The Newsletter

of the Orwell Astronomical Society (Ipswich)

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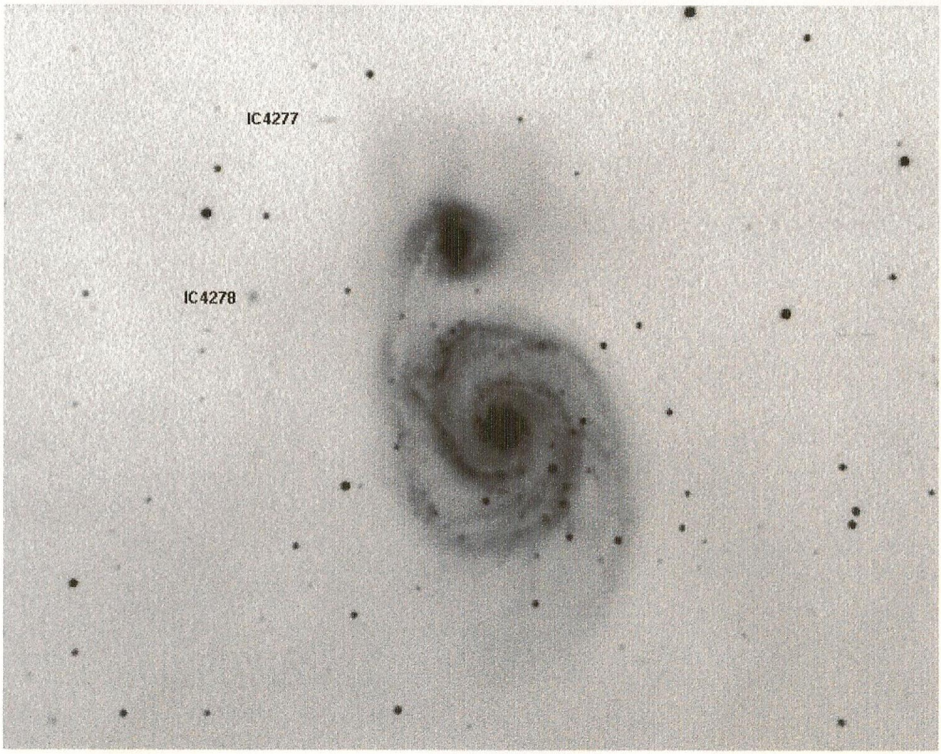
2009 JUNE No 442



M51

This is an image of M51 taken by Mike Harlow

Society News (Roy Gooding)

1 Committee Meeting Sunday 20th September 2009 at 7:30pm

All members are invited to attend the next Committee meeting, on Sunday 20th September at 19:30 at Nacton Village Hall **Please note date, time and venue**

2 Observatory Keys

A new set of observatory key costs the society £18. If you have a set of keys that you no longer need please return them to Roy Gooding

3 Access into the School Grounds and Observatory Tower

Please use the third gate into the school grounds, this is the gate behind the Gym. If the Black door entrance at the base of the observatory tower is locked, you will have to phone someone in the observatory to let you in. My mobile number is [redacted]. (Roy Gooding) alternatively the Observatory mobile is [redacted] during meeting hours. The gate code is on the back of your membership card

4 Welcome to New Members

Roger Lewis Peter Hallows Michael Norris
Tony Baines and family Neal Daley

5 Events for International Year of Astronomy 2009 (IYA 2009)

Autumn Meetings	Venue	Date
Autumn Open Weekend		Saturday & Sunday 24th & 25th October 19:30 to 22:00
Talk and Telescope Evening	Nacton Village hall	Monday 26th October 19:30
Talk and Telescope Evening	Nacton Village hall	Tuesday 27th October 19:30
Sidewalk Astronomy (Night Observing)	The Ship Levington	Thursday 29th October 19:30
Astronomy in the Park Solar observing	The Reg Driver Visitors Centre Christchurch Park (Bolton Lane entrance)	Saturday 31st October & Sunday 1st November 11:00 to 15:00

The success of our contribution to IYA 2009 is dependent on the enthusiasm of our members. Please come along to as many events as you can.

