.6
Electra	3.7
Maia	3.9
Merope	4.1
Taygeta	4.3
Pleione	5.1
Calaeno	5.4
Asterope	5.8 & 6.4 (double)

Table 1. Nine brightest stars in the Pleiades.

The following chart shows the names and magnitudes of the brightest stars.

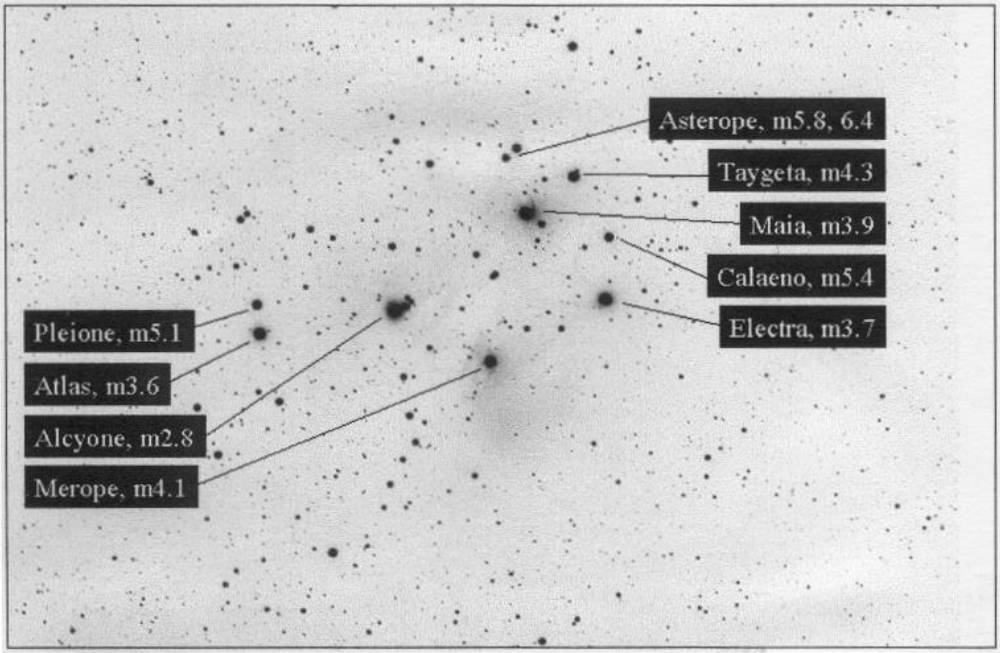


Figure 2. Bright stars in the Pleiades.

The following chart shows the magnitudes of some faint stars forming a line running roughly west of Merope. The line is an easily recognised feature and contains faint stars which can be identified using binoculars or a telescope.

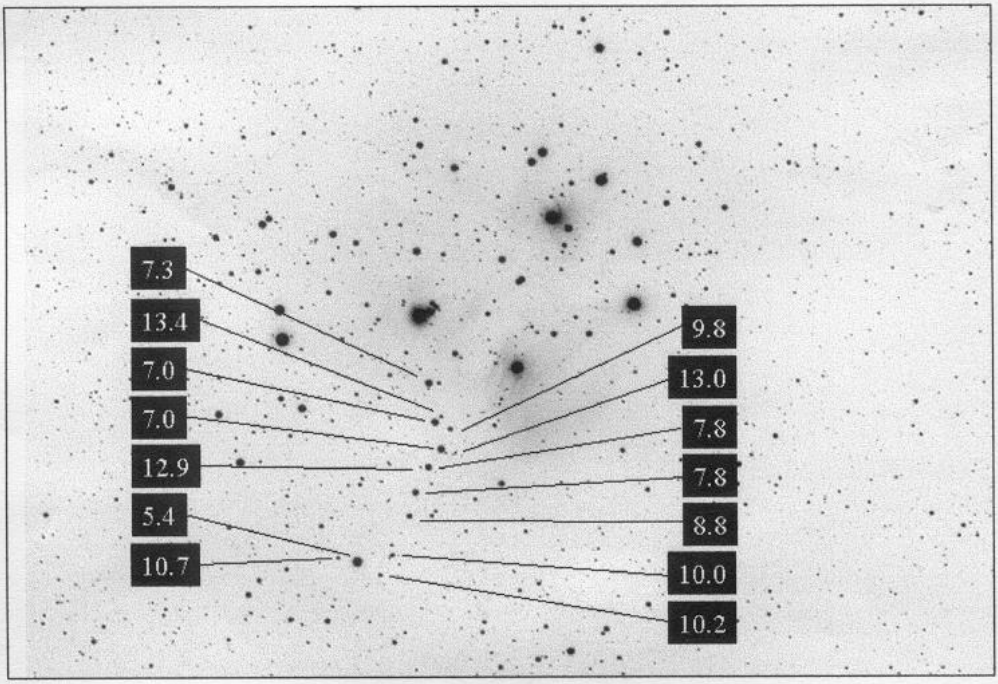


Figure 3. Faint stars in the Pleiades.

The charts above are slightly updated versions of those distributed to members of OASI as part of the Pleiades Observing Project.

