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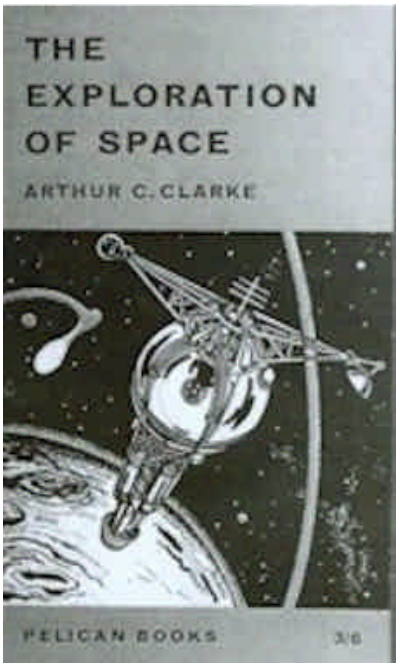
The Newsletter of

Cleveland & Darlington Astronomical Society

05 July 2006



The front page of a small booklet written in 1951 by Arthur C. Clarke who inspired a whole generation of space enthusiasts and accurately foretold so many of the technical leaps which space technology brought into the 21st century

Editorial

9th June meeting :

"Remotely Operated Telescopes" by Dr John McCue, FRAS, Honorary Vice-President of CaDAS.

John introduced the Society to the Remote Telescope work he conducts at the Planetarium for school groups. Having a privileged access to telescopes in California, Hawaii, Chile, and soon Australia and Arizona, he has grandly extended the resources of the Planetarium. His skilled use of imaging and processing software not only allows the capturing of pretty (but amazing) pictures for the schools, he also uses his immense astronomical abilities to calculate the size, distance and content of the objects he captures as part of his own research interests.

There will be a summer break in Society meetings until the next meeting in September 2006. The Secretary, Neil Haggath, will advise the 2006/2007 meeting schedule of speakers.

The Society Library – located at the Planetarium – has a new copy of "The Canopus Encyclopedia of Astronomy". A superb book donated by the publisher to the Society. You can have your own copy for £25 if two or more CaDAS members place an order via the Society Treasurer Ian Miles. Why not pop into the Planetarium to view the book and obtain contact details for Ian. This excellent book is reviewed further on in the newsletter by Alex Menarry.

Letters to the Editor :

Any new observations, any comments on local or international astronomy, anything you want to share with your fellow members?

Recent double star observations from Mike Gregory.

Dear Editor.

O.S. 11/06 – Wednesday, May 31st 2006 – Twice in consecutive days! At 22.45 it was much clearer than last night and pleasanter too. However, by the time I was kitted up and outside there were ominous signs of thin cloud forming. But both Vega and Arcturus were shining brightly so I thought here was an opportunity to set up the Sky Wizard as an aid to finding 20 Draco. This I accomplished quite well even though I did not polar align to any great accuracy. Using the RA/DEC mode on the Sky Wizard, I found two candidates immediately for 19 Draco and 20 Draco as the cloud was thickening. Story of my life? Looking up 20 Draco in the Sky Wizard catalogue, I find that it was number 589, so I used the Find mode and was directed to the same position. So it looks as though

I managed OK though conditions continued to worsen and just after 2400 BST I decided to retire for the night. As I did so, a massive roaring noise from the north then a yellow glow in the sky. Sounded like a pressure valve blowing off!

Looking up 19 & 20 Draco on Redshift 5.1, the magnitude of 19 Draco is given as 4.89 and 20 Draco is given as a wide companion of 19 Draco at 6 arc minutes seperation. However, 20 Draco is a proven binary pairing in its own right with a separation of 1.13 to 1.14 arc seconds depending whose catalogue we use and with almost equal magnitudes of 7.04 and 7.27. Even on a night of good seeing it will be a tough test for my 120mm refractor but I will persevere!

As to the noise I heard, apparently it was a major leak of ammonia, hydrogen and nitrogen gasses at Terra Nitrogen(UK) Ltd on the old Billingham site!