Telescopes are needed for events at, The Ship, and Astronomy in the Park (preferably solar ones if available)

For more information please contact Paul Whiting or Roy Gooding

6 Other Society Events

Meeting	Venue	Date
Summer Barbecue	Newbourne Village Hall	Date and time to be confirmed
Perseid meteor watch	The Dip" Felixstowe"	Saturday 15th August 20:30
Geminid meteor watch	The "Dip" Felixstowe	To be confirmed
Christmas Meal	Not yet confirmed	Wednesday 16th December

Spring Open Weekend

This year, as every member should know, is International Year of Astronomy. The Op Weekend was the culmination of our week of IYA Spring events.. It was held on Saturday Sunday 4th & 5th April. The programme was the same as in previous years, with 3 observi locations in operation, the Tomline 10" refractor, small telescopes on the balconies a observing outside on the School's playing field.

The outside observing has been expanding in recent years. In the past the field was us primarily for naked eye and binocular astronomy only. This year we had two telescopes a two large binoculars available. John Wainwright had his 8" reflector in use, this has n become a regular Open Weekend feature, in recent years. In addition, James Appleton a brought along his 10" Meade. On the Saturday all this kit had to be manhandled up from t car park behind the school's gym onto the playing field. After a little investigation it v found that the gate onto the playing field was not locked, this enabled the telescopes to driven to the observing location on Sunday. The site chosen was our usual one, between t pavilion and the clock tower.

The weather on Saturday was quite sunny, which bid well for the evening, However t evening sky was disappointing. The skies were very hazy with a limited mag. of about Conditions were so bad that observing any deep sky objects was impossible. We were unal to give the visitors a guided tour of the night sky as scheduled, but not all was lost. The clo cover was thin enough to observe the Moon and Saturn. Sunday also started sunny, and seemed well for the evening. The skies remained clear while travelling out to Nacton, but t was about to change. At around 7:30 a dense bank of sea fog drifted up the Orwell. Visibil reduced to about less than 200 yards. As far as I can remember this was the first ti observing on an Open Weekend had ever been effected by fog! Luckily the Moon was bri enough to be seen through the murk.

The number of visitors was about 160. Finally I would like to thank all members who w able to give their time and making this Open Weekend another success.

Roy Gooding

Night Sky (June)

All times GMT

Moon

Full Moon	3rd Quarter	New Moon	1st Quarter
7th	15th	22nd	29th

Object	Date	Times		Mag.	Notes
		Rise	Set		
Sun	1	03:50	20:15		
	30	03:48	20:28		
Mercury	1	03:28	18:13		Mercury is very low down in the morning twilight sky. Greatest western elongation is on the 13th
	30	02:47	19:18		
Venus	1	02:18	15:46	-4.2	Venus is low down in the early morning twilight this month.
	30	01:30	16:35		
Mars	1	02:20	16:19	1.1	Mars is also in the morning twilight sky, making it difficult to see
	30	01:09	16:28		
Jupiter	1	00:30	10:14	-2.3	Jupiter still low down in Capricornus
	30	22:33	08:20		
Saturn	1	11:48	01:19	0.6	Saturn is now moving into the evening twilight sky.
	30	10:03	23:23		
Uranus	1	01:21	13:04	5.8	Uranus is in the morning twilight at the start of the month
	30	23:24	11:12		
Neptune	1	00:27	10:15	7.8	Neptune and Jupiter are close to each other in the sky this month.
	30	22:28	08:19		

Shower	Limits	Maximum	ZHR
Ophiuchids	May19th to July	June 9th June 19th	5

Meteor source is the BAA Handbook

OCCULTATIONS DURING JUNE

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

Date	Time (UT)	D R	Lunar Phase	Sun Alt (d)	Star Alt (d)	Mag	Star
01 Jun	23:14:09	D	0.69+	-15	13	7.1	RW Vir
16 Jun	00:44:29	D	0.49-	-14	8	4.5	lambda Psc
	01:47:29	R		-11	18		
30 Jun	21:51:15	R	0.65+	-10	11	4.8	69 Vir

James Appleton

ELECTRONIC NEWSLETTER ARCHIVE

Diligent readers (and there are many!) of the OASI *Newsletter* will recall that in the October 2005 issue I gave details of the electronic *Newsletter* archive which I had created. At that time, the archive covered edition 1 to edition 400 (February 1972 to August/September 2005) and was complete apart from edition 24 (January 1974) for which no paper copy could be located.

