

# ORWELL ASTRONOMICAL

## SOCIETY IPSWICH

Charity No 271313

JANUARY 1998

*Happy New Year  
to all!*



*"Dad could we see the New Year coming in through your Telescope?"*

*"Shouldn't think so, it's always cloudy when something special should be in view."*

*Leland*

## SOCIETY NEWS

1998 AGM 17th January

\*\*\*\*\*  
 \* The 1998 AGM will be held on Saturday 17th January. All \*  
 \* members are invited to attend. The meeting will be held \*  
 \* in the room at the rear of the school library, \*  
 \* starting at 8.00 pm. If you are not sure where this is \*  
 \* please meet in the club room. \*  
 \* \*\*\*\*\*

### 2 1998 ANNUAL SUBSCRIPTIONS

Subscriptions for 1998 will be due from 1st of January, for members who have not already paid. The rates for 1998 have been kept at the 1997 prices

The rates for the new year will be:-

|              |        |
|--------------|--------|
| Junior & OAP | £8.00  |
| Adult        | £12.00 |
| Family       | £14.00 |

A renewal form is included with the January newsletter. It would be appreciated if you could return this 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 to

Martin Cook

Ipswich  
IP4 5PZ

## COMMITTEE MEETING NOTES

The last committee meeting of the year was held on Saturday 29th November.

- 1 The membership for 1997 reached an all time record, of 86.
- 2 The magazines that the society gets eg Sky & Telescope, are presently delivered to or collected from town, by several members. This is to be changed so that subscription magazines will be posted to the societies Librarian.
- 3 A review document on Light Pollution has been obtained, and has been placed in the library.
- 4 The renewal of our Licence to use the observatory was discussed at a recent meeting of the School Governors. The renewal of the licence has been verbal agreed. A full written copy will be obtained, probably early in the new year.
- 5 A brief discussion was held about the AGM meeting. The 1998 committee will probably be short of 1 or 2 members. If any one would like to fill any of these vacancies. please contact Roy Gooding

## NIGHT SKY

All times GMT

### SUN

Rises approximately at 08.00 to 07.50  
 Sets approximately at 16.00 to 16.40

### MOON

First quarter 5th  
 Full moon 12th  
 Last quarter 20th  
 New moon 28th

MERCURY Mercury will be at greatest western elongation on the 6th ( 23° ). It will be visible in the pre-dawn sky till mid month. Brightest mag. 0.0

VENUS Venus will be at inferior conjunction on the 16th. When it reappears in the morning sky it will be to close to the sun for observation.

MARS Mars will be visible only in the early evening. It will be setting by 19:00 in mid month. Mag. 1.2

JUPITER Jupiter will be visible in the early evening. By the end of the month it will be setting by 18:30. Mag. -2.0

SATURN Saturn will be setting at about 23.30 in mid month. Mag. 0.7.

URANUS Uranus will be conjunction with the sun on the 28th.

NEPTUNE Neptune will be in conjunction with the sun on the 19th.

*R. Gooding*

## GRAZING OCCULTATIONS

The paths of two grazing occultations pass close to Ipswich during 1998. Table 3 summarises the circumstances.

| Date   | Time (UT) | Lunar Phase | Sun Alt (°) | Star Alt (°) | Star Azi (°) | Limb | Star                 | Mag |
|--------|-----------|-------------|-------------|--------------|--------------|------|----------------------|-----|
| 12 Sep | 00:46     | 0.62-       | -33         | 30           | 102          | N    | ZC 635, $\gamma$ Tau | 3.9 |
| 07 Dec | 01:40     | 0.85-       | -54         | 52           | 145          | N    | ZC1236, $\xi$ Cnc    | 5.1 |

Table 3. Grazing occultations.

The first two columns of table 3 give the date and time of the graze. Column three gives the lunar phase (waning for both events), while column four gives the altitude of the Sun (below the horizon). Columns five and six give the position of the star. Column seven details the lunar limb which grazes the star, while the final two columns detail the star and its visual magnitude. ( $\xi$  Cnc is a triple star, with components of magnitude 5.6, 6.0 and 6.2; the table lists the combined magnitude.)