Pleiades Observing Project

An insert in the November 2002 Newsletter gave details of the Pleiades Observing Project. Observers were asked to proceed as follows:

1. Choose a reasonably clear evening, and use either naked eye, binoculars or a telescope to identify stars in the Pleiades.
2. Using star charts provided in the insert, determine the faintest star visible.
3. If observing by naked eye or binoculars, describe the appearance of the double stars Pleione/Atlas and Asterope.
4. If observing by telescope, attempt to identify three close, faint companions of Alcyone.

Summary Of results

A total of 13 members of OASI participated in the project and returned their observations to me. The following table gives details of the observations:

Observer	Location	Date	Observing Equipment
James Appleton	Orwell Park Observatory and East Ipswich	18 October 09 November & 04 December	Naked eye, 10x50 binoculars, 254mm Meade LX200 SCT
Kit Bird	Chelsworth	07 December	Naked eye, 10x50 binoculars, 90mm Meade ETX 90
Simon Clarke	North Colchester	07 November	Naked eye, 8x24 binoculars
Garry Coleman	Kesgrave	04 December	Naked eye, 7x50 binoculars
Martin Cook	East Ipswich	?	Naked eye, 11x80 binoculars, 250mm reflector
Alice Longhurst	Holbrook	15 November	Naked eye, 10x50 binoculars
Monica Lustig	Assington	09 December	Naked eye, 10x50 binoculars
Pete Richards	Nacton	06 November	Naked eye, 90mm Meade ETX 90
Dave Robinson	North of Ipswich	03 November	Naked eye, 10x50 binoculars, 200mm Meade Starfinder reflector
Ted Sampson	Orwell Park Observatory	04 and 09 December	Naked eye, 8x50 binoculars, Tomline Refractor
Roy Tremlett	Kesgrave	30 November	Naked eye, 8x30 binoculars
Paul Whiting	Woomera, South Australia	03 December	Naked eye, 10x50 binoculars
Mike Whybray	Nacton	07 November	Naked eye, 8x30 binoculars, 110mm Orion Newtonian

Table 2. Observers and observations.

Note especially the observations by Paul Whiting under the clear skies of Woomera, South Australia. Paul travelled to Australia to observe the total solar eclipse on 04 December. Paul's observations transformed a purely local observing project into a truly international effort!

Naked Eye Observations

All 13 observers reported naked eye observations. The most immediately obvious aspect of the observing reports was the wide variety of descriptions of the Pleiades, summarised below:

- Not impressive - nearly full Moon in Pisces interfering.
- A dim glittering luminosity.
- Clearly visible but faint stars.
- A splodge in the sky! Took time to "get the eye in" and make out individual stars.
- Moon-sized group of stars.
- Bright star cluster.
- Faint smudge.
- A fuzzy patch.
- Fairly obvious but not bright open cluster.
- First ever - and continuing - impression: this cluster demands further investigation.
- Very clear, obvious nebulosity.
- Small, pretty cluster of stars.

Most observers looking out on a night with average weather conditions reported seeing some five - seven Pleiads, corresponding to a faintest magnitude of 4.1 – 5.1. Under good sky conditions, observers reported typically nine Pleiads visible to the naked eye, corresponding to a faintest magnitude of 5.8. Under good conditions, where up to nine Pleiads were visible, observers were more likely to report seeing the double star Asterope as apparently elongated, reflecting the fact that it consists of two components (mags 5.8 and 6.4) separated by a distance of 150 arc-sec.

Observing on 04 December at the relatively dark site of Orwell Park, I was initially able to discern seven Pleiads but after more than 30 minutes of "intensive" dark adaptation I managed to glimpse 10 Pleiads. The 10 Pleiads were the nine brightest forming the heart of the cluster plus the magnitude 5.4 star marking the end of the line of stars west of Merope. The latter star is in fact 0.4 magnitudes brighter than the faintest of the nine bright central Pleiads; however its isolation from the rest of the group of bright stars means that it is much more difficult to locate. No other observer reported seeing more than nine Pleiads by naked eye.

Dark adaption, a moon not too close to full and the absence of light pollution are important factors in discerning the maximum number of Pleiads by naked eye. On 18 October, under clear, frosty skies but with a 95% waxing moon in Pisces (only 60° distant from the Pleiades) I was able to observe only eight Pleiads and needed averted vision to see the eighth faintest (Calaeno). This compares with 10 Pleiads seen from

Orwell Park some six weeks later on a moonless night (as noted above). However, Alice Longhurst, observing on 15 November with an 85% waxing moon in Cetus was able to count nine Pleiads by naked eye – so clearly the moon does need to be very close to full before it materially reduces the number of Pleiads visible to the naked eye.

Many of the great observers of history counted the number of Pleiads visible to the naked eye. Some of these observers had exceptional eyesight, and of course observed without the curse of light pollution that we suffer from so badly today. The most impressive historical observers of the Pleiades are as follows:

- Maestlin (1550-1631; Kepler's tutor) claimed to see 14 and mapped 11 before the invention of the telescope.
- Carrington (1826-1875) & Denning (1848-1931) counted 14.
- Miss Airy (daughter of G B Airy) counted 12.
- William Dawes (1799-1868) counted 13.

One record of the modern era is by O'Meara who claimed to discern 17 Pleiads by naked eye in 1978 at Cambridge, MA, USA.

