TRANSIT

The Newsletter of

Cleveland & Darlington Astronomical Society

05 April 2008

Spring is Aurora Season

Front Page Image - Northern lights erupting over Tromso, Norway:

"It was a very powerful outburst of Northern Lights," says photographer Bjorn Jorgensen. "The ground actually turned green!"

Last Meeting. 14 March 2008 : "We Are Not Alone" by Neil Haggath. An excellent presentation with a subject that kept conversations going in the Planetarium for long after. The good news – Neil has discovered Powerpoint!

Next meeting : 11 April 2008, Sir Patrick's 50 Years Celebration by Keith Johnson

Letters to the Editor

Dear Editor,

Those telescope owners who, like me, are past the first flush of … er … middle age probably fall into two main camps: enthusiasts and sceptics about using GoTo scopes. I'm in the former group, but have always had a nagging feeling that the sceptics were following the One True Path in slowly and carefully star-hopping around the sky to get to the objects on the viewing list for that night.

However, a recent experience made me realise that there are things that GoTos enable you to do that are in practice impossible or very hard to do in other ways. I'd spent part of the day painstakingly training the motors of my recently acquired Meade LX90 8". When it was fully dark, I aligned the scope and did a couple of tests on Orion stars to check its GoTo accuracy and tracking – all spot on. I collimated the optics and then made the mistake of going in for a hot meal.

When I came back out, Orion could still be seen but was covered with a thin murk. It was still explorable, and I had good views of the Great Orion Nebula (M42); but well to the west of it, the sky appeared to be unviewable – an orange fog of mist and of Teesside industrial glare reflected off it. Then I noticed a single star just visible – my planisphere told me it had to be Capella (a Aurigae). With the Messier menu still on Meade's AutoStar controller in front of me, on a whim I told the scope to go for the brightest of Auriga's open clusters, M37 (mag. 5.6).

I hadn't really expected to see anything at all, but there was M37 right in the centre of the 26mm eyepiece's field of view, with its 150 or so stars against a black background (OK, I didn't count them …). And the experience was repeated with the other two slightly fainter Messier clusters nearby, M36 and M38. I was astonished.

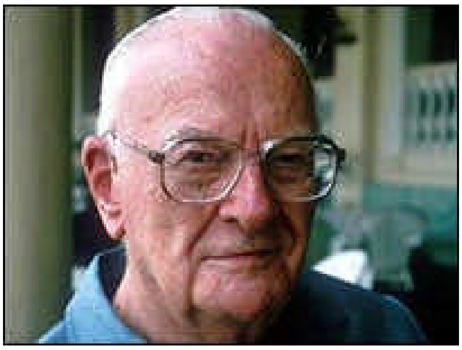
Perhaps I could have got there if I'd had really accurate RA and Dec setting circles. However, quite honestly I wouldn't have bothered trying. But now I know that viewing conditions that look very unpromising can be well worth persevering with to discover quickly with a GoTo scope what can be tracked down and what can't. I'll stay in the enthusiasts' camp on this one.

Best wishes – Rod Cuff (Guisborough)

Rod is eclips- bound to the Gobi Desert to watch the next total solar eclipse on 1 August 2008, as part of a 3-week trip along part of the old Silk Road. He flies to Tashkent, then takes in parts of Uzbekistan and Kyrgystan. He then hops over to the western edge of China for the eclipse before going on further east, ending up in Xian and Beijing. We less hardy, or unfortunate, souls look forward to his report on his return (Editor).

Obituary : Sir Arthur C Clarke

from the BBC News



Visionary science fiction writer Sir Arthur C Clarke, author of more than 100 books, has died at the age of 90 in Sri Lanka.

Once called "the first dweller in the electronic cottage", his vision of the future, and its technology - popularised in films like 2001: A Space Odyssey - captured the popular imagination.

Sir Arthur's vivid - and detailed - descriptions of space shuttles, super-computers and rapid communications systems were enjoyed by millions of readers around the world.

His writings gave science fiction - a genre often accused of veering towards the fantastical - a refreshingly human and practical face.

His ideas and gadgets engaged his readers because of, not despite, their plausibility. Quite often, his fictional musings formed the basis of what we now see as science fact.

Passion for science

Arthur Charles Clarke was born in Minehead, a town in Somerset in the south-west of England, on 16 December 1917.

A farmer's son, he was educated at Huish's Grammar School in Taunton before joining the civil service.

A youthful interest in dinosaurs and Morse code blossomed into a fascination with all things scientific.

During World War II, Sir Arthur volunteered for the Royal Air Force, where he worked in the, then highly-secretive, development of radar.

Demobbed at the war's end, he went to King's College, London, where he took a First in maths and physics, before becoming a full-time writer in the late 1940s.

He wrote story-lines for the comic-book hero, Dan Dare, inspired Gene Roddenberry to create Star Trek and posited Clarke's Law: "Any sufficiently advanced technology is indistinguishable from magic."

Beyond this, during the war, he published a paper in which he predicted that, at 22,000 miles above the Earth's surface, communications satellites would sit in geo-stationary orbit, allowing electronic signals to be bounced off them around the globe.

2001

His vision, soon proved, revolutionised the communications and broadcasting industry.

No wonder, then, that Sir Arthur counted both Rupert Murdoch and CNN founder Ted Turner among his friends and acolytes.

But it was his creation, with the legendary film director Stanley Kubrick, of 2001: A Space Odyssey, that brought Sir Arthur world-wide fame.

Based in part on his short story, Sentinel, the film quickly established itself as a cult classic.

Its mysterious monoliths, the psychopathic Hal 9000 computer and a final sequence which baffled many cinema-goers have become frequently-referenced icons of cinema.

He lectured, was feted by everyone from the astronaut Buzz Aldrin to R Buckminster Fuller, inventor of the geodesic dome, and appeared on television, most notably in Arthur C Clarke's Mysterious World.

Sir Arthur's private life was as off-beat as his books. He moved to Sri Lanka - then called - Ceylon, in 1956. There he lived with a business partner and his family, scuba-dived and played table-tennis with local youths.