The graze tracks over East Anglia are as follows:

12 Sep: Great Dunmow → Sible Hedingham → Sudbury → Needham Market → Debenham → Laxfield → Halesworth → Lowestoft.

07 Dec: Braintree → Coggeshall → South side of Colchester → Wivenhoe → Great Bentley → Thorpe-le-Soken → Walton-on-the-Naze.

Figure 1 illustrates the graze tracks.

# OCCULTATION PREDICTIONS FOR 1998

by James Appleton

This article summarises the occultations visible from East Anglia during 1998. The Orwell Park Observatory holds a comprehensive listing which contains full details for each event.

In general terms, 1998 is a good year for occultation observers! There are a total of 703 lunar occultations during the year, including two grazing occultations. The Moon does not occult any planets as seen from the region during 1998.

The remainder of this article summarises the circumstances of the most spectacular occultations. It lists details for the location of Orwell Park Observatory; however, differences will in general be negligible for locations throughout East Anglia.

## OCCULTATION PREDICTIONS

I use a complex suite of computer software to predict occultation events. The software models the motion of the Moon through the sky in great detail, and by comparing the position of the Moon at each instant of time with the co-ordinates of all stars within a narrow band of the ecliptic, it evaluates the precise time at which occultation events occur. Once the time of an event is known, the software runs additional algorithms to calculate other relevant astronomical details.

The software is based on the algorithm *Occult* in *Astronomy On The Personal Computer* by O.Montenbruck and T.Pfleger. However, I have incorporated numerous enhancements to improve accuracy and to filter out predictions occurring under unfavourable circumstances. The software uses the ephemeris DE-200 to provide the position of the Moon and the star catalog XZ94D to provide stellar positions. DE-200 is a high-accuracy reference ephemeris created by the NASA Jet Propulsion Laboratories. XZ94D is a special purpose catalog compiled by the International Occultation Timing Association (IOTA) in 1994. XZ94D is an enhancement of NASA's Position And Proper Motion (PPM) star catalog.

The software uses IOTA's electronic Watts charts to correct predicted timings for the local lunar limb profile. (This typically makes a difference of several seconds.)