In recent months, I have updated the archive up to and including edition 437 (January 2009). Martin Cook found a copy of edition 24 in his loft, thanks to which I have been able to make the archive complete.

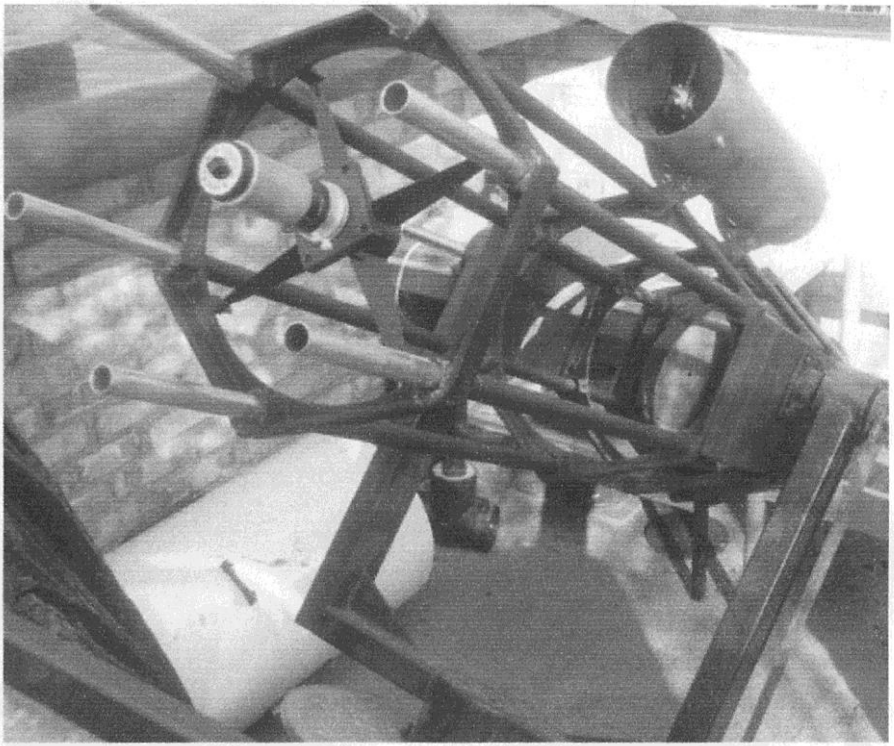
The archive fits on a DVD. It contains a scan of every non-blank page of the *Newsletter* and an index to the articles in the form of an Excel spreadsheet, enabling keyword searches. The index is hyperlinked to the scans of the articles to make for easy retrieval of material.

Key statistics of the archive are as follows:

Newsletters archived:	edition 1 to edition 437
Period:	February 1972 – January 2009
Number of scanned pages:	4862
Number of items indexed:	10,293
Size of archive on DVD-ROM:	2.1 GB
Size of index when printed	237 A4 pages

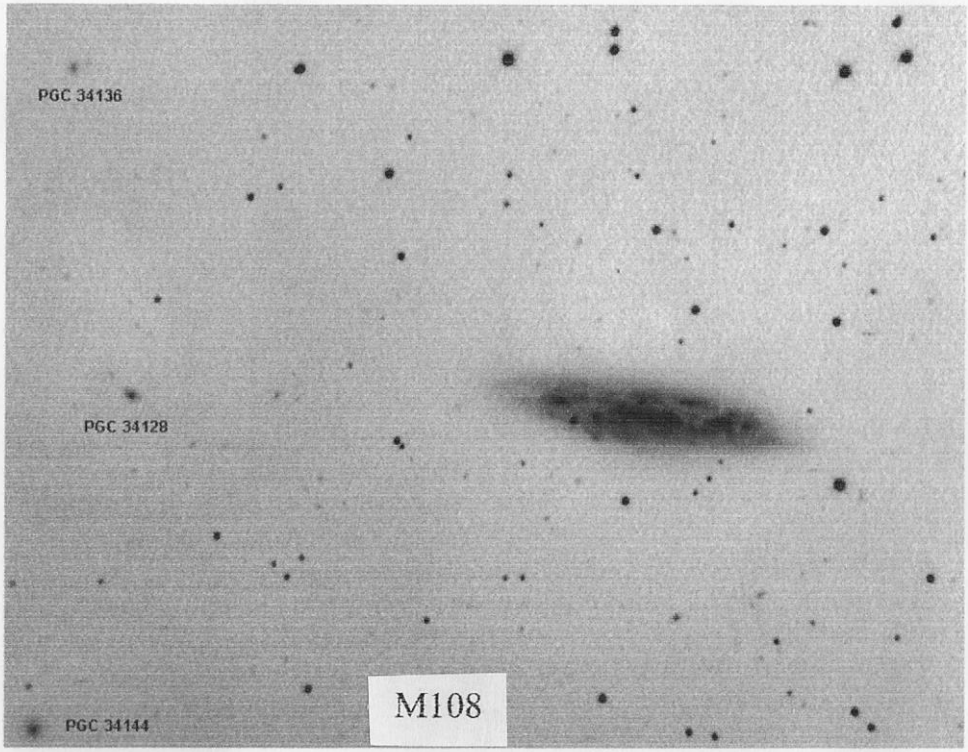
There is a copy of the archive in the OASI library, and I can burn a copy onto DVD for any member of OASI who wants one.