Binocular Observations

Twelve observers reported observations with binoculars, using instruments ranging from 8x24 to 11x80. Binoculars in fact are the ideal instrument to observe the Pleiades as a cluster, because their wide field of view enables the observer to see the cluster in its entirety and thus appreciate it in its full glory.

Many of the observers commented on the superb view offered by binoculars as follows:

- Wow!
- All main stars easily seen and stood out well, with many others visible.
- Nine quite sharp, clear stars. Cannot identify many others.
- Best view. The whole cluster visible against a lovely background of small stars.
- Considerable improvement over naked-eye.
- Wonderful spectacle: better in bins than in smaller field of telescope.
- Bright star cluster that fills the whole field of view.
- Beautiful cluster of blue-white stars.
- Impressive!
- Nice cluster of about 12 stars.
- Very clear, exceptional seeing.

All binocular observers could separate Pleione and Atlas. Three observers commented that the stars were separated easily.

All but one of the binocular observers could separate the components of Asterope, although there was uncertainty in two cases where observers held the binoculars by hand and suffered from image shake.

Binocular observers were typically able to detect stars down to magnitude 8.8 directly, with stars circa one magnitude fainter accessible using averted vision. This meant that binocular observers were able to discern the brightest stars in the line of stars west of Merope.

Telescopic Observations

Seven observers reported observations with telescopes, ranging from 90mm reflectors to the 260mm Tomline Refractor.

A telescope provides a much smaller field of view than binoculars and is capable of separating stars in close proximity to one another. This is reflected in the following comments from telescopic observers:

- Lots of stars visible!
- Can't see the wood for the trees - but individual groupings (e.g. Alcyone group) very rewarding.
- More stars resolved but binoculars give more impressive view.
- Attractive open cluster of white stars (no nebulosity visible).
- Bright blue-white stars, large number of fainter stars, unable to see nebulosity.
- Good for separating stars. Best overall view is in binoculars.
- Beautiful cluster. Many tens of stars visible.

One aim of the observing project was to determine telescopic visibility of three close, faint companions of Alcyone. The table below lists data on the stars.

Star	Mag	Separation from Alcyone (arc-sec)
Alcyone, 25 Tau, eta Tau, Tycho 1800-2202-1	2.8	
24 Tau, Tycho 1800-2201-1	6.3	117
V647 Tau, Tycho 1800-1607-1	8.2	181
Tycho 1800-2222-1	8.7	191

Table 3. Close, faint companions of Alcyone.

Six telescopic observers were able to identify the three companions; one telescopic observer did not check.

Telescopic observers typically reported the faintest star visible in the Pleiades as being circa magnitude 12-13. In this range, a skilled observer could hope to see roughly half of the stars in the cluster. Unfortunately, I have been unable to find a star chart that identifies all the members of the Pleiades down to very faint magnitudes so there is no obvious means of determining unambiguously which very faint stars are members of the Pleiades and which are not.

No telescopic observers reported any trace of visibility of nebulosity in the Pleiades – this is unsurprising for observations from the UK where poor skies and light pollution are endemic problems!

Photograph

Neil Morley submitted the following photograph of Taurus.

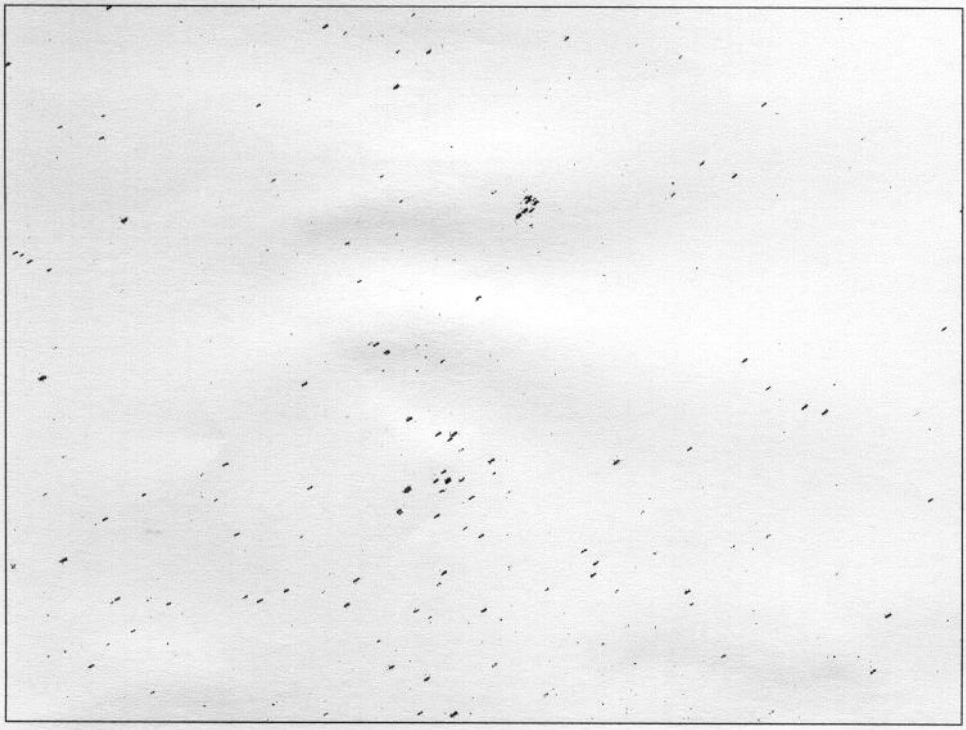


Figure 4. Digital photograph of Taurus.