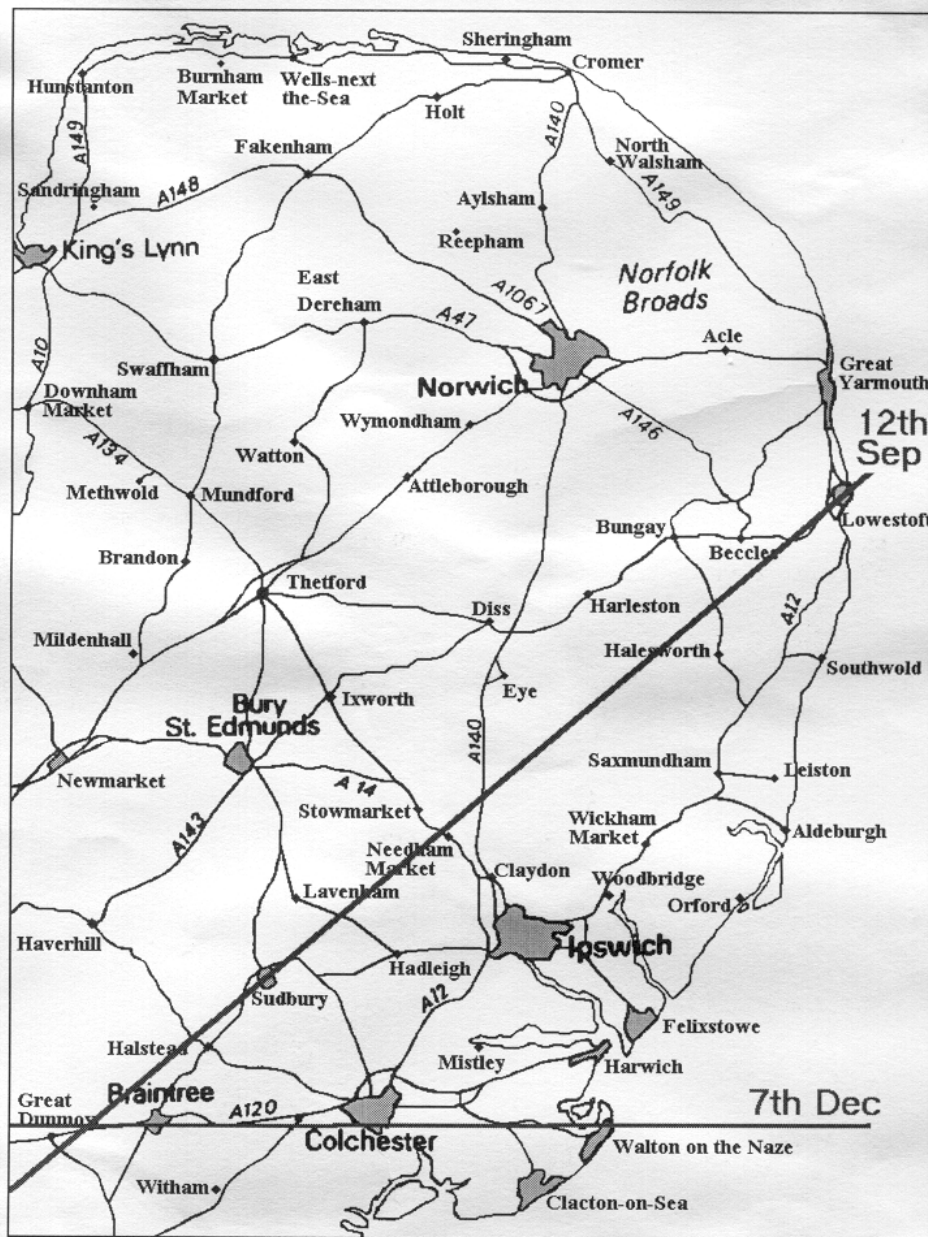


Figure 1. Grazing occultation tracks.

## TOTAL OCCULTATIONS

Thirteen of the occultations are brighter than magnitude 4.0, and so should be readily visible in small telescopes or binoculars. Table 1 lists the circumstances of these events.

| D<br>or<br>R | Date & Time<br>(UT) | Lunar<br>Phase | Sun<br>Alt<br>(d) | Star<br>Alt<br>(d) | Min<br>Dist<br>(rad) | Star        | Mag |
|--------------|---------------------|----------------|-------------------|--------------------|----------------------|-------------|-----|
| R            | Sat 17 Jan 22:28    | .75-           | -53               | 6                  | .93S                 | beta Vir    | 3.8 |
| D            | Wed 04 Mar 21:37    | .44+           | -35               | 30                 | .14N                 | theta 2 Tau | 3.3 |
| R            | 22:39               |                | -41               | 21                 |                      |             |     |
| D            | Sat 14 Mar 05:39    | .99-           | -6                | 10                 | .17N                 | eta Vir     | 3.9 |
| D            | Tue 28 Apr 18:40    | .07+           | 4                 | 26                 | .81N                 | Aldebaran   | 0.8 |
| R            | 19:14               |                | -1                | 21                 |                      |             |     |
| D            | Sat 12 Sep 04:42    | .60-           | -7                | 54                 | .18S                 | theta 2 Tau | 3.3 |
| D            | Fri 16 Oct 03:03    | .16-           | -30               | 9                  | .48N                 | rho Leo     | 3.8 |
| R            | 03:58               |                | -23               | 18                 |                      |             |     |
| R            | Thu 05 Nov 18:58    | .96-           | -25               | 10                 | .51N                 | gamma Tau   | 3.9 |
| D            | Thu 05 Nov 21:45    | .95-           | -47               | 34                 | .60S                 | theta 2 Tau | 3.3 |
| R            | Thu 05 Nov 22:35    |                | -52               | 41                 |                      |             |     |
| D            | Fri 06 Nov 01:21    | .95-           | -49               | 54                 | .07S                 | Aldebaran   | 0.8 |
| R            | 02:32               |                | -40               | 52                 |                      |             |     |
| D            | Sun 15 Nov 04:22    | .13-           | -26               | 11                 | .36S                 | gamma Vir   | 2.9 |
| R            | 05:26               |                | -16               | 20                 |                      |             |     |
| R            | Wed 30 Dec 16:25    | .92+           | -5                | 19                 | .46N                 | gamma Tau   | 3.9 |
| D            | Wed 30 Dec 19:36    | .93+           | -33               | 45                 | .82S                 | theta 2 Tau | 3.3 |
| R            | 20:15               |                | -39               | 50                 |                      |             |     |
| D            | Wed 30 Dec 23:18    | .93+           | -60               | 51                 | .02S                 | Aldebaran   | 0.8 |
| R            | Thu 31 Dec 00:28    |                | -61               | 43                 |                      |             |     |