James Appleton
05 May 2009



They say it's difficult to take a bad image of M51 so it seemed like an ideal target to test out my newly built telescope. The parts for the telescope have been around for years. I made the 30cm mirror way back in the early 1980s and the 'tube' assembly is based on a design illustrated in the '1976 Yearbook of Astronomy'. Thanks to Martin Cook for getting me the aluminium poles which enabled me to rebuild it.

The design dispenses with the secondary mirror so it is purely a 'camera' or prime focus reflector. In the photo a laser collimator is placed in the focuser where the CCD (Starlight Xpress MX916) normally sits on a heavy duty spider. Getting rid of the secondary adds an extra 10% or more to the light gathering power but more significantly for me makes collimation much easier.



The image of M51 is a stack of 13 x 20 second exposures liberally stretched and shown as a negative. Two other presumably more distant galaxies also appear (with IC numbers added for identification). M51 On front cover

The image of M108 is a stack of 25 x 20 second exposures processe in a similar way. More distant galaxies pop into view this time with PGC numbers added. To give some idea of what can be detected wit this set-up, PGC 34128 is listed as magnitude 16.

Incidentally, the little blue tube on the side of the main telescope is the refurbished 4 ½ inch that was at the observatory for so long. It's perfect finder given that it isn't possible to look through the main instrument.

Mike.

How Young Did You Start Astronomy ?

I find it highly appropriate in the year of astronomy for my 20 month old son, [redacted] to start using a telescope. A few days a go after he pointed out the moon to his mother and myself he asked for "dad's scope". He had only used it once before with me to look at the moon. We then spent half an hour trying to look at the moon though the clouds. He now also understands how much a pain clouds are.

My son starting early into astronomy made me think how early other people had started into astronomy. Maybe others will let us know?

I for one started at about 5 years of age after one of my uncles took it upon himself to give me a small telescope (1.5" refractor) and a lot of science information books /magazines over a period of years. It was like feeding an open furnace.

I set up a school astronomy club at about 8 years of age. The club was causing concern for parents because we used to go around each others houses and the number of people in the club was starting to get large. Part of the problem seemed to be the wonderful food that the parents were giving us possibly attracting non astronomical types. I had to ask each child to pay a small fee towards the food and to also set a small exam to ensure those that were in the club were genuinely interested in astronomy. Well, having given everyone in the club the works, some-one pointed out that I was the only one who had not been tested so the others set a test for me –luckily I passed. This was in the early 60s and one of the fun things in the club was we used to pretend we had sent a manned rocket to the moon and we set up a command centre in one room and the astronauts in another. We used to tape and play back what we did to see if it made sense –let alone cause a lot of hysterics when we did not do things right and had also made funny noises to simulate poor reception.

My secondary school had a refractor and domed observatory but they were both in a bad state and no-one was willing to spend the time and money to refurbish them. So instead of running an astronomy club I used to give talks about astronomical subjects in my English lessons where we were all expected to give talks every so often. I seemed to capture several people's interest and I was pleased that when we were all taking our CSEs and have to give a talk there were 4 different presentations on astronomy. I gave a talk on suspended animation which at the time totally mind blowed the assessor. I was mainly discussing how it could possibly

be used to enable astronauts to travel the vast distances in space. In my talk I compared what the Russians and American were doing and that I believed the Russians were ahead of the Americans in "cooling/partially suspending" and recovering mice.
Anyway that's my story and in 1980 I joined this club. I suspect several of you had similar introductions to astronomy.