O.S. 012/06 – Friday, June 2nd 2006 – Not a good morning for me but improving as the day went on. An hour sitting in the Sun at the South Gare early in the evening probably helped. By dusk it was looking decidedly hazy but I set the refractor up on the rear lawn at about 23.00 BST and used Deneb and Arcturus to align the electronic setting circles. In this I was marginally out but it was near enough to find 19 and 20 Draco. However, no definite luck with the latter though I thought I could see it as a double at times. Conditions were, as usual, against such observing, 20 Draco being classed as a "double star challenge" for a 102mm refractor. Every time I look up from the eyepiece I see unwanted light shining nearby so my eyes cannot ever become "dark adapted". This is just one of the perils of observing in suburban Middlesbrough. As far as 20 Draco goes, I must be honest and say "I will have to try again on another night"!

Yellow and turquoise Albireo looked pretty good. So did 'little Albireo', actually Struve 3053 in Cassiopeia, dimmer and with only 50% the separation of the real Albireo, but with similar colours. For some unknown reason, Struve 3053 does not figure much in the list of colourful pairs.

Over in the west, where seeing conditions appeared a bit better, Cor Caroli looked crisp and bright. In this area I also had a go at 78 Uma but definitely no success here. As the Pittsburgh Amateur Astronomers needed x400 with their 11" refractor to clearly separate 78 Uma perhaps I can be excused. And, though I was not accurately polar aligned, I was just able to see the dim companion of Polaris near to the edge of my 12.4mm .Plossl

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Arthur C. Clarke – an inspiration.

The following article puts together some early images from Arthur C. Clarke's 1951 book, "The Exploration of Space" supplied by John Crowther and a biography of Arthur C. Clarke from Wikipedia.

As a youngster I was inspired by Arthur C. Clarke's writings, mainly with his Dan Dare *episodes in the wonderful* Eagle *comic and then with his many articles in the technical radio press then followed by his books, both fiction and non-fiction .*

Clarke was a man of many quotes – this is my favourite :-

"For every expert there is always an equal and opposite expert." - Editor.

Lunar type spaceship

Spaceships refueling in free orbit

High altitude man-carrying rocket

The Spaceship on the Moon

The Space station

Building a Space station

Moon explorers in their Spacesuits

Biography -

Arthur C. Clarke was born in Minehead in Somerset, England, and as a boy enjoyed stargazing and enthusiastically read old American science-fiction magazines (pulp magazines, many of which made their way to England as ballast in ships). After secondary school, and studying at Richard Huish College, Taunton he was unable to afford a university education and consequently acquired a job as an auditor in the pensions section of the Board of Education.

During the Second World War, he served in the Royal Air Force as a radar specialist and was involved in the early warning radar defense system which contributed to the RAF's success during the Battle of Britain. He retired in the rank of Flight Lieutenant. After the war, he obtained a first class degree in mathematics and physics at King's College London.

His most important contribution may be the idea that geostationary satellites would be ideal telecommunications relays. He proposed this concept in a paper titled "Extra-Terrestrial Relays - Can Rocket Stations Give Worldwide Radio Coverage?", published in *Wireless World* in October 1945. The geostationary orbit is now sometimes known as the Clarke orbit in his honour. However, it is not clear that his article was actually the inspiration for modern telecommunications satellites. John R. Pierce, of Bell Labs, arrived at the idea independently in 1954, and he was actually involved in the Echo satellite and Telstar projects. However, Pierce stated that the idea was "in the air" at the time and certain to be developed regardless of Clarke's publication. Nevertheless, Clarke described the idea so thoroughly that patents on the concept have been denied on the grounds of prior art.

Clarke's first professional sale was in 1946 to *Astounding Science Fiction*, the still memorable short story "Rescue Party". Along with his writing, Clarke worked briefly as Assistant Editor of *Science Abstracts* (1949) before devoting himself to writing full-time from 1951. Clarke also contributed to the *Dan Dare* series and his first three published novels were for a juvenile audience. He has been chairman of the British Interplanetary Society and a member of the Underwater Explorers Club. In 1951, he wrote "The Sentinel" for a BBC competition. Though the story was rejected, it changed the course of Clarke's career. Not only the basis for *2001*, *The Sentinel* introduced a more mystical and

cosmic element to Clarke's work. Many of Clarke's later works feature a technologically advanced but prejudiced mankind being confronted by a superior alien intelligence. In the cases of *The City and the Stars*, *Childhood's End*, and the *2001* series, this encounter produces a conceptual breakthrough that accelerates humanity into the next stage of its evolution.