Table 1. Occultations of stars brighter than magnitude 4.0.

The first column of table 1 denotes the phenomenon: 'D' denotes a disappearance and 'R' a reappearance. Both D and R times are listed for all occultations except where one or the other would occur at too low an altitude to be easily visible. Column two gives the date and time (UT) of the occultation. Column three details the lunar phase as a fraction of unity ('+' denoting waxing and '-' denoting waning). Columns four and five give the altitude of the Sun and the star, both in degrees. (A negative solar altitude implies that the sun is below the horizon.) Column six gives the minimum distance, in lunar radii, of the star from the centre of the Moon, at the time of closest approach (midway between D and R events). Here 'N' indicates a North passage of the star and 'S' a South passage. Columns seven and eight provide the star's name and magnitude.

The Moon's orbit is defined by a range of periodicities, both short and long term. The short term periodicities mean that the Moon's path through the sky tends to follow a pattern whereby it almost repeats itself every month (on average). However, the longer term periodicities gradually shift the orbit so that no particular pattern of approximate repetition can last more than a few years. This results in so called "occultation seasons", lasting for some years, during which particular stars are repeatedly occulted. We are currently in the middle of an occultation season of Taurus. This is reflected by the three occultations of Aldebaran during the year, and also by several passages of the Moon through the Hyades star cluster.

When the Moon traverses a rich star field such as the Hyades, several occultations can occur during a single evening. Table 2 lists all the evenings during 1998 during which more than ten occultations occur - many of these are associated with stars in the constellation Taurus.

| Date   | No<br>occs. | Date   | No<br>occs. | Date   | No<br>occs. | Date   | No<br>occs. |
|--------|-------------|--------|-------------|--------|-------------|--------|-------------|
| 01 Jan | 11          | 02 Jan | 12          | 03 Jan | 13          | 04 Jan | 18          |
| 01 Feb | 15          | 02 Feb | 14          | 04 Mar | 24          | 05 Mar | 11          |
| 07 Mar | 18          | 02 Apr | 18          | 03 Apr | 15          | 01 May | 11          |
| 03 May | 14          | 26 Oct | 20          | 27 Oct | 19          | 23 Nov | 12          |
| 24 Nov | 11          | 26 Nov | 12          | 22 Dec | 14          | 24 Dec | 12          |
| 25 Dec | 18          | 27 Dec | 11          |        |             |        |             |