Neil took the photograph with a digital camera on a fixed mount. The following table lists main details of the configuration, but note that the image has been significantly manipulated subsequently to improve its presentation in the *Newsletter*.

Camera model	Casio QV-2800UX
Date	06 Nov 2002 23:28 PM UT
File size	800 KB (compressed to 78.1 KB)
Resolution	1600 x 1200 pixels
Exposure	Manual, 60 second
Aperture stop	F3.2 (max aperture on camera)
Focusing mode	Auto focus
Sensitivity	ISO 80 equivalent

Table 4. Parameters of digital photograph of Taurus.

Star trailing is visible because the camera was fixed; however the photograph shows clearly Aldebaran, the Hyades and the Pleiades. The faintest star visible in the image is of magnitude approximately 6.5 (i.e. the very best that a naked eye observer could hope to see under ideal conditions). It is possible to obtain similar results with a standard 35mm camera.

Further Observations

Hopefully the Pleiades Observing Project has whetted appetites for practical observing. For those who would like to explore the subject of the Pleiades further, the following star chart of the central region provides a great deal more detail and lists stellar magnitudes over a much wider range (2.87 – 12.89) than the OASI project was able to do. The chart is based on that in *Challenges of Astronomy* by W Schlosser, T Schmidt-Kaler and E F Milone, published by Springer Verlag Inc., 1991.

Several members of OASI have commented to me that they found a structured approach to observing useful both in terms of encouraging them to undertake observations in the first place and subsequently in guiding them as to what to observe once they stood under the starry sky! Personally, I find a structured approach to observing is always beneficial, so I appreciate this viewpoint. I am therefore willing to help to get future observing projects off the ground - if any members of OASI would like to propose future observing projects please feel free to contact me to discuss informally any ideas or proposals.

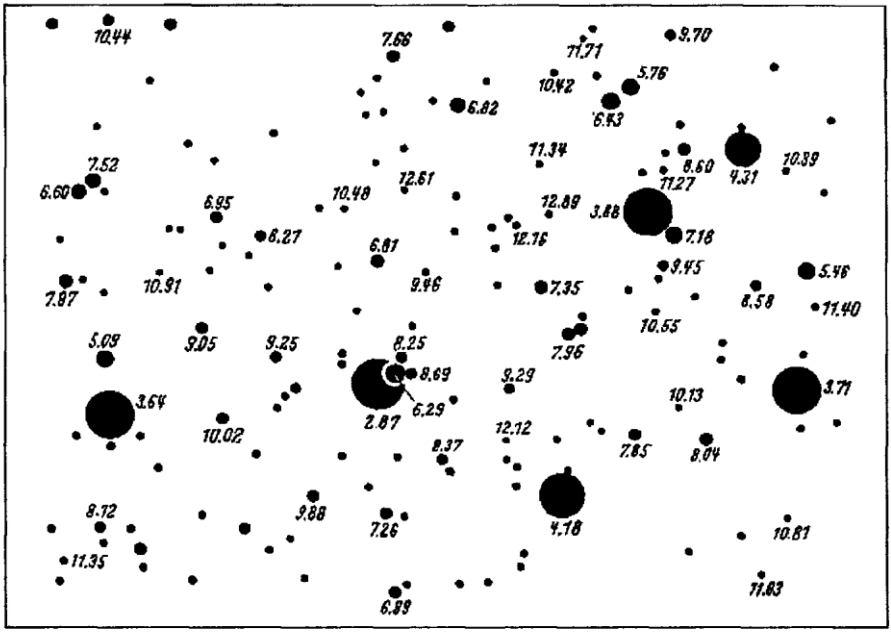


Figure 5. Star magnitudes in the central Pleiades region.

Conclusion

The Pleiades Observing Project was a great success! During my 14 years as a member of OASI, I have harboured doubts that many members of OASI were enthusiastic observers. Fortunately, my doubts were proved wrong and 13 members of OASI contributed their observations to the project, bringing to bear a wide range of abilities, approaches and observing equipment.

Finally, I'd like to give a huge *thank you* to the observers who contributed to this project. Their time and effort is much appreciated and hopefully points the way to further similar projects in the future.

Postscript

I received several observing reports considerably after the end date of the project, by which time I had completed the analysis and written this article. I thank the observers concerned for their reports but unfortunately was not in a position to rework the analysis and update this article to incorporate their input.

James Appleton

26 December 2002

Astronomy on a shoestring – The middle years – Part Two

My excursion into producing a six inch telescope mirror was about to begin. The slab of inch thick plate glass that I had ordered duly arrived and I clamped it in a jig that had a plywood template on top with a six-inch hole cut in it. Into this hole a notched edged 6 inch cake tin was fitted. The tin glass cutter was turned round using a carpenter's hand brace mounted above it – making it look a little like Caxton's first printing press. This permitted a trickle of wet 80 grit carborundum powder to be fed in around the edge. After about three hours of very noisy rotation, out dropped – to the amazement of all the sceptics – a perfectly circular six-inch glass disk.