Best regards from Roy Lobbett

[redacted] with 80mm Meade refractor looking at the moon with a low magnification (*24), wide field eyepiece.

LIGHT GATHERING

By Trefor Harries

NOTE: Please be forewarned that the conclusions of this article should in no way be interpreted to imply that it is safe to use telescopes or binoculars to view the Sun - it is not, and no such implication is intended. Using any sort of optical instrument to look at the Sun directly is dangerous and can lead to permanent blindness.

This article discusses the basic concept of light gathering by telescopes. Astronomers are obsessed with gathering as much light as they can. The glib statement that the more light you collect the more you will be able to see seems to be eminently self-evident but, as with most ideas, looking deeper reveals that there is a little more to it. This article explores the basics of this topic. Some very simple maths will be used to quantify the arguments.

During visual use of a telescope not all the light that enters the objective lens will be received by the eye:

1. Only that part of the light cylinder exiting the eyepiece (the 'exit pupil') that is encompassed by the eye is received.
2. Only light from the actual field of view is received.

First, let us define some of the parameters we will be dealing with :-

L	Light gathering power (as multiple of eye)
A_o	Aperture of objective
A_e	Aperture of exit pupil
A_p	Aperture of eye pupil (approx 7mm for a young eye, 5mm for an old eye)
I	Intensity (light per unit area as multiple of eye)
M	Magnification

Consider the simplest case of a field of view comprising a uniform brightness :

$$L = (A_o / A_p)^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

also $$A_e = A_o / M \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

From (1) and (2) :

$$L = (M A_e / A_p)^2 \qquad \text{Providing } A_e \leq A_p$$

Now $I = L / M^2$ which, again from (1) and (2) :

$I = (A_e / A_p)^2$ Providing $A_e \leq A_p$

So, if $A_e < A_p$

then $I = (A_e / A_p)^2$

else $I = 1$

since if $A_e > A_p$ *then* $I\ (= L / M^2) = (A_o / A_p)^2 / M^2 \times (A_p / A_e)^2$

$(A_p / A_e)^2$ being the proportion of available light which enters the eye.

and as $M = A_o / A_e$

$$I = (A_o / A_p)^2 \times (A_e / A_o)^2 \times (A_p / A_e)^2 = 1$$

Table 1 : Some examples for an eye pupil diameter A_p of 5mm :

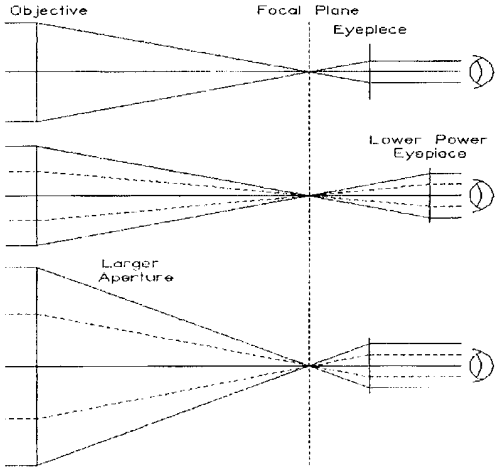
M x A_o	**$A_e < A_p$**	**Exit pupil A_e (mm)**	**Theoretical L**	**Actual L**	**I**
7 x 50	No	7.14	100	49	1
10 x 50	No	5.00	100	100	1
10 x 80	No	8.00	256	100	1
15 x 70	Yes	4.67	196	196	0.87
30 x 150	No	5.00	900	900	1
60 x 150	Yes	2.50	900	900	0.25
120 x 150	Yes	1.25	900	900	0.0625
240 x 150	Yes	0.625	900	900	0.015625

Where Actual $L = (A_o / A_p)^2 \times (A_p / A_e)^2$ and $I = (A_e / A_p)^2$ when $A_e < A_p$ (else = 1)