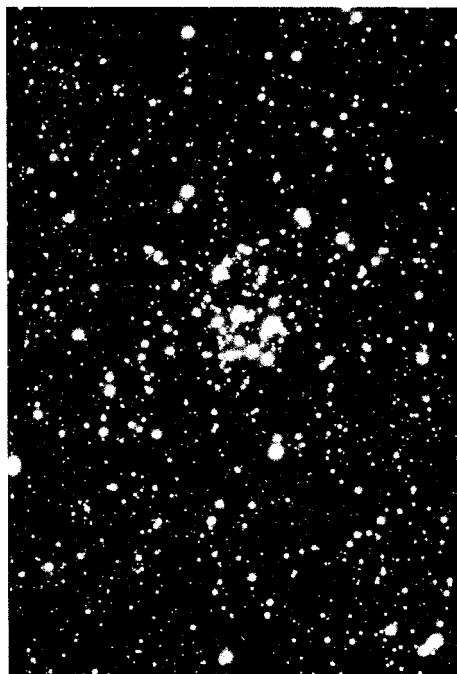
Table 2. Evenings during 1998 with more than ten occultations.

## Deep Sky objects in Monoceros

David Payne

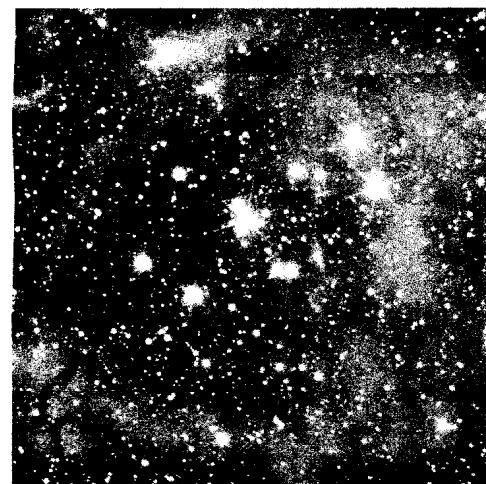
Lying east of brilliant Orion, north of Canis Major with Sirius and southwest of Canis Minor with Procyon, Monoceros tends to be rather outshone by its impressive neighbours. It contains only four stars just above 4th magnitude. The brightest star  $\beta$  is a double with components of magnitude 4.6 and 4.7 at a separation of 13.2", the combined magnitude of 3.7 outshines  $\alpha$  Monocerotis which shines at only magnitude 3.93. The other two stars above magnitude 4 are 30 at magnitude 3.9 and  $\gamma$  at magnitude 3.98. Such a faint constellation bordered by such bright neighbours tends to get overlooked, however it lies within a rich part of the Milkyway and contains several interesting deep sky objects including the famous Rosette nebula.

Monoceros only contains one Messier object, M50, a bright open cluster containing maybe 200 stars in the 12 to 14 magnitude range. It is a fine sight in small telescopes, easily resolvable even in 10x50 binoculars. It is a moderately compact cluster with a diameter around 20'. As often occurs in these galactic clusters there is a fairly prominent red star just south of the cluster centre. The integrated magnitude of the cluster is 6.3 making it a potential; naked eye object for keen sighted observers under good clear conditions and dark skies. The cluster is estimated to be about 2900 light years away which would give an actual diameter for the brighter central region of around 10 light years.

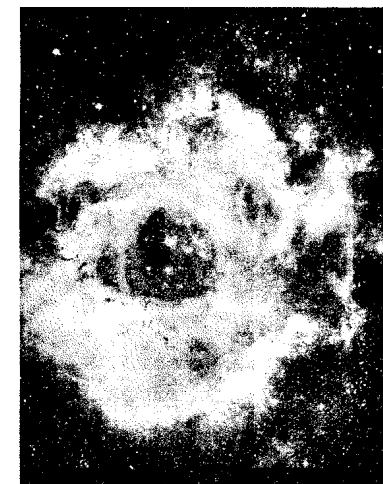


Open Cluster M50

NGC 2244 is the conspicuous open cluster buried within the Rosette nebula. The gaseous Rosette nebula is very faint and difficult visually in the telescope,



Open Cluster NGC2244



NGC 2237 The "Rosette" nebula

although it can be glimpsed in binoculars as a faint glow surrounding the cluster.