It was then up to Smith and Daniel's in Westgate Street (do you remember them) and getting them to order me a range of carborundum powders, from 120 grit through to 400. Yes, you guessed – they thought I was more than slightly eccentric.

The undamaged back of the old mirror I had been given became the lower tool and grinding began. To help grip the mirror blank disk, I had fixed on the back with pitch an old wooden draw knob. I recall that it was 80 grit for the rough grinding – and trying to guess when the curvature was deep enough. I used to wet the 'frosted' surface of the mirror periodically with soapy water and focus the image of the sun on a light coloured wall until I could get a surprisingly sharp image at about five feet – I was aiming to finish with a mirror of around four feet six inches focal length.

It seemed to take a long time for me to work my way through the successively finer and finer grades of carborundum until I was satisfied that all the pits created by the earlier coarser grits had completely gone from the mirror surface.

My first pitch tool for the polishing stage was created by making a thin rubber gasket mat through which I had punched holes using a football stud punch. The mat was placed on the soapy surface of the upturned mirror and melted pitch poured over it. Onto this hot sticky puddle was bonded the tool. With a quick reversal of tool and mirror before the two stuck together, the still soapy mirror was slid off and the mat peeled away from the pitch leaving a faceted pitch tool on which the polishing operation could begin.

Polishing a glass telescope mirror using red jeweller's rouge was, I discovered, a messy business. The stain seemed to get onto everything I wore and my fingers were permanently coloured – as if with the nicotine of a chain smoker, only red. I cannot recall anything being said at school about them, but I suspect I got some funny looks. Polishing seemed never ending and got slower and slower until I thought that the clarity of the glass that I had achieved in the centre of the mirror would never reach the edges – but it did eventually.

I remember my schoolboy excitement on producing a classic spheroid shadow on the mirror using the Foucault knife-edge test. We had quite a long kitchen at home which had a hard tiled floor – essential if you are trying to keep a test lamp, knife edge and mirror absolutely free from vibration and still dare to breathe normally. "What was this silly boy up to now" I heard people say.

After several more weekends of grunting over my polishing jig, and periodically halting the household as I insisted on setting up my testing equipment in the kitchen, I believed I had produced a reasonably acceptable parabolic mirror.

I was now making up the telescope design as I went along, using materials as they came to hand, not having much to go on. In my final school year during a visit to the London Science Museum, I got permission to go off and visit Foyle's Bookshop in Tottenham Court Road. It was absolute heaven to be able to gaze on all their scientific books and wish they were mine. Indeed, the trick was to select a book and curl up on the floor at the end of one of their long alleys between the shelves, read it and then put it back. A bit like a lending library – except that I never found any of these sorts of books in my home town library.

One book in particular had been recommended to me. It was Amateur Telescope Making – a Scientific American publication edited by Albert Ingalls. Someone had told me that every successful telescope maker had one – this was the 'Bible' – and it had just been re-published. I ordered a copy – for a staggering price of £2.25. When it arrived, I read it from cover to cover. At that stage it was to provide me with all my telescope making techniques and ideas. I treasure it even today – perhaps through nostalgia – though I added to it Book Two when it came out.

By now at age 15 – I had left school and was in my first job in Local Government. It gave me privileged access to a number of helpful craftsmen. They produced for me a beautiful lightweight square cedar telescope tube with dimensions that would exactly fit my completed mirror.

Although the mirror was finished, it still required silvering. I read and re-read my Scientific American 'Bible' and felt that with luck, this was another job I could do myself.

Thus it was that I took a trip to Wiggins, the Chemist (do you remember them at the bottom of Berners Street?) I gave them precise quantities of all the materials I would need – silver nitrate, potassium hydroxide, ammonia, nitric acid and distilled water. They looked shocked and I was ushered in to see who I believe was Mr Wiggins himself. He quizzed me for a long time as to what I was up to. Eventually he sighed and made me sign the poisons register before my package was handed over.

John Barbrook

From the New Boy in the Chair

It was a considerable honour at our AGM to have been elected Chairman[1] of Orwell AS. I am conscious that my predecessor, David Payne, will be a hard act to follow. Indeed, it is difficult to imagine how the society could otherwise have evolved from a small club into a 100 plus member group with an excellent reputation both within and without the astronomical world and into a registered charity operating what an internationally renowned science historian has described as a 'Splendidly restored Victorian Observatory'[2] without David's guiding hand at the helm over his extraordinary 23 year term of office.

Thank you David, your contribution to the Society has been of seminal importance, and your future help and advice will always be as welcome as it will be appreciated.

Perhaps I should introduce myself, as the majority of members will not know me. An 'Armchair Astronomer' for more years than one cares to remember and like so many in the hobby, drawn into the science by Sir Patrick Moore's influence. I got off the metaphorical armchair in the early 90s, when a spot of heart trouble forced me into early retirement from the police service. Something still works though – and twin sons were born a couple of years after that so-called retirement… Nowadays I find myself working harder than ever in the 'House Husband' role! Quite unlike my predecessor, I am anything but a regular, knowledgeable or proficient observer and my 10" Newtonian almost never collects photons – *well* - its easier just to get the binoculars out…

There are many facets to Astronomy and my particular bent is towards the study of the history of the great science. My current research endeavour in this field is Orwell Park's history and the lives and observing endeavours of local astronomers from the nineteenth to mid 20th centuries. Within the past year it has been my privilege to provide a small assistance to OASI's President, Dr Allan Chapman – and others, in the foundation of a new national body, the Society for the History of Astronomy – and for which organisation I am also Treasurer. *"Each to his own"* - one can almost hear you groan!