He only married once, to Marilyn Mayfield in 1953. According to his entry on Who's Who, the marriage was dissolved in 1964, and Sir Arthur never had children.

A seer of the modern age, Sir Arthur was an original thinker, a scientific expert whose tales combined technology and good old-fashioned storytelling and whose influence went far beyond the written page.

Marking his 90th birthday last year, he told fans: "I want to be remembered most as a writer. I want to entertain readers and hopefully stretch their imaginations as well.

"If I have given you delight by aught that I have done, let me lie quiet in that night, which shall be yours anon."

Say Hooray, For the Lamp-Post Men!

from Pat Duggan

In our village most people pass the time of day with others they meet. So, it was okay for me to say "G'morning", as I passed around the white van parked on the pavement with a set of stays pushed down instead of wheels and a chairlift on a stalk bearing a man aloft to change a bulb in the streetlight.

I have to admit, it wasn't what I was thinking - that actually ran more like, "why don't you two buzz off - I like it dark here at night!" However, they were still dutifully illuminating the village as I was coming back from the dogwalk, so I asked the lift operator at the bottom in the cab about the <u>position</u> of the replacement lamp posts the village has been told to expect to have installed at some time in the future.

I then made bold enough to say, "What if we didn't actually want the replacement in <u>exactly</u> the same place? Could it be installed to shine into somebody else's garden or window instead of ours?" (Well, not quite that wording perhaps) The reply surprised me, he was concerned!!! I told him it shone in our eyes and illuminated our bedroom and that it had spoiled our hobby, amateur astronomy.

He said, "Look at the contact phone number, remember the lamp post identification number, then all you have to do is ask for a, "shield". I phoned, did as he said and requested a shield for the west side of the lamp - and low and behold one has just been fitted!!

I can only say it must have been as a result of the legislation that covered Light Pollution and Light Trespass etc. So the effort of sending in letters to some obscure Parliamentary Sub-committee which I contributed at the time have actually paid off - very satisfying.

I do encourage any one else in the Society to try it out in their area too, even if in the past it has met with refusal. So after a short chat I moved on. Then the helpful man in the cab remembered his buddy leaning dangerously down to try and say he had quite finished up there in the lift now... I couldn't make out what it was he said.

Dear Pat, I don't think legislation has made a hoot of difference to the attitude of the local authorities towards local light pollution. What you came across was the phenomenon of a really nice Lighting Engineer and your ability to flutter your eyelids, we should all be so lucky. (Editor)

Buying a Laptop

Introduction

There are two aspects to using a laptop for astronomy, data acquisition and data reduction.

Data acquisition includes real-time tasks such as controlling the camera, telescope and any related peripherals whilst data processing can be carried out later and on a different machine. However, it is often beneficial to do some data processing whilst observing as it allows you to get an idea of image quality.

Processor

The processor is at the heart of any PC/Laptop. The choice of processor depends on what you want to use your laptop for. For just image acquisition you do not necessarily need a powerful processor. An Intel Celeron or AMD Sempron would be sufficient. However if you want your laptop to be a dual-purpose acquisition and processing machine (e.g. aligning and stacking) a more powerful processing core would be beneficial such as the Intel Dual Core or AMD Turion X2 Dual Core processors.
One other note about processors. Some inexpensive laptops come with desktop processors which consume more power thus eating up precious battery life. Check to make sure which processor is inside your choice of machine.

Memory

Many laptops come with 1Gbyte as standard. This will allow you to run the vast majority of applications. The more memory you have the more applications you can run without slowing the computer down. This is important when using intensive applications such as Registax where you can have many hundreds (or thousands) of frames that need to be aligned and stacked.

Screen Size

Laptops typically come with 14.1", 15" and 17" displays. If you have a large screen you can certainly display bigger images which is ideal for showing others your prized astrophotos! However,you can also take advantage of the larger screen size as you will be able to display more information such as the display from a guiding camera as well as the information being recorded by your imaging device. Having a larger display also can help with critical tasks such as focusing. However, on the down side, bear in mind that a larger display consumes more power thus shortening your battery life.

Graphics Card

Some desktop PCs and laptops come with graphics cards that are integrated onto the motherboard (the electronics board that the processor, memory and other devices fit onto) and they use a portion of the system memory to process and store graphics information. Although this may seem like a good idea, system memory processes graphics information slower than dedicated graphics cards with dedicated (faster) memory. Try and choose a machine that has a dedicated graphics card.

Hard Drive

60Gbyte minimum. An increasing number of laptops are now coming with 60Gbyte minimum. However the larger the hard disk the more images (both raw and processed you can store).

Cost

You can buy a decent image-acquisition laptop for about £350. These machines have a Celeron/AMD processor, 15" screen, 80Gbyte Hard drive, 1Gbyte memory. However for about £500 you can get a machine with Intel/AMD Dual Core processor, 17" display, 2Gbyte Memory, 256Mbyte Graphics Card and 120Gbyte Hard Disk.
Nte that prices change rapidly and these are offered as a comparison to show the relative prices of a machine suitable just for data acquisition and one suitable for data reduction as well.

The Ideal Dual-Purpose Laptop

- Processor: AMD Turion x2 or Intel Dual Core
- Memory: 2Gbyte
- Graphics Card: Nvidia dedicated graphics card with 128Mbyte/256Mbyte

- Hard Drive: 120Gbyte
- Screen Size: 17" Widescreen

Windows XP or Vista?

At the time of writing most new laptops are supplied with Vista so you don't really have much choice, but, some of the software supplied by equipment manufacturers doesn't yet run under Vista. Most of the major image processing packages do.

What about Apple?

Makes a fine sauce with pork! Also makes a nice cider.

Making the Best First Impression, with Aliens

written by Fraser Cain

Did you know the SETI Institute has a Director of Interstellar Message Composition? I did not know that. I guess it makes sense. If we're going to be communicating with aliens, we'll want to be careful about the words we choose. Get it right, and we've got extraterrestrial friends, here to uplift us to the galactic community. Get it wrong and we might be looking at radio silence, or worse…

So how should we present ourselves to prospective galactic neighbours?