The cluster is a loose roughly rectangular collection of about twenty bright members and a much larger number of fainter stars with a diameter about 40'. It is dominated by the 5.85 magnitude star 12 Monocerotis, which may not be a true cluster member. The cluster is bright enough to be glimpsed with the naked eye and is a splendid binocular object. In the telescope low power wide field eyepieces are required to see it at its best.

The Rosette nebula is best as a photographic object. It is about 80' in diameter and surrounds the cluster which is embedded in the relatively clear central region. The distance of the nebula and cluster is estimated to be about 2600 light years which gives a diameter for the nebula of around 55 light years. In photographs the nebulous region reveals a wealth of detail including dust lanes and small dark globular objects that appear to be local condensations of the gas and dust in the nebula. These globulars will probably be the progenitors of new stars and planetary systems.

The gaseous nebula NGC 2261 is known as Hubble's Variable Nebula because of the peculiar way that it changes its visual appearance over time. It is a tenth magnitude object about 1' in length and has a high surface brightness that makes it fairly easy to observe in moderate telescopes.

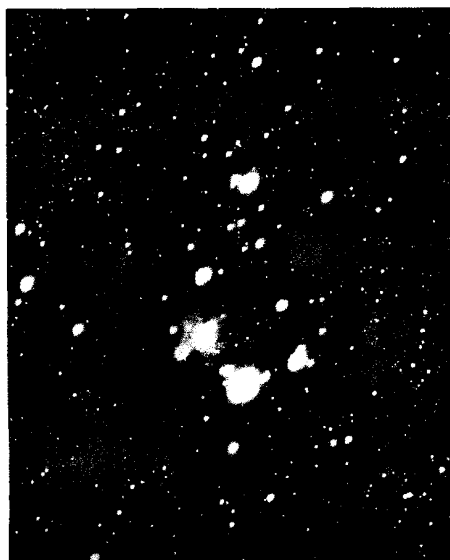


NGC 2261

The illuminating star is an irregular variable with a range of about two magnitudes. The changes in the appearance of the nebula do not appear to correlate with the changes in the brightness of the star and can occur over relatively short periods of time. The apparent movement of patches of changing illumination within the nebula have been observed to move as much as 1" in as little as four days. At the distance of the nebula this would require movements approaching or even

exceeding the speed of light! It now appears that the changes in the appearance of the nebula are probably due to shadowing effects produced by material orbiting close to the star, casting shadows and changing the illumination of the nebula. Photographs over long periods of time reveal that details will disappear and later reappear within the nebula, suggesting that the basic structure is only slowly changing with time.

Another bright open cluster with associated faint nebulosity is NGC 2264. The



NGC 2264 Christmas Tree Nebula



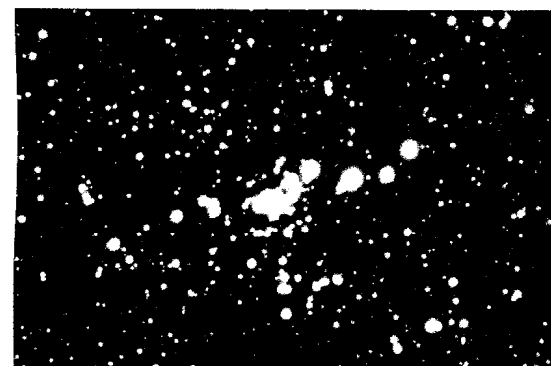
"Cone Nebula

11

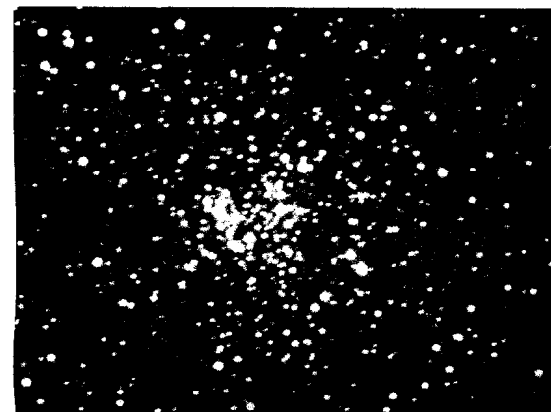
cluster is also known as the "Christmass Tree Nebula" while a portion of the gaseous nebula is known as the "Cone" nebula for obvious reasons after a glance at the photograph.