He has lived in Sri Lanka since 1956, immigrating when it was still called Ceylon, first in Unawatuna on the south coast, and then in Colombo. This inspired the locale for his novel *The Fountains of Paradise*, in which he describes a space elevator. This, he figures, will ultimately be his legacy, more so than geostationary satellites, once space elevators make space shuttles obsolete.

Following the release of *2001*, Clarke became much in demand as a commentator on science and technology, especially at the time of the Apollo space program. The fame of *2001* was enough to get the Command Module of the Apollo 13 craft named "Odyssey".

He signed a three-book publishing deal, a record for a science fiction writer. The first of the three was *Rendezvous with Rama* in 1973, which won him all the main genre awards and has spawned sequels that, along with the *2001* series, formed the backbone of Clarke's later career.

Clarke is also well known to many for his television programmes *Arthur C. Clarke's Mysterious World* (1981) and *Arthur C. Clarke's World of Strange Powers* (1984).

In 1986, Clarke provided a grant to fund the prize money (initially £1,000) for the Arthur C. Clarke Award for the best science fiction novel published in Britain in the previous year. In 2001 the prize was increased to £2001, and its value now matches the year (e.g., £2005 in 2005).

In 1988, he was diagnosed with post-polio syndrome and has since needed to use a wheelchair.

Clarke was knighted in 2000. Clarke's health did not allow him to travel to London to receive the honour personally from the Queen, so the UK High Commissioner to Sri Lanka awarded him the title of Knight Bachelor at a ceremony in Colombo.

He is currently the Honorary Board Chair of the Institute for Cooperation in Space, founded by Carol Rosin and on the Board of Governors of the National Space Society, a space advocacy organization originally founded by Dr. Wernher von Braun.

He was the first Chancellor of the International Space University, serving from 1989 to 2004, and Chancellor of Moratuwa University, Sri Lanka, from 1979 to 2002.

In 2005 he lent his name to the inaugural Sir Arthur Clarke Awards - dubbed "the Oscars for Space". His brother attended the awards ceremony, and presented an award specially chosen by Arthur. On 14 November 2005 Sri Lanka awarded Arthur C. Clarke its highest civilian award, the Lankabhimanaya *(Pride of Lanka)* award, for his contributions to science and technology and his commitment to his adopted country.

Book Review –"The Canopus Encyclopedia of Astronomy"

Edited by Paul Murdin and Margaret Penston

Reviewed by Alex Menarry

Our secretary, Neil, Haggath, was sent this book by the publishers, Canopus, with an offer to reduce the £40 selling price to £25 for members. It is "approved by the Royal Astronomical Society" and contains "a synthesis of reports from 800 of the world's leading astronomers". It was published in 2004.

How does one review such a large format, 470-page, glossy, coffee-table production? You can't just read through it, novel-like! Well, I'll tell you what I did. I turned over every page, trying to absorb an overall impression of the content and presentation. The title tells you something of the structure. It's an encyclopedia, defined in the dictionaries as "a literary work, giving information on all branches of knowledge or of one subject, usually arranged alphabetically". So you will find each selected topic arranged in an order easy to find.

Not sure of the difference between an encyclopedia (one encyclopedium?) and a dictionary, I turned up my Oxford Dictionary of Astronomy, by Ian Ridpath, to compare content. The difference in presentation between the two is stark. The Oxford Dictionary is in black and white with small diagrams and close, simple fonts, printed on basic paper. The Canopus Encyclopedia is very beautifully presented, on glossy paper, with well chosen and interesting fonts. The illustrations are lavish – there is at least one colour picture illustrating the adjacent topic, on every page. The pictures are sometimes quite stunning.