Douglas Vakoch, the aforementioned Director of Interstellar Message Composition at the SETI Institute has done some thinking about this, and recently wrote it up in an article entitled, How we Present Ourselves to Aliens.
The trick, of course, is to make a good first impression. When the aliens finally receive our first communications, we want them to be wowed. But should we hide our more violent tendencies, or is the best strategy to just be honest. Sure, we fight a few wars here and there, but that's just a phase we're working through.
Vakoch thinks that honesty is the best policy.

Sure we're flawed, but what member of the Milky Way club didn't ravage society with constant warfare and nearly destroy their environment before they reached perfection?
The aliens might be touched at our honestly, recalling their own struggle to get to a stable, peaceful society. Or they might just send in the berserkers to wipe the violent apes off the planet.

Deep Sky Diving

from Rob Peeling

When I talk to people about astronomy, one question comes up fairly frequently, " How far can you see with your telescope?" Up to now I've answered something along the lines of, "*mumble, mumble* million light-years", because to be perfectly honest I didn't know the answer. Perhaps you've done the same thing.

I know I have observed a fair number of galaxies but except for M31 and M81 I don't know how far away they all are or which is the furthest one. However I do know that their distances are measured in *millions* of light-years thanks to M31 and M81. *Mumble, mumble* millions of light-years is at least an honest but not a very informative answer to the question.

It is possible to give yourself a definitive and satisfying mind-boggling answer to the question. All you have to do is to record a clear observation of the object 3C273. The answer can then be stated proudly, "I can see 2.15 **billion** light-years with my telescope". No more mumbling.

(Image credit: J. Bahcall, STScI)
Kitt Peak National Observatory.

3C273 is the furthest object readily observable by visual observers. This is because it is the brightest of the quasars at an average magnitude of 12.8. The absolute magnitude is a staggering –26. In other words, if it were 35 light-years from Earth it would be as bright as the Sun in our sky. A quasar is the bright, active nucleus of a galaxy. The light emitting volume (a black hole) is similarly sized to our solar system i.e. very small compared to the size of its host galaxy. 3C273 is so far away that it is moving away from us at 16% of the speed of light due to the expansion of the Universe.

3C273 is the 273th object in the 3rd Cambridge catalogue of radio sources compiled in the 1950s. The visual counterpart was discovered in 1963. The name quasar stands for QUASi-stellAR radio sources meaning they appear star-like in telescopes. This gives a clue to what you will actually see, 3C273 is going to simply look like a 12th magnitude star. Large, professional telescopes show it is not a star. There is long jet of material ejected from the central black hole.

If you look carefully this can even be spotted in Digital Sky Survey images.

Other quasars are accessible to for CCD imaging observers but are unlikely to be seen visually except by observers with access to dark sites or large telescopes because none are brighter than 14th magnitude.

How I found 3C273

As 3C273 will only appear to be another 12th magnitude star when viewed through a telescope, a certain amount of preparation is required to make a serious attempt to track down and positively identify the object.

3C273 is marked in Sky Atlas 2000.0 lying about 4^{o} northeast of eta Virginis. As Sky Atlas 2000.0 only plots stars down to magnitude 8.5, this doesn't help to get you into more than the right general area of sky. I therefore used Sky Map Pro to provide me a map of the area bounded by delta, eta and 16 Virginis down to 12th magnitude. Suspecting I'd need more help to positively identify the quasar, I also printed out images of the area immediately surrounding the object from the Digital Sky Survey on the internet. The first was a 50 arc-minute square around 3C273 and the second reduced the field to 10 arc-minutes. Fully prepared, all that was now needed was a clear night with no moon.

On 4th March 2008, the conditions were right. At 23:20 UT I noticed the southern part of Virgo was high enough for an attempt to find the quasar with my 12" Dobsonian. I started from eta Virginis and using Sky Atlas 2000 I star hopped to the northeast to find the stars in the vicinity of NGC 4536 using the finder. Switching to a low power (50 mm) lens and the map showing 12 magnitude stars I was able to track my way to the stars immediately in the area of 3C273.

There is a 10th magnitude star, which marks the target area well. After increasing power with a 15 mm lens it took a little while to orientate the DSS images to the star field I could actually see. Fairly early on I found a "star" which I was reasonably certain was 3C273. The photos showed a pair of stars very close to it forming a tiny triangle. Every now and again the seeing improved slightly and these came into view. By 23:42 UT I was certain I had positively identified 3C273.

"First Light" for Twin-Eyed Telescope

The world's largest set of opera glasses is operational.

From David Tytell

This image, one of the first ever taken using both mirrors of the Large Binocular Telescope, shows ultraviolet, green, and red light in the spiral galaxy NGC 2770. *LBT*

The Large Binocular Telescope (LBT) in Arizona achieved an important milestone in January when both of the telescope's 8.4-meter mirrors pointed toward the spiral galaxy NGC 2770. Last week the LBT folks released the images.

This critical step means we're not far from having another full-time telescopic giant producing incredible observations and scientific discoveries. And it poses the question: Is LBT the largest telescope in the world?

If you ask me, I say no. When the images are combined, the two LBT eyes have the light-collecting area of a single 11.8-meter mirror. And they ride on the same mount and always point in the same direction. But it still takes two separate primary mirrors and two separate optical systems to make the magic happen.

The largest binoculars? Sure. The largest telescope? The purist in me still gives the title to the 10-meter Kecks. The 10.4-meter GranTeCan in the Canary Islands isn't quite up and running yet, but it should be soon. When that happens, in my book it will take the crown. And I don't count Hobby-Eberly Telescope or the Southern African Large Telescope because they can't point all over the sky, and not all of the primary mirror is working at a given time.

So let's start the debate. Do you think the LBT should rank as the "world's largest largest optical telescope"? If you read their press release, that's what they're calling it. What do you think?

Observations in late February/early March, 2008

from Michael Gregory.

Despite a multitude of woes I have managed to make a better start to the observing year than ever before. Only hope I can keep up the pace though conditions make it wholly impracticable to observe from my own garden

O. S. 011/08 – Thursday February 28th – Despite an almost disastrous O. S. 010, here I am observing again just 24 hours later. I set our refractor up at 20.00 UT and used Mizar to align the Gotostar then found Saturn accurately, complete with maybe three moons on show, which would be a 'first' for me from Homebase.