The cluster contains about 20 bright stars and a hundred or so fainter members. The brighter stars form a triangular or arrow head shape which clearly resembles the lights decorating a christmas tree. It is almost 1/2 a degree in length so again requires low power wide field eyepieces to see it well. The cluster lies at a distance of about 2600 light years giving a true length for the Christmas tree of about 20 light years. This cluster also appears to have a super giant member, the star S Monocerotis has a magnitude of about 4.3, it is slightly variable with a range between 4.2 and 4.6. If the star is a true cluster member it will have a luminosity of about 8500 suns.

The nebulosity surrounding the cluster is too faint to be seen visually except in large telescopes but time exposure photographs/ccd images reveal a complex and beautiful structure with the dark "Cone" dominating the scene. The "Cone" appears to be a huge column of dark gas and dust, about 6 light years long, silhouetted against a background of bright nebulosity.



NGC 2301

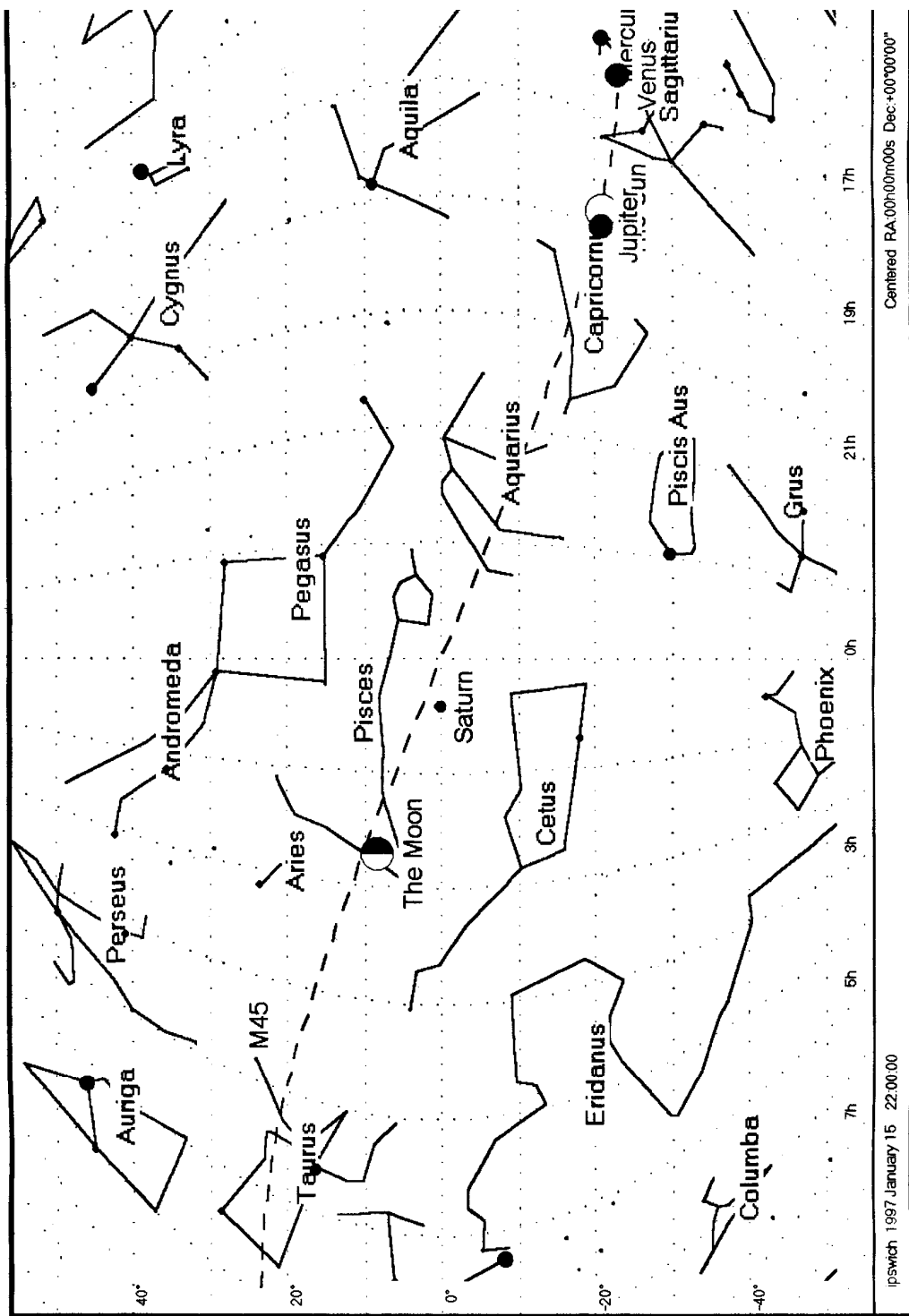


NGC 2506

While searching in the area of Monoceros there are several other NGC objects worth finding including the bright group in NGC 2301 which is a fairly condensed although somewhat elongated cluster of about 60 stars in the magnitude 8 region. Another fine object is NGC 2506 a more compact cluster of fainter stars about 10' in diameter with a visual magnitude around 11.

12





Centered RA:00h00m00s Dec:+00°00'00"

Ipswich 1997 January 15 22:00:00

## PROGRAMME FOR JANUARY

|   |   |
|---|---|
| Mondays from 7.30pm<br>No Director for this night         | GENERAL OBSERVATION SECTION                             |