Scattered throughout the book are "yellow pages", which are an exposition of how to observe the objects being described nearby. These pages are a very good idea, usefully introducing how to start observing. This being the "age of the web", one can follow up the introduction by doing a google on the topic, too.

Comparing the content of the Oxford and the Canopus, as one might expect, the Encyclopedia's editors have had to leave out a number of topics, which are covered in the Dictionary. Whether the exchange of content for presentation is worth it is a personal decision. However, there is only about 10% 'lost' and the presentation really is superb. How do editors decide what to include and exclude from a publication like this? An impossible task, it seems. The technical level of the entries must have been discussed at some length. There are no maths equations or complex technical discussions to be found here. No doubt the publishers applied the "one equation equals a loss in sales of 10%" rule for a 'popular' book.

I looked in detail at a few topics that interested me – variable stars and eclipsing binaries among them - and found they were a good introduction to the subject.

Is the book worth £25? Well, it was first published at £40, so there is a substantial reduction. The copy I looked at had been stored somewhere for two years or so but looked in good condition. It doesn't smell musty or anything. If you are a compulsive collector of astronomy books for your library shelves, I would say buy one. I am seriously considering doing so – when I can negotiate £25 from the Financial Controller.

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The Amazing and Enduring Mars Rovers

from S & T

May 12, 2006 | The longevity of NASA's Mars Exploration Rovers, Spirit and Opportunity, is becoming the stuff of legend. Mission scientists had hoped that the wheeled robots would each last 90 sols (Martian days) on the surface and perhaps drive as far as 600 meters (2,000 feet). As of early May, both rovers had passed the 800-sol mark; Spirit had traveled 6.8 kilometers (4.2 miles) and Opportunity 7.5 km. Combined, the twin craft have shot more than 150,000 images and analyzed many dozens of rocks. Most importantly, the rovers, reporting from opposite sides of the planet, have confirmed suspicions that ancient Mars was indeed wet.

The rovers are showing their age, however. Spirit's right front wheel has seized up completely, and as the rover limps backward across the landscape, it carves a deep trench in its wake. Mobility is typically limited to less than 10 meters a day. Opportunity's instrument arm has a balky shoulder joint, and engineers have had to develop a new way to analyze rocks with a limited range of arm motion.

Recently Spirit, at a latitude of 15° south, spent many days hobbling to a sunny spot for the long, cold winter. Because the Martian southern hemisphere is tipped away from the Sun, when the Red Planet is near the far point of its eccentric orbit, only 70% as much sunlight falls on the rover's solar cells in winter as in summer. To conserve precious energy, the rover team has parked the craft on a 10° slope facing the Sun. "We're probably going to sit there for the Martian winter," says panoramic camera lead scientist Jim Bell (Cornell University). "We're basically acting like a lander for the next six months." While Spirit huddles for warmth, the team plans to analyze reachable rock and soil targets in great detail, monitor the atmosphere, and shoot an enormous 360° mosaic using all of the camera's filters.

Meanwhile, since Opportunity is driving in Meridiani Planum, close to the equator, it receives more sunlight and has no need to find slopes to perch up against in order to survive. With its six good wheels, the rover traversing up to 50 meters per day toward Victoria crater. As of early May the 800-meter-wide depression was only 1.3 km away. Arrival is expected sometime in June or July. Once there, the rover will spend the winter

scouting around the edge and looking for rock outcrops to examine. Controllers may even plot a path inside for next summer.

But how long will the rovers survive? Right now there is no real answer. By winter's end they will have lived 10 times longer than their "expiration dates." "We are heading into our second Martian winter and we think we'll survive," says Bell. The science team is resigned that someday a critical part will break on each rover and both will fall silent. "But until that happens we are going to just keep driving until the wheels fall off," says Bell.

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Alien Civilisations – How many are there?

from Michael Roe

The question of Alien Civilisations in our galaxy has stimulated the brains of the greatest genius's of humanity without an answer, though our imagination has created all kinds of strange aliens. The SETI, or Search For Extra Terrestrial Intelligence using radio telescopes and recently laser detection has produced nothing apart from an isolated signal in 1972 that was probably a signal of terrestrial origin. I'm going to tell you why, the truth is out there even though people may not like it.