Then I found Cor Caroli, which was easily split. I used this star to accurately synchronise the Gotostar then found Alula Australis and Alula Borealis, though only the former was definitely separated. Using the Internet at Coulby Newham library earlier today I found that Alula Australis is actually a sextuple system, each of the visual components consisting of three stars all gravitationally bound, though beyond the resolution of any visual observations – the Aa pairing have an common orbital period of just 3.6 days.

Next I found Alioth in the handle of the Plough and slewed onto nearby 78 UMa, which is said to be the finest GB star in the Northern Hemisphere, though generally beyond a telescope of only 102mm even in good conditions. I would need a really dark sky site for any hope of success.

Then I slewed almost 180 degrees to the Pleiades and the Gotostar positioned Alcyone and its attendant triangle of stars right in the centre of the field. I then fitted my 40mm Plossl for a 25x wide field view though even this would not encompass the whole of the Pleiades cluster. Unfortunately central heating outlets (including mine) degraded the view somewhat but neat all the same.

Then I used the Gotostar to find M 103 in Cassiopeia. I did see a small grouping of faint stars but not sure if this was M 103. Almach (? Andromedae), though getting low in the northwest, easily displayed its yellow and bluish green components, though as often happens in my eyes, the smaller star looked definitely green. I also had a look at M 31, the Andromedae Galaxy, and though the Gotostar positioned it in a wide field of view, it was a rather pointless exercise to view. However, back into Cassiopeia, I did manage to find and separate Little Albireo (S 3053), a yellow and blue miniature of the real Albireo; the bluish and green (by contrast) s Cass; and one of my favourites, the all yellowish triple star challenge, ?Cass. Being able to split this last threesome in the hopeless local conditions still gives me a little hope for the future!

Then I moved back again into Canes Venatici, and had a go for the gold and blue pair, 2 CVn but, as during a previous try, no clear sign of the blue component. At this stage clouds were appearing from the west so I switched off the power to the Gotostar but then a minor miracle for it suddenly cleared so I decided to continue the old fashioned way, finding stars manually then observing them using only the RA drive.

I looked at the Mizar/Alcor area at my lowest magnification which gives plenty of black contrasty background to this grouping, then I moved into the head of Draco at this time situated just above the sodium pink glow that is central Middlesbrough. Kuma (nu Draco), which was the first double star I ever found about twenty-five years ago, was an easy split in my 6x30 finder (though once a big challenge in 10x50 binoculars), and even easier still in the main optics. The same went for 17,16 Draco, again easily split in the finder, though 118x was needed in the main optics to see this star as a triple. The same magnification just about split Alrakis (mu Draco) which is a GB pair in between Kuma and 17,16 Draco. Finally I returned to where I had started two hours previously and had a look at gamma Leo situated just above Saturn. Nicely split at 59x and easily so at 118x, but once again no signs of the bronze gold and antique gold colours of six years back. More a silvery white lately!

Overall though, quite a multiple star haul for a bitter late winter night though, regrettably, no 'new to me' multiples!

Friday February 29th 2008 – Well, the good news is that I have not been proposed too!

Tonight was the CaDAS telescope club evening which I attended though no longer a CaDAS member. Those present were Dr Ed Restall, Keith Johnson, John Gargett, Dave Blenkinsop and four visitors plus myself! Brave of them to attend, as the weather was atrocious.

Some observations on the actual position of the Pole in relation to Polaris! On a line drawn from Polaris to Benetnasch (eta UMa), which is situated at the bottom of the dipper's handle, the actual Pole is situated just 0.75º or 44.66667 arc minutes to be exact, away from Polaris!

O. S. 012/08 - Saturday March 1st 2008 – Up to 22.00 UT it has not been a clear evening here and it looks as though my neighbours have gone away and have left their kitchen blinds open with the lights on a timer in addition, of course, to their infernal security light!

About 21.00 I drove west beyond Worsall to the double lay-by about one mile east of Toll Bar garage where I used to observe with my binoculars many years ago. Though there was some fluffy cloud, the stars were magnificent. Oh to take my refractor there (it is unfortunately adjacent to the main road) but my only hope to be able to observe there would be if I purchased an easier to assemble telescope such as a Dobsonian; I cannot really see that happening especially as a 250mm *f*/5 Dob would not easily fit in my little car!

Back home conditions were appalling with a howling gale blowing sodium pink clouds from west to east. However, I was determined that my neighbour's hopeless lighting was not going to put me off having a go and I set my refractor up on the lawn at exactly 01.00 UT March 2nd and I then used Arcturus to set up the Gotostar; my plan was to have a go at a few tight doubles in Bootes as a metaphorical two-fingered salute to those who make my observing at times quite frantic.

Izar (epsilon Bootes) was my first target but it took much patience before I could split the two components. Even then no sign of any colours, both stars looking decidedly yellowy white, so I moved on to xi Bootes (say it ksi Bow-oh-tees!) but again no signs of any definite colours especially in the secondary that is said to be reddish violet. This pairing is one of the nearest of the true gravitationally bound stars being 22 LY distant from Earth and they have an orbital period of 149 years.

Then next to pi Bootes, a neat double with blue white companions of magnitudes 4.9 & 5.9 that stood out nicely against a black background at 118x.

Thinking that conditions might be improving, I returned to Izar but I was mistaken as conditions were just the same. However, with perseverance I did manage to see the companion just as a pale blue pinpoint.

Next up was an old favourite, Alkalurops (mu Bootes), which I could split as a double star in my 15x60 binoculars years ago. But the secondary component is actually two quite close yellowy stars with an orbital period of some 260 years, both resembling our own sun in type and luminosity. Just split on this occasion despite a relatively tight separation of 2.3 arc seconds.

And finally to 39 Bootes which is situated quite high up in the constellation and about level with Benetnasch in nearby Ursae Majoris. This consists of two dwarf yellow-white stars of almost equal magnitude and a separation of 2.9 arc seconds.

So overall success with all five targets but where is the pleasure of sitting on a homemade seat on a freezing cold Sunday morning at two o'clock bathed in neighbouring security light? It must be there somewhere!