A member of OASI for a mere five years, the latter three of which I have served as Treasurer, you may apprehend that one really is a *New Boy* in the broadest terms! Having laid out my personal astro preferences may I state categorically at the outset that in the best traditions of our society, all facets of the hobby and science of astronomy will be encouraged on an equal basis during my term of office. As with any new broom, I hope to bring about a few changes in the general administration and running of the society, but not so radically as to throw the proverbial baby out with the bath water! For that matter, **I would certainly appreciate hearing your views on where we are and where we as a society ought to be going? If you perceive a problem, or can see a way of improving some aspect of the running of the society, please do not hesitate to pass on your thoughts to any Committee member or to me??** The Orwell Astronomical Society has a proud heritage and is, I believe, by and large a happy band. David has handed me the helm of a well-found ship – I'll try not to capsize it!!

That's enough of me – *what else is new?*

Well, we have a new Treasurer for a start, in the guise of Garry Coleman and it has to be said there is a certain attraction in having a canny Scot looking after our cash! Many of you will know Garry through his previous sterling Committee work organising visits to the observatory by outside groups. Roy Gooding remains as Secretary – and mighty glad I am about that too. If ever there was a 'Mr Orwell AS', then Roy surely would be the fella and to his considerable credit, 2003 will be his 23rd year in office. We also welcome Paddy O'Sullivan onto Committee. Any regular attendee at the observatory on Wednesday nights will know Paddy and his recent work on the Millennium Telescope project stands out as a model of aptitude, dedication and determination by someone who has taken up the hobby comparatively recently. James Appleton has made a welcome return to the Committee and, alas, Joe Walsh has had to stand down through pressure of work. Thank you Joe for all your effort over many years. I am delighted that Martin Cook, Eric Sims, Mike Whybray and Ted Sampson have remained in office. Without Martin's engineering know-how the Tomline Refractor would be a pale shadow of the fine instrument we all know and love. For the first time in a very long while the Committee was elected by ballot as we had eight members standing for six places. A very healthy sign indeed and I hope those who were not elected this time around will try again next year. **ALL members of the society have an absolute right to attend Committee meetings and I would encourage you to do so** – we are all members together - the

Officers and Committee are merely members who have taken on the task of running the society from day to day.

We are blessed with members who quietly contribute in the background to the overall well being of the society and scarcely receive a mention. Of particular merit is our octogenarian artist, Leslie Lamb. For a number of years now, Les has drawn the cartoons that front our newsletter – even though he has lately been rather unwell. Those cartoons display his incisive wit and ability to make us laugh at ourselves and are what most members read before anything else. For that matter, you'd have to search a long way to find another astronomical society that can boast of having a monthly newsletter in constant production for over 20 years. Our editor, Eric Sims, deserves full marks for making it happen.

This coming year we shall be seeking a renewal of our licence with the school and, hopefully, the Library refurbishment work will be nearing completion. There is a potentially expensive problem on the horizon, which will need to be addressed. The observatory fabric is suffering water ingress and although Dave Payne and Martin Cook have made excellent temporary repairs, it looks as though some major work will sooner or later have to be undertaken around the base of the dome and the dome gutter where the original lining has rotted away.

Next month we look forward to Dr Allan Chapman coming along to deliver his first Presidential lecture on the singularly appropriate theme of the 'Victorian Amateur Tradition' – and the evening (Friday 7th March) should be a 'can't miss/must attend' for all our members... There is every possibility that our long awaited Millennium Telescope will achieve 'first light' sometime later this year, thanks to the previously mentioned effort by Paddy, along with Mike Harlow (Mirror grinder/polisher) and Neil Morley (Project manager) and others. The annual Barbeque will be held in my garden at Tuddenham in July - but there is some doubt over the future of the annual coach outing, which was rather poorly attended last year and consequently heavily subsidised – a case of *'use it or lose it'*! Due to the availability of planets for the next few years, it seems that we will have to shift the annual Open Weekends into the late winter/early spring period. Given that we have only just staged a large event, it may be expedient to make this year's show a small affair – just the observatory with no supporting exhibition – and begin to plan for the larger kind of event we have gotten used to in the past couple of years for Spring 2004? Talking of planets, we have the closest recorded opposition of Mars to look forward to this summer – building upon the success of James Appleton's

recent project with the Pleiades - there is surely scope for another society observing project? Mercury will transit the Sun's disk on the morning of Wednesday 7th May and we may be opening the observatory to members who would want to observe this comparatively rare phenomenon. An offshoot from our enormously successful workshops organised by Ted Sampson are the Small Telescopes Evenings and I am pleased to see that they have proved popular enough to allow us to expand our observing by two Mondays per month, besides the usual Wednesday evening meetings. Lastly, but by no means least, Roy Gooding is looking into the – *possibility* - of OASI hosting a one-day seminar in the late(ish) Spring in co-operation with the Society for Popular Astronomy to celebrate their 50th anniversary...