| Tuesdays from 7.30pm<br>Mr P Richards [REDACTED]          | OBSERVATORY VISITS FROM OUTSIDE GROUPS                  |
| Wednesdays from 8.00pm<br>Mr M Cook [REDACTED]            | NEBULA & FAINT OBJECTS SECTION<br>Mr D Payne [REDACTED] |
| Thursdays from 7.30pm<br>Mr P Richards [REDACTED]         | OBSERVATORY VISITS FROM OUTSIDE GROUPS                  |
| Fridays from 7.30pm<br>9th - 23th<br>Mr J Hood [REDACTED] | DOUBLE STARS  |

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

Lectures and other events:

### Annual General Meeting

The A.G.M is to be held on Saturday 17th of January at 8.00pm in the room behind the school library. All members are welcome to attend.

e-mail enquires to [oasieng@btbcs.bt.co.uk](mailto:oasieng@btbcs.bt.co.uk)  
 WWW url <http://www.ast.cam.ac.uk:80/~ipswich/>

### 1997 COMMITTEE

|                           | Home Phone | Work Phone   |
|---------------------------|------------|--|
| CHAIRMAN                  | D Payne    | [REDACTED]   |
| SECRETARY                 | R Gooding  | [REDACTED]   |
| TREASURER                 | M Nicholls | [REDACTED]   |
| MAINTENANCE CO-ORD        | M Cook     | [REDACTED]   |
| JOURNAL CO-ORDINATOR      | E Sims     | [REDACTED]   |
| PUBLICITY & VISIT CO-ORD  | P Richards | [REDACTED]   |
| EQUIPMENT CURATOR         | M Harlow   | [REDACTED]   |
| SPECIAL EVENTS CO-ORD     |            |  |
| LIBRARIAN & COMP SOFTWARE | J Appleton | [REDACTED]   |
| JOURNAL ARTICLES TO       | E Sims     | [REDACTED] Ipswich Suffolk IP1 4HA                   |
| CORRESPONDENCE ADDRESS    | R Gooding  | OASI Secretary<br>[REDACTED] Ipswich Suffolk IP1 6AE |
| MEMBERSHIP                | M. Cook    | [REDACTED] Ipswich IP4 5PZ                           |