From all this it appears that a uniform background brightness cannot be increased in intensity by any passive optical apparatus, i.e. any apparatus that doesn't use photomultiplication as in e.g. a nightscope. It appears that the increase in light gathered is offset by the dilution due to magnification. Attempting to increase the surface brightness by reducing magnification merely

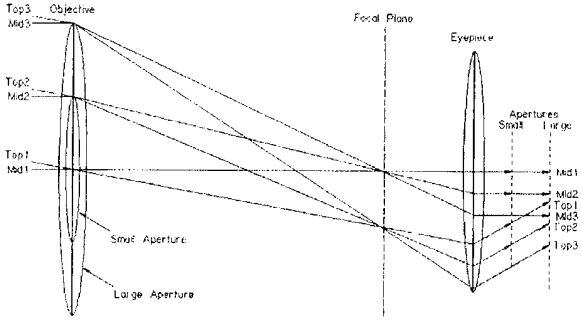
enlarges the exit pupil beyond the bounds of the eye pupil thereby restricting the received area of the exit pupil, which is equivilent to stopping down the objective by the same proportion, so resulting in the loss of any extra light (Fig. 1).

FIG. 1 : Effect Of Lower Magnification And Larger Aperture



Note that all parts of the field of view contribute to the final image regardless of the size of the exit pupil. This is demonstrated in Fig. 2 :

FIG. 2 : Aperture And Exit Pupils



In Fig. 2 rays are drawn from two points in the object : 'Mid' from the middle of the object, and 'Top' from the top of the object. The small aperture contributes rays 1 and 2 to the final image. The large aperture contributes rays 1, 2, and 3. From this it can be seen that the larger aperture contributes more rays, but that the smaller aperture includes rays from all the same points of the object that the

larger aperture does.The foregoing conclusion concurs with our experience; when we look at the daytime sky through binoculars for instance, we are not initially blinded by the intensity of the sky even though the objective lenses may be gathering a hundred times the amount of light that our eyes could. Light adaption by the eye will not explain this as it would take several seconds to achieve during which time we would be painfully dazzled. Instead we see the sky brightness very much as with the unaided eye. This conclusion should not be used to assume that observing the Sun directly with telescope or binoculars is possible. Although the surface brightness may not be higher, there will be a large increase in the total light and heat received which may get focussed onto the eye causing retinal damage, the amount of which will depend on where the eyepiece is positioned within the focussing tube, and where the eye is placed relative to the eyepiece.

So how is it that a telescope or binoculars allows us to see fainter objects than our eye can perceive? The unaided eye can typically see stars down to the sixth magnitude whereas for example a 150mm telescope might detect stars down to the thirteenth magnitude. To explain this we must remember that the above arguments applied to a uniform background brightness so we must distinguish between two situations; stars, which are point sources of light, and distended objects such as nebulae. For stars, the dilution of light due to magnification does not apply: their light is still focussed to a point, so collecting more light will make the star proportionally brighter, and enabling many more stars to be brought into view. Even a toy telescope will be sufficient to demonstrate this.

Limiting Magnitude Of Telescope For Stellar Objects

G_m = Magnitude gain
D_o = Diameter of objective
D_p = Diameter of pupil
M_L = Limiting magnitude

$$G_m = log_{2.512}(D_o / D_p)^2$$

$$G_m = \frac{\log_{10}(D_o / D_p)^2}{\log_{10} 2.512}$$

$$G_m = 2.5 \log_{10}(D_o / D_p)^2$$
$$G_m = 5 \log_{10}(D_o / D_p)$$

Now if D_p is taken to be 5mm :

$$G_m = 5 \log(D_o) - 5 \log(5)$$
$$G_m = 5 \log(D) - 3.5$$

where D_o is now rewritten simply as D

And if the naked eye limiting magnitude is taken as 6 :

$$M_L = 6 - 3.5 + 5 \log(D)$$
$$M_L = 2.5 + 5 \log(D) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Nebulae require a different explanation. Previous arguments would imply that there is nothing to be gained, visually, in terms of surface brightness, by using a larger aperture. To some extent this is true, and there will be less advantage than for stellar objects. However there are two effects which will produce some benefits from the larger objective or mirror :

(1) The reduced angle of view from a telescope will reduce the reception of stray light from outside the field of view, leaving light from the target object as a bigger contributor to the image thus enhancing contrast. Dark-adaption of the eye also helps here, which explains why the apparently low figures for some of the values of I in Table 1 are still perfectly observable. As an incidental point, narrow band filters may provide a further advantage by eliminating those frequencies in the skylight that are not emitted by the target, so increasing the contrast against the sky. The effectiveness of these will depend on the amount of light pollution, its spectrum, the spectrum of the target object, and of course, the transmission characteristics of the filter.