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The Vanishing Rings of Saturn

Saturn: jewel of the solar system, taker of breaths, ringed beauty. Even veteran astronomers can't help but gasp when they see her through a small telescope.

Red Alert: Saturn's rings are vanishing.

Around the world, amateur astronomers have noticed the change; Saturn's wide open rings are rapidly narrowing into a thin line. Efrain Morales Rivera sends these pictures taken through a backyard telescope in Aguadilla, Puerto Rico:

The rings have narrowed considerably in the last year," he reports. "The Cassini division (a dark gap in the rings) is getting hard to see."

Four hundred years ago, the same phenomenon puzzled Galileo. Peering through a primitive spy-glass, he discovered Saturn's rings in 1610 and immediately wrote to his Medici patrons: "I found another very strange wonder, which I should like to make known to their Highnesses…." He was dumbfounded, however, when the rings winked out little more than a year later.

What happened?

The same thing that's happening now: we're experiencing a "ring plane crossing." As Saturn goes around the sun, it periodically turns its rings edge-on to Earth—once every 14-to-15 years. Because the rings are so thin, they can actually disappear when viewed through a small telescope.

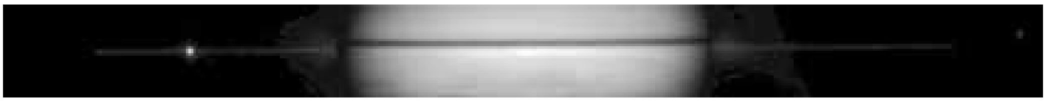
In the months ahead, Saturn's rings will become thinner and thinner until, on Sept. 4, 2009, they vanish. When this happened to Galileo in 1612, he briefly abandoned his study of the planet. Big mistake: ring plane crossings are good times to discover new Saturnian moons and faint outer rings.

It's also a good time to behold Saturn's curiously blue north pole. In 2005 the Cassini spacecraft flew over Saturn's northern hemisphere and found the skies there as azure as Earth itself. Saturn is a planet of golden clouds, but for some reason clouds at high northern latitudes have cleared, revealing a dome of surprising blue.

For years, only Cassini has enjoyed this view because from Earth, the blue top of Saturn was hidden behind the rings. No more: "Now that Saturn's rings are only open 8 degrees, we can finally view its northern hemisphere's beautiful teal blue colored belts and zones.

Galileo never understood the true nature of Saturn's rings. He didn't know that they were a disk-shaped swarm of orbiting moonlets ranging in size from microscopic dust to tumbling houses. (Scientists still aren't sure, but they may be debris from a shattered moon.) He didn't even know the rings were rings. Through his 17th-century telescope, they looked more like ears or planetary lobes of some kind.

Yet, somehow, his intuition guided him to make a correct prediction: "they'll be back," or Italian words to that effect. And he was right. Saturn's rings opened up again and scientists resumed their study. In 1659, Christaan Huygens correctly explained the periodic disappearances as ring plane crossings. In 1660, Jean Chapelain argued that Saturn's rings were not solid, but made instead of many small particles independently orbiting Saturn. His correct suggestion was not widely accepted for nearly two hundred years.



Above: Saturn's rings are wide but very thin. Astronomers using the Hubble Space Telescope captured this image of the rings edge-on in 1995. Star-like objects in the ring plane are icy satellites.

Almost 27 ring-plane crossings later, we still marvel at Saturn. Even with rings diminished, she is still a breathtaking sight through the meanest of telescopes. Saturn is easy to find: Go outside after sunset and look around for it under Regulus in Leo, Saturn will remain visible all night until 4.00am most of April.

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"In awe I watched the waxing moon ride across the zenith of the heavens like an ambered chariot towards the ebony void of infinite space, wherein the tethered belts of Jupiter and Mars hang forever festooned in their orbital majesty" said Les Dawson.

"And as I looked at all this I thought: 'I must put a roof on the lavatory'."

The Ultimate Fate of the Earth and the Sun

from Michael Roe

Recently in Transit and earlier in The Sky and Telescope magazine there has been articles claiming that in the far future, about 7,000 million years time, our Sun will expand to such a size that Earth will be engulfed or nearly engulfed by it.

I believe that the Sun will never reach such a gigantic size. True, it will grow huge compared to its present 865,000 mile diameter and the Earth will still suffer a terrible fate, all water vapourised and life incinerated, even many miles of crust melted, maybe even some of the mantle too, but I am sure the bulk of our Earth will survive.

My reasons for this are simple. Some stars do grow to 200 – 500 million miles in diameter, they are called supergiants. Antares and Betelgeuse are well know supergiants, in fact Betelgeuse has been measured at 42 thousandth's of an arc second in diameter. If the old distance of 520 light years is correct that equals 650 million miles in diameter. If the more recent estimate of 430 light years is true then Betelgeuse is 540 million miles in diameter, these measurements were made using interferometry techniques.

The important thing is that supergiant stars all have more mass than the Sun, around 4 and up to 50 solar masses. Their end is a spectacular supernova explosion, leaving a tiny but heavy neutron star or a black hole. But the Sun hasn't the needed mass. It will eventually evolve and grow into a red giant star, not a red supergiant star. A red giant is more like Arcturus or Aldebaran, both stars being about one solar mass. They will grow to 30 – 50 million miles in diameter, perhaps a little larger for a short time.

So, how did these people make this mistake? Simple, it is very easy to make wrong calculations, think of weather forecasts and then on a much larger scale of size and time over millions of years involving our Sun. A better idea would be to check any measurements of mass and diameters of existing giant and supergiant stars. Eclipsing binaries would provide the information needed.

I am pretty sure that although the Sun will grow huge it will only swallow up Mercury and scorch Venus a great deal. The Earth will survive after its molten surface freezes and the Sun becomes a white dwarf, tiny and dense. Eventually it will cool to become a black dwarf, something I wondered about when I was young. No black dwarfs exist as yet, the Universe isn't old enough.

So, the ultimate fate of the Sun and Earth will be two globes, one – the Sun - with nearly a million times more mass than the other – the Earth - but smaller in diameter and incredibly dense, continuing to be orbited by the Earth and other outer planets in total darkness.