We have much to think about.
Lots to look forward to.
Time, then, to
GET ON WITH IT...

Best wishes

Kenneth J Goward FRAS
Chairman

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[1] I make no apology for using that rather non-politically correct term and have always understood a chair to be something one sits upon!
[2] Dr Allan Chapman on the occasion of the naming of the Tomline Refractor.

The first Orwell AS Presidential Lecture
Friday 7th March
At the Orwell Park School Orangery
Dr Allan Chapman MA D(Phil) FRAS

'THE VICTORIAN AMATEUR TRADITION'

7.15 for 7.30pm
Cheese & Wine Reception to follow the lecture

Open Weekend Unplugged!

Neil Morley, Jan 13th 2003

November 2002 marked the 30th Anniversary of OASI Open Weekends. The event coincided with two other 30th Anniversaries, namely the last manned lunar mission, Apollo 17, and the founding of the telescope supplier, Meade Corporation. Lunar rock samples from the Apollo 17 mission loaned from PPARC were displayed in the Exhibition area. Trade Stands included Anglia Cameras, Earth & Sky Books, Intes Micro (Russian telescope importer) and Aurora books who travelled all the way from York!

For the first time, publicity included local television coverage as well as newspapers. TV News interviews for BBC Look East and Anglia News were filmed at the observatory on the Saturday morning of the event. The Ipswich Evening Star publicised the event the preceding Friday evening and similarly the East Anglian Daily Times in their 'What's On' column.

The event proper commenced at 1pm on Saturday afternoon with a flurry of activity. Children's footlockers/desks and general paraphernalia were cleared at the foot of the observatory tower. This allowed the displays to be constructed in readiness for the official opening to the general public at 5pm. Display boards, extension leads, trailing sockets, DIY clamps, matt black backing sheets and the ever-useful Bluetac were very much in abundance. A volunteer's very much appreciated private refreshment area serving tea/coffee/squash and assorted biscuits was set up in the "end classroom".

The event was judged a true success. I received some positive feedback from the Trade Stands. In particular, Aurora Books stated they found this event extremely enjoyable and well organised compared to some others they'd attended recently. They fully appreciated a lot of work had gone into publicising the event which meant they could meet a much wider range of people than would be reached by simply advertising within the astronomical press. Aurora books mentioned to a large extent, the future of astronomical trading lies in attending these events which provide the ultimate vehicle for encouraging more people into the hobby and boosting membership of local astronomical societies.

Finally, I'd like to summarise the success of the event by quoting Ken Goward's words of thanks:

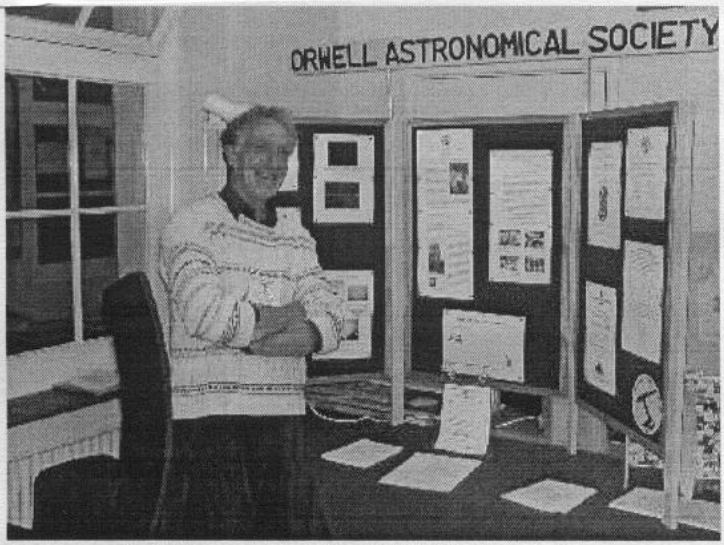
"This year's Open Weekend may be judged a success by any measure and was an excellent team effort which, from initial estimates, appears to have generated around £500 for the society coffers".

"All four traders have asked to come to any further Open Weekends and Anglia Cameras, for instance, took firm (cash deposit) orders for a dozen telescopes".

"Most of all it was fun (?) and the society can be proud of putting on an event which is gaining popularity both within and without the amateur astronomical community".

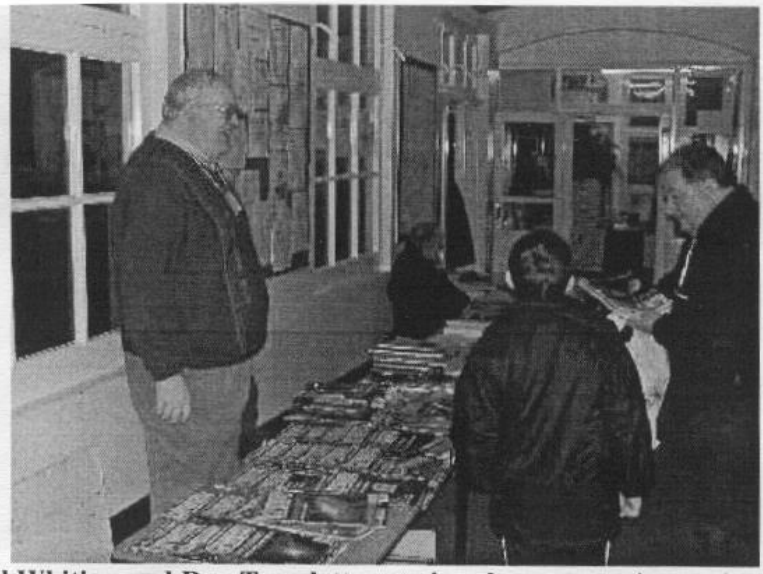
"THANK YOU VERY MUCH, all those who so generously supported us by arranging displays, helping out at the stands, answering endless questions at the eyepieces or freezing out in the car park..."