(2) A larger aperture does permit a higher magnification for a given image brightness. A larger object is more readily detected by the eye than a smaller object of the same surface brightness since the total light signal is greater, and more retinal cells are contributing to consolidate the impression of the faint image. This also combines with (1) since more magnification results in more restriction of the field of view.

In addition to this we must add the further consideration that a larger aperture will also provide greater resolution, so enabling more detail to be presented provided the image brightness is sufficient to enable the extra detail to be discerned. So a larger aperture is definitely desirable for observations of Moon, planets, planetary nebulae, and resolving globular clusters and galactic nebulae etc.

Also, it must be remembered that these arguments apply only to visual observations; use of film or CCD cameras enables the full advantage of an instrument's light-gathering power to be realised for that part of the image that is projected into the frame of the film or chip.

It will be seen that this subject contains more subtleties than at first sight. Other factors can come into consideration such as the physiology of the eye at various light levels and the psychology of perception. It is hoped, however, that the deliberations presented here will provide a useful insight into some basic concepts. Another article 'Visibility Of Deep Sky Objects' will deal in more detail with the concept of surface brightness and why it is a useful gauge to the visibility of deep sky objects.

Further references :
For a detailed discussion of visual sensitivity to dim objects see
www.clarkvision.com/visastro/omval

[I welcome comments, feedback and discussion from any of my articles.]

FURTHER RESEARCH ON JOHN ISAAC PLUMMER

My biography of John Issac Plummer, Colonel Tomline's professional astronomer, in the OASI *Newsletter* April 2008 – April 2009 summarised what was known of his life and work as of early 2008. Since then, I have undertaken much additional research in Cambridge, in the archives of the RGO and in St John's College Library Special Collections Department. I have published an updated biography of Plummer, in the form of a 148 page A4 booklet, available from any committee member for £5 (all proceeds to OASI funds). The text of the biography is also available on the OASI web site: www.oasi.org.uk → History → Biography of John Isaac Plummer.

Research on Plummer is continuing. Thanks to OASI Treasurer, Paul Whiting, I have made contact with Joan Kenworthy, former principal of St Mary's College, University of Durham. Joan has some interesting information on meteorological work that Plummer undertook in Durham in the early 1870s. (It was not previously known that Plummer had any association with meteorology before he moved to Hong Kong Observatory in 1891.) Joan is now searching the archives of Durham Observatory (where Plummer worked from 1867 to 1874) for further information. When Joan completes her research I will update the biography.

James Appleton
05 May 2009

Committee Contacts
Paul Whiting finance
Martin Cook Membership
Eric Sims Newsletter
Bill Barton Safety & Security
Peter Richards Email distribution lists

DIARY FOR JUNE

Monday	**SMALL TELESCOPES OBSERVING NIGHTS AT THE OBSERVATORY** Will resume in October ☎ Paddy O'Sullivan ☎ Gerry Pilling
Wednesdays **From 8PM**	**MAIN OBSERVATORY CLUB NIGHTS** Primary Observational targets: Nebulae and faint objects. ☎ Martin Cook (mobile) ☎ Roy Gooding (mobile)
Wednesday	**OASI WORKSHOP** Will resume in the autumn ☎ Mike Whybray
Thursday	**OBSERVATORY VISITS BY LOCAL COMMUNITY GROUP** No outside visits this month **Taster evening** Will resume in the autumn ☎ Paul Whiting FRAS
Sunday 20th SEPTEMBER 7.30pm	**COMMITTEE MEETING** **Nacton Village Hall**

Society Primary Contacts

Chairman: Neil Morley ☎
Secretary: Roy Gooding ☎ (daytime) (evenings)
E-Mail queries: Ipswich@ast.cam.ac.uk

Society Trustees

Mr Roy Adams Mr David Brown Mr David Payne

Society Honorary President

Professor Allan Chapman D.Phil MA FRAS

Observatory Telephone Number

Meeting nights only