First a fact. About 15 stars a year on average have been born in our Milky Way galaxy over its lifetime. This means an absolute maximum of 15 new separate civilisations could appear every year. I don't think more than one planet per star system could produce a civilisation. But many stars are just not right for producing life on their planets, being too short lived or unstable and those left are likely to have planets unsuitable for life due to size, composition or temperature, often all three or more reasons.

And those planets that do manage to produce life don't all produce intelligent life. Our own example, Earth, took three thousand million years to get from one-celled life to anything more complicated – many worlds throughout the Galaxy could be stuck at this stage. Also life evolves in millions of different ways on Earth, only humans have developed a real civilisation with electronics, space travel and much else. Other worlds could be teeming with alien creatures that have only, say, the intelligence of a mouse or a beetle.

So only a few civilisations are likely to arise. I guessed in a previous article that only one civilisation would ever appear in a million star/planet systems, 200,000 civilisations would appear in the Galaxy, or perhaps one new civilisation would appear on average in the Galaxy every 13,000 years.

Now the final question, how long does a civilisation last? Specifically, how many years does a civilisation last beyond its development of space travel and radio telescopes. Our

own example on Earth is about 50 years so far. But with a rapidly increasing population, presently six and half thousand million inhabitants, increasing at eighty five million a year and with only a finite amount of resources on the planet I anticipate our civilisation only lasting another 50 to 100 years.

Possibly some civilisations out in the Galaxy may be more careful and stable, possibly lasting thousands of years, others may destroy themselves with nuclear war within a decade or less of their discovery of nuclear weapons. But even assuming an average of a thousand years … well, that works out on average at a 1 in 13 chance of a civilisation in the Milky Way galaxy at any one time. At this time I suggest there is only one civilisation, we are all members of it on planet Earth.

I did say the answer may not be popular. We have been raised on Science Fiction books and TV, showing us hordes of aliens, mostly nasty vicious ones but these exist in human imagination and the Universe is just as it is, not how we want it to be, sorry!
Actually my estimate could be too high, we just don't know. It is only a few years since we first detected planets orbiting other stars. I remember over 20 years ago a former member of CaDAS, Alistair Lovett, told me about a science fiction book where nothing more advanced than grass existed in the rest of our galaxy, perhaps this book was closer to the truth than I realised.

For anyone who believes my conclusions are too pessimistic, they are! But think!
As I have said, no genuine signals from an interstellar intelligence has been detected despite decades of searching. Not just that, no interstellar spacecraft have been seen (space crockery doesn't count), or any large artifacts or structures have been observed on the surfaces of the Moon or similar worlds where there is little surface erosion.
A scientist, Enrico Fermi, once said "if highly advanced civilisations exist in our galaxy where are they?" He believed some could colonise the whole galaxy in a few million years, yet nothing our great telescopes and spacecraft have seen indicates advanced artificial technology in space.

Once our own civilisation was predicted to achieve great things and last many centuries but the worship of economic growth and the continued population growth has destroyed any chance of this. Look at the media, especially television, once a medium for educating people as well as providing entertainment, has deteriorated to over-emotional drama and rather silly factual programmes - intelligence is not encouraged. If this can happen to one civilisation it can certainly happen to others.

It is likely that civilisations are rare throughout the Universe, I don't think we are unique except in the Milky Way, but all civilisations are short lived and none are advanced enough to colonise a galaxy.

So there is the answer, there is only one civilisation in the Milky Way galaxy, ours – and it is sadly on the wane.