Astro Pornography???

from Brenda Shaw

Astronomy's dirty little secret has been what I like to call "astroporn"—beautiful images featured on telescope boxes and in magazines that give beginners the impression their telescope will take them on a colorful voyage through the universe.

Of course, the dirty secret is that you have to attach a camera to the telescope and take lengthy time exposures to build the image, which might still not look as good as the ones in the box. For some people, it can be disappointing enough to make them put away their telescope for good. The truth is that most objects seen through an optical telescope will reveal little to no color—our eyes are simply not sensitive enough.

The work-around is to know what objects will look good through your telescope to avoid early disappointment. But perhaps the best advice is that one should read up on an object before observing it. If you know something about the object, you'll have a better appreciation of what you are observing—be it a stellar nursery or a galaxy millions of light years-away. Even if the view through the telescope doesn't show a lot of detail, you'll be delighted to know that you are seeing it with your own eyes.

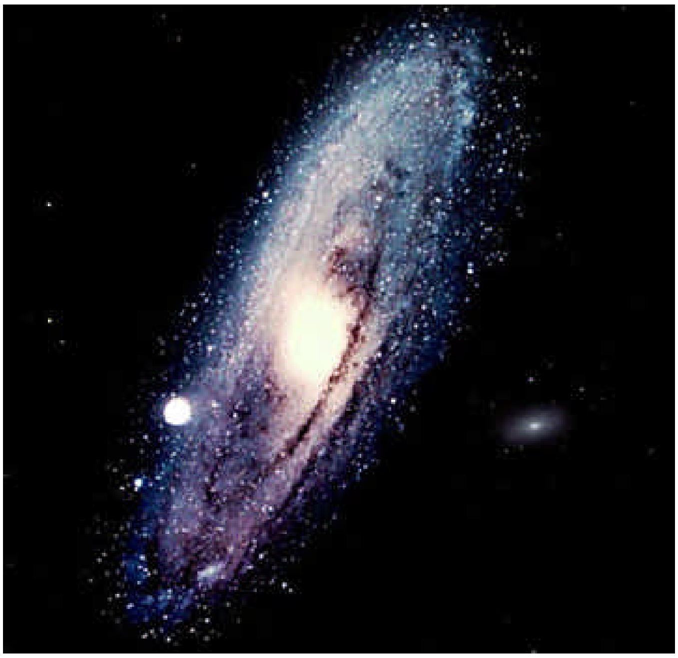


Figure 1. A long exposure photograph of the Andromeda Galaxy (M31).

Figure 2. A realistic view of the Andromeda Galaxy (M31) as seen through a 6" telescope under dark skies.

There are two big reasons why the view through a telescope doesn't look like all those pictures.

Time exposures

When you look at an object, your eyes and brain are effectively creating a series of thirty 'pictures' every second. This allows you to detect motion (compare it to the way a cartoon simulates motion through a series of still pictures shown in rapid succession). In other words, if an object doesn't give off enough photons in one thirtieth of a second, you can't see it. If your eyes and brain took fewer pictures per second, each one would contain more photons and you'd be able to detect fainter light sources – but then, you wouldn't be able to see movement as efficiently.

Astrophotography is done by leaving the camera shutter open and pointing at its target for a very long time. The camera records incoming photons from the target for as long as the shutter is left open. If it's left open long enough, the sensor (the film or the light-sensitive chip) will eventually accumulate enough signal to bring out even the faintest details of the object. Areas of the image corresponding to brighter parts of the object will appear brighter because more photons fell there.

The way to get more photons to your eye in a thirtieth of a second is to use a larger telescope.

A telescope is like a light funnel. Its wide barrel intercepts more photons from the sky than your tiny eye can, its mirrors or lenses focus that light into a narrow beam, and when you look through the eyepiece all of that light goes into your eye. The wider the telescope, the more photons you get, and the brighter and more detailed the image appears. (Take a look at a nocturnal animal like an owl, a cat, or a bushbaby—they have huge eyes to help them gather more photons in a low-light environment.) But no matter how big a telescope you're looking through, putting a camera on that same telescope and taking time exposures will result in a brighter and far more detailed image.

Color sensitivity

Every photon that comes at you has its own wavelength. The human eye interprets different wavelengths as colors, and can only detect a narrow range of possible wavelengths. The longest wavelengths we can detect make us see what we call 'red', and the shortest produce 'violet'. If you don't get enough photons, you might be able to see the shape of a light-emitting object without being able to tell what color it is. A similar phenomenon is reported by some people who are legally blind, and who can see vague light and dark shapes around them but do not see color.

The most surprising thing about modern astronomical cameras is that they don't see color at all! They are digital cameras, and they are sensitive to a wider range of wavelengths than the human eye is, but when they send their data to a computer, there's no way to tell what color each photon was when it came in. The output is a grayscale picture.

Astronomers who want to take detailed color pictures do this by using filters. A standard 'RGB' set of filters has glass plates of red, green and blue. When you put the red filter in front of the camera, only red photons get to the sensor. The output on the computer still doesn't look red until you use image manipulation software to make it red. If you then take pictures of the same target with the green and blue filters, you can color the images green and blue respectively, and then combine all three to create a full-color image (similar to the way color books are printed by overlapping yellow, magenta, cyan, and black images).

In other words, the colors in an astronomical image are false colors. If you looked at the object you wouldn't be able to see the colors, so the image is colored to show you what it would look like if you could. Of course, this is a subjective process, and an astronomer trying to make a pretty image will experiment with various shades of red to use on the red-filtered image. To make matters even more confusing, an astronomer trying to make a scientific image and bring out as much detail as possible might even use colors that don't correspond with the filters, in order to increase contrast and see details that might have been missed otherwise.

On top of that, an astronomical camera can detect photons in a slightly wider range than our eyes can. Another type of standard astronomical filter set comes with an infrared filter, which lets through photons that have a slightly longer wavelength than red photons. The output is still a grayscale image that is displayed as a visible pattern of light and dark on the computer screen. No matter what color is assigned to it in the finished color image, it won't be 'accurate', because the true color is one that we can't even see.