My thanks to everyone in making this a most memorable occasion!

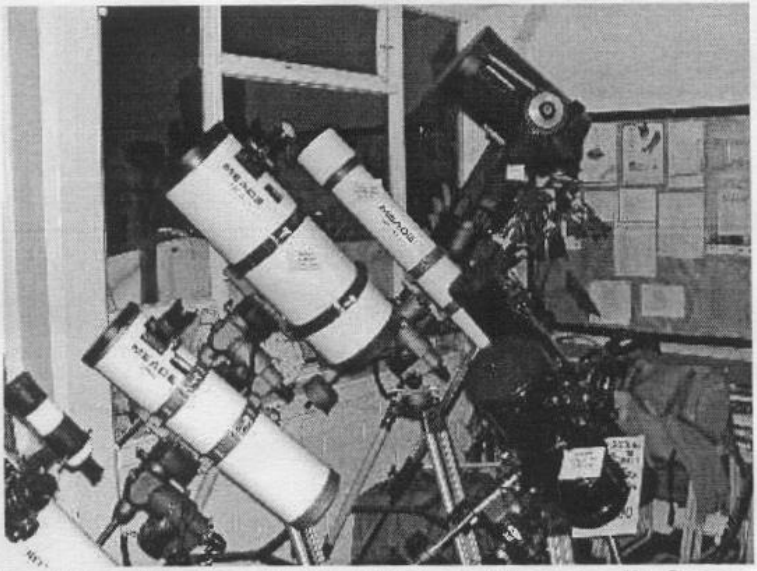


Ted Sampson at the OASI Society Stand

Ken Goward with the moon rock samples



Paul Whiting and Roy Tremlett manning the entrance/magazine stall



Selection of Meade and Helios telescopes from Anglia Cameras

Group Visits to the Observatory

Between September and November 2002 , 7 groups from outside the society visited the observatory

Between now and the end of March another 8 groups will be visiting us. Volunteers are needed to host visits in March , and to avoid the same few members being overburdened, more volunteers are required.

Below is the list of visits seeking hosts, please come forward and volunteer to host a visit

Please call Garry Coleman on [redacted]

Group	Date	Hosts
9th Ipswich Cubs	Thur 6th March	Volunteers needed
9th Ipswich Cubs	Thur 13th March	Volunteers needed
18th Holywell Cubs	Thur 21st March	Volunteers needed
Woodbridge Ladies Club	Thur 27th March	Volunteers needed

2003 COMMITTEE

		Home Phone Work Phone
CHAIRMAN	K Goward	[redacted]
SECRETARY & WORK PARTY ORGANISER	R Gooding	
TREASURER & PUBLICITY	G Coleman	
MECHANICS	M Cook	
NEWSLETTER CO-ORDINATOR	E Sims	
ASTRONOMY WORKSHOP	T Sampson	
VISIT CO-ORDINATOR	J Appleton	
EQUIPMENT CURATOR	P O'Sulivan	
LIBRARIAN	M Whybray	
CO-OPTED MEMBER LECTURE CO-ORDINATOR & DARK SKIES	P Richards	
JOURNAL ARTICLES TO	E Sims [redacted]	Ipswich Suffolk IP1 4HA
CORRESPONDENCE ADDRESS	R Gooding OASI Secretary [redacted]	Ipswich Suffolk IP1 6AE
MEMBERSHIP	M. Cook [redacted]	Ipswich IP4 5PZ

Observing Programme For February

Dates	Observing Director	Activities
Monday 10th February Monday 24th February	T Sampson P O'Sulivan	Small Telescopes Night Topic Jemini
Tuesday		Nothing Booked
Wednesdays 5th 12th 19th 26th from 8.00	M Cook D Payne	Nebular & Faint Objects
Thursday 13th AJS & Matchless Owners Club Thursday 27th St Albans School		Group Visit
Friday		Nothing Booked

All members are welcome on any night, but on nights other than Wednesday please check with the appropriate director that the observatory will be open.

Special Events

1. ASTRONOMY WORKSHOP 5th February
The Astronomy Workshop starts at 7.45pm on Wednesday 5th February. The topic is " Transit Telescopes ". The Presenter is Bill Barton.

2. COMMITTEE MEETING 15th MARCH
The next Committee Meeting is to be held on Saturday the 15th of March at 7.30pm in the club room at the observatory. All members are welcome to attend.

Society Contact Details

		Home Phone	Work Phone
Chairman	**D Payne**		
Secretary	**R Gooding**		

Contact details for the full committee are inside the back page.

e-mail queries: **ipswich@ast.cam.ac.uk**
WWW address: **http://www.ast.cam.ac.uk:/~ipswich/**