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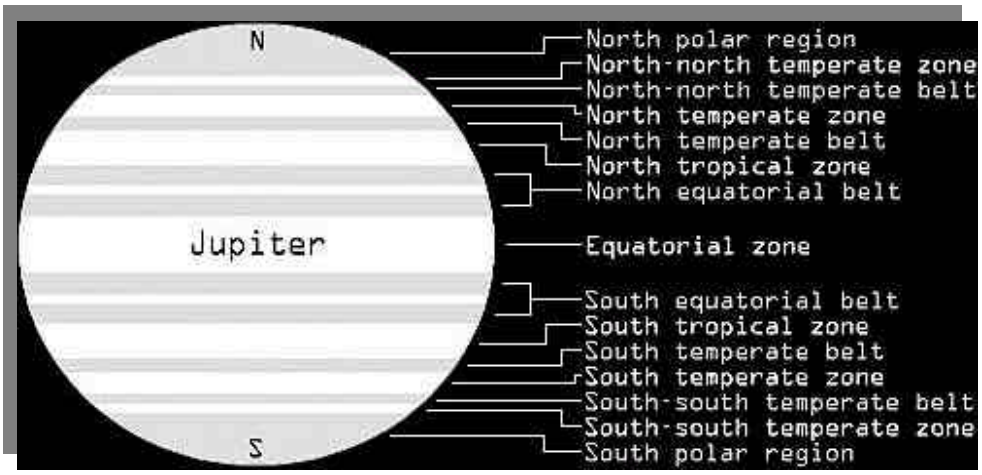
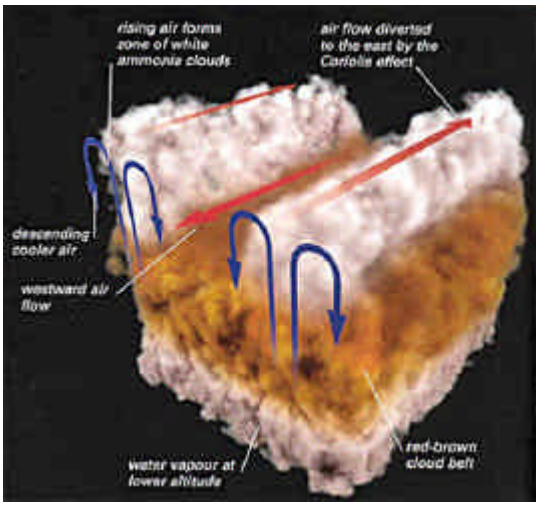
The Cloud bands and Storms of Jupiter

The bands of dark and light clouds on Jupiter are a distinctive feature of its atmosphere. In fact, they represent regions of varying pressure; the light bands are high-pressure 'zones', and the dark bands are low-pressure 'belts'. Jupiter has such a fast rotation rate (of only 9 h 55 min) that the zones and belts are stretched around the planet, forming the bands. The diagram below illustrates the bands and their names. (Based on a diagram by McLellan, 1999.) Through most telescopes the observer sees an inverted image, so the northern belts and zones would appear to be in the southern hemisphere, and *vice versa.*



Jupiter's proximity to the Sun, compared to the distances of the other gas giants, means that a great deal of turbulence occurs within the zones and belts. Consequently, they are never so clearly defined relative to each other as in the diagram above :-



(courtesy of " Universe, The Definitive Visual Guide, pub. Dorling Kindersley.)

As one might guess from looking at the photos we have of it, Jupiter is a very active planet. Many storms rage all over its surface, the most famous being the 'Great Red Spot'. This is a gigantic rotating storm, wider than 3 'Earth diameters'. It is highly complex and moves in a generally anti-clockwise direction. It is known to have existed for at least 100 years.

Jupiter's atmosphere is dominated by hydrogen (89.8%) with the rest made up of helium and traces of methane, ammonia, water, ethane, acetylene, and propane. It is the mixing of gasses that gives rise to the different coloured clouds we can observe in the upper atmosphere.

The temperature of the atmosphere increases towards the planet's interior. Different gases condense at different temperatures so different types of clouds form at specific altitudes. Simultaneously, the gas in Jupiter's equatorial region is heated directly by the Sun which causes this gas to rise and move towards the polar regions. Cooler gas flows from the polar regions at a lower altitude to take its place thereby creating a large hemisphere-wide circulation cell.