And now for the good news...

When you look through a telescope for the first time one thing that's important to realize is that your eyes are not trained to see such faint things with such subtle levels of detail. The more you use your telescope, the better you'll get at seeing through it. Mars might look like a yellow ball at first glance, but with practice you'll be able to see differences in color across its surface, and white frost caps when one of them is tilted towards the Earth.

If you're ambitious, you might even want to get into photography yourself, and learn how to coax beautiful pictures from your equipment. If your telescope has a motorized mount so that it can track the sky as the Earth rotates, it can stay pointed at any object for at least a little while. (More expensive mounts are better at this, of course, and don't vibrate or drift as much as cheaper ones.)

Recently, some astronomical cameras for beginners have come on the market with much friendlier price tags that won't scare anyone who has ever bought even a cheap telescope. Even a video camera or Web cam can be used for astrophotography. One popular technique is to take video through the telescope, choose only the clearest and steadiest frames, and then stack and line them up on your computer and combine them to bring out more detail than any single frame has by itself.

Of course, sometimes it just doesn't matter that the actual view doesn't look like the picture. Looking right at a planet or a galaxy and catching its photons with your own eyes is something special, even if the target is faint and fuzzy. It's the difference between looking at telephoto pictures in National Geographic, and actually going to Africa to catch a distant, brief glimpse of a live wild elephant. Pictures can show you a lot that you may never see with your eye, but sometimes the knowledge that you're right there living the experience can be worth much more.

Some of our favorite objects for telescopes

These are sure to delight even in small telescopes. Here are some of our favorite objects for viewing even with modest optical equipment such as large binoculars or a small telescope.

- **The Moon**

Bright enough that there's no reason to worry about lack of photons, the Moon is an impressive target through any optical instrument. Start with your eyes and binoculars, and work your way up to higher magnifications in telescopes, and you will never get bored with the increasing levels of detail. Best time to observe? During any phase of the Moon other than new or full, scan along the terminator (the border between the dark and light sides of the Moon) for some sharp-shadowed views of craters and mountains.

- **Jupiter**

The biggest planet in our solar system may look like a snowball the first time you see it through a telescope, but even a small instrument can show you the familiar butterscotch-ripple details once your eye is acclimated. Try looking at Jupiter in a twilight sky just after sunset or before sunrise; you might find it easier to see the color bands when your eye is not dealing with the intense contrast of a pale planet on a black sky. For an additional treat, try making observations a few hours apart, and see if you can spot the motion of the four inner moons.

- **Saturn**

Even a very modest telescope can reveal Saturn's rings. Bigger telescopes can resolve finer details to the point where you can see space between the rings and the planet, or even see the famous Cassini division, the empty gap between the A and B segments of the planet's ring structure.

- **The Pleiades (M45)**

A cluster of young stars is in fact better seen through a smaller instrument with a wider field of view. It's a classic binocular object, easy to spot naked-eye even from a light-polluted location. Too much magnification and you'll find yourself looking right through it and not seeing the stars at all!

- **Andromeda Galaxy (M31)**

Our nearest galactic neighbor is two and a half million light years away, and is estimated to be twice the size of our own Milky Way. All but the biggest backyard telescopes will reveal only the bright central bulge; a big scope and a trained eye under a dark sky will be able to coax out some of the spiral structure of the outer arms.

- **Orion Nebula (M42)**

This is one deep-sky target that looks good through any optical instrument, no matter how modest or how powerful. Also known as the Sword of Orion, this giant star-forming region has an appropriately nest-like structure that can be seen even in binoculars. Mid-sized telescopes can reveal more detail, including wispy gas tendrils and newly-formed stars.

- **Albireo**

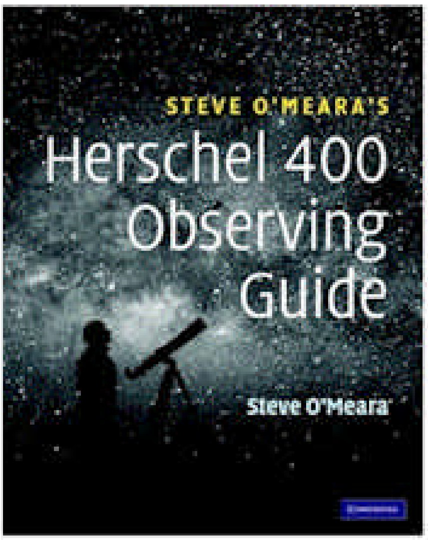
Marking the head of Cygnus the swan, Albireo is an easily-resolved binary system famous for the brilliantly contrasting blue and yellow colors of its stars.

- **The Ring Nebula (M57)**

This planetary nebula, a gas bubble that was blown off the surface of a dying star, looks like a small round smudge in binoculars and small scopes. A mid-sized telescope will reveal a well-defined circular 'smoke ring' shape.

Book Review

from Rob Peeling



- **Hardcover:** 380 pages
- **Publisher:** Cambridge University
- Press; 1 edition (14 Jun 2007)
- **Language** English
- **ISBN-10:** 0521858933
- **ISBN-13:** 978-0521858939

My son bought me this book as a birthday present last summer. One of his friends was with him and said, " Isn't that rather boring?" To which my son replied, "Of course it is. He'll love it!" He was right. This book inspired me to get systematic about tracking down and observing deep sky objects, including some quite faint and difficult ones.

Steve O'Meara is a well known visual observer and this book is one of a number he has written to encourage the rest of us to explore the deep sky. This one deals with the Herschel 400 list compiled from the NGC catalogue by the Ancient City Astronomy Club in Florida. The Club's idea was to present an observing list that would *challenge* observers with 6" or larger telescopes working under skies somewhat affected by light pollution. All the objects were originally discovered by either Sir William Herschel or his sister Caroline. Some Messier objects are included in the list e.g. M76.

After a short introduction to introduce the Herschel 400 list and to explain his approach the main body of the book is devoted to all the galaxies, clusters and nebulae in the list. O'Meara proposes short lists of objects for his reader to capture in one evening's observing by dividing among 7 nights observing in each month of the year. The book is split into months and for each of the seven nights in the month he provides a series of finder charts. Each object for the night is then described. First he gives a small table of facts together with a difficulty rating from 5 (easy) to 1 (hard).

Take his rating seriously. If O'Meara says it is hard to see that it almost certainly will be hard. He then supplies an image from the Digital Sky Survey. These can be useful to complete a positive identification. Then comes a short written description, directions to find the object based on the charts and finally a short paragraph describing what a visual observer may see based on O'Meara's own observations with a 4" refractor. A very comprehensive index finishes the book.

As I have already said, I have used the book extensively to guide my observations, usually I have it immediately to hand when outside with my telescope. As an active observer, I like it immensely but it is not a book to read from cover to cover and will not impress armchair astronomers. I enjoy O'Meara's occasionally slightly over the top descriptions and pet-names for the objects but these might offend the serious minded who dislike levity with their dose of stars.

I have mentioned the comprehensive index, and the real value of this is that you are not restricted to O'Meara's recommended target lists because the index lends itself to other approaches such as working through a complete constellation or through types of objects e.g. selectively finding planetary nebulae.

I have now had the book 7 months, so how I have done? According to my observing records I have so far seen over 150 objects from the Herschel 400 list. More importantly I have greatly increased my ability to locate the right bit of sky to point the telescope at by cross-referencing what I seen in the finder or the telescope to maps and charts.

I am now much more efficient at picking up that very faint whiff of fuzzy nebulosity that is the target. I have also learnt how to see more detail than I previously could. In short, thanks to the inspiration of this book I have trained myself to be a considerably better observer than I was. Further recommendation is surely redundant.

Making Lunar Soil Usable

Written by Nancy Atkinson, Original News Source: New Scientist

Based on what we currently know about the makeup of the lunar regolith, future colonists on the moon will not be able to use the soil on hand to grow food. But in a new experiment, bacteria called cyanobacteria grew quite well in simulated lunar soil. While this wouldn't be a food source for humans, it would enable lunar soil to be broken down to extract resources for making rocket fuel and fertilizer for crops.

This could help with the feasibility of setting up a base on the moon, aiding in Reducing costs for certain supplies.

Lunar soil isn't conducive for growing plants from Earth because many of the nutrients in the soil are locked up in tough minerals that the plants cannot break down.

But a group led by Igor Brown of NASA's Johnson Space Center added the cyanobacteria taken from hot springs in Yellowstone National Park in Wyoming (US), to materials designed to approximate the lunar soil. They found that when water, air and light were supplied, the cyanobacteria grew quite well. Cyanobacteria were found to produce acids that work very well to break down tough minerals, including ilmenite, which is relatively abundant on the moon.

Breaking down the same minerals artificially would require heating them to very high temperatures, which would use precious energy, Brown said. Cyanobacteria, on the other hand, use only sunlight for energy, although they do their extraction work more slowly than heating the soil artificially.

Cyanobacteria typically grow in water-rich environments. They are technically a type of bacteria, but like plants, they produce their own food via photosynthesis.
Brown says he envisions growth chambers for cyanobacteria being set up on the Moon, as part of a multi-step process for making use of the resources bound in the lunar soil. The chambers would be supplied with water, sunlight and lunar soil to allow the cyanobacteria to grow.

Cyanobacteria harvested from the chambers could then be further processed to make use of the elements they extract from the lunar soil. For example, they could be broken down by other bacteria, resulting in a nutrient-rich soup that could be used as fertilizer for food plants grown in hydroponic greenhouses.

Methane given off by the breakdown of the cyanobacteria could be used as rocket fuel.

Deadly Mission to the Red Planet

by Rebecca Sato

It's bold and it's bad, but some brave souls say we can overcome the biggest challenge of a Mars mission by making it a one-way trip. A planet of extremes, Mars is home to the largest mountain in the solar system, the largest canyon in the solar system and intensely severe dust storms. It is also home to the only other likely option for humans to live within our Solar System.

Astrophysicist Charlie Lineweaver of Australian National University says, "ever since the first telescope was invented and we learned that there are other worlds out there, people have dreamed of going to them. Of course we now know that Mars is the only other planet in the solar system you'd want to set foot on."

Physicist Rod Boswell says getting people there isn't the real problem. "There is no doubt you could get people to Mars. Whether you get them back again is a debatable point."

Former NASA engineer Jim McClane says it's worth considering that there is an option that would remove many of the biggest hurdles keeping us from the Red Planet now: We don't plan for the astronauts to come back. They would agree beforehand to the likely possibility that they will die in space after their mission was complete.

Dubbed "Spirit of the Lone Eagle," his plan would eliminate the hardest aspect of any potential Mars mission: the need to launch off of Mars to return to Earth. "When we eliminate the need to launch off Mars, we remove the mission's most daunting obstacle," said McLane. And because of a small crew size, the spacecraft could be smaller and the need for consumables and supplies would be decreased, making the mission cheaper and less complicated.
It could be called a suicide mission, but McLane feels the concept makes sense.

"There would be tremendous risk, yes," said McLane, "but I don't think that's guaranteed any more than you would say climbing a mountain alone is a suicide mission. People do dangerous things all the time, and this would be something really unique, to go to Mars. I don't think there would be any shortage of people willing to volunteer for the mission. Lindbergh was someone who was willing to risk everything because it was worth it. I don't think it will be hard to find another Lindbergh to go to Mars. That will be the easiest part of this whole program."

Any volunteers?

Transit Tailpieces

Still For Sale : 10” Meade 2120 LX6 Schmidt – Schmidt Cassegrain Telescope with Quartz Drive System, tripod and wedge, lots of eyepieces and filters plus other goodies. £500 o.n.o. Also an Observatory Shed with sliding roof specially manufactured by Hodgson's, £200 ono. Please contact John McCue or Bob Mullen.

Articles : Please send contributions for the newsletter to Bob Mullen, 18 Chandlers Ridge, Nunthorpe, Middlesbrough, TS7 0JL, 01642 324939 (b2mullen@hotmail.com) Copy deadline date is the 20th of each month.).

“It sort of makes you stop and think, doesn't it.”

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