Due to the very rapid rotation of the planet a force known as the Coriolis Effect deflects the north-south flow into an east-west flow which splits the large circulation cell into many smaller cells of rising and falling gas. These are seen on Jupiter's surface as alternating bands of colour – the white bands of cool rising gas called zones, the red-brown bands of warmer falling gas called belts. This can be illustrated in the following diagram:

Overall Jupiter looks yellow, but you can notice a lot of different coloured features on the surface. These are caused by different types of molecules plus a stormy atmosphere. The Jovian core is thought to be a bit rocky, but mostly Hydrogen in a metallic form. Then comes an atmosphere of 90% Hydrogen and 10% Helium. The surface, a layer with a relative thickness smaller than an apple peel, is made up of other elements that give Jupiter its colour. The additional white colours are caused by ammonium (NH_3) in the highest parts of the atmosphere (ammonium stinks). The orange and brown colours come from a mixture of NH_3 and H_2S, the stuff that smells like rotten eggs. Further H_2O (water) gives some more colour to Jupiter.

These colours can be seen as large bands parallel to the equator. Between these bands you can see a lot of ovals; they are thousands of whirlwinds, with the red spot the largest of them all. These turbulences are caused by the outflow of warmth caused by contraction of the planet. The turbulences themselves cause the cloud bands to rotate around Jupiter. The small turbulences can last up to a few years, but the red spot has been present for centuries.

If you closely examine the white zones between the belts you can sometimes see curving dark wisps called festoons. These are streaks of swirling gases intermixing rapidly in the turbulent equatorial zones of Jupiter. When observing Jupiter it is worth considering using filters to enhance the contrast between dark and light regions, for example: yellow-green: brings out fine detail in cloud belts orange: accentuates belts; light green:

accentuates red features (GRS) ; light blue: enhances white features and details in orange and purple belts.

Note that filters are not magical devices. Filters don't make things 'appear', they only enhance them by blocking wavelengths of other features to make them stand out. Spend time at the eyepiece to allow your eye to detect the different details. You can find additional filter using tips at http://www.lumicon.com/filterspec.htm

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The CaDAS new Meade 10 inch GPS Telescope

from the Editor

John McCue announced at the June CaDAS meeting the Society now has a new fully automated 10 inch Meade LX200 telescope for use in the WWP Observatory. The telescope was purchased with funds donated from the local chapter of the Institute of Measurement and Control and the Ropner Trust. Below is the Meade spec. for this telescope.

Telescope GPS alignment is accomplished automatically using signals from the Global Positioning System (GPS), a satellite system that enables extremely precise communication to the telescope of the observer"s latitude and longitude, as well as local time. Integrated true-level and North electronic sensors in combination with a 16-channel GPS receiver located in the left-hand fork arm result in accurate telescope alignment to the sky at the touch of a button: Just press the ENTER button on the Autostar II hand controller and watch as the telescope measures level, points North, and slews at 8°/sec. to its first alignment star. Magnetic declination compensation designed into the telescope software automatically engages during the alignment process.

New Heavy-Duty Fork Mounts:
All-new LX200GPS fork mounts are the strongest, most rigid mountings ever made available for telescopes of these apertures. DC-servo-motor-controlled (12v DC) worm gear drives with almost two hundred selectable drive speeds, combined with the Meade Smart Drive on both telescope axes, permit observatory-level precision in tracking, guiding, and slewing.

Photo-guide speeds:
Are selectable from 0.01x to 1.0x sidereal, in increments of 0.01x; fast-slew speeds are selectable from 1°/sec. to 8°/sec. in 0.1°/sec. increments. Use the 8°/sec. speed for rapid motion of the telescope across the skies; once near the target, switch instantly to a speed

of 1.5°/sec. or 3°/sec. for centreing in the viewfinder. Observing in the main telescope, use the 16x or 64x sidereal speed to place the object in the centre of the field.

Built-in 145,000-Object Library Included as Standard Equipment: Enter into the Autostar II handbox any of the 145,000 celestial objects stored in the LX200GPS onboard database, press GO TO, and the telescope automatically slews (moves) to the object at 8°/sec., centreing it precisely in the main telescope field. Additionally, the display reads out for each selected object its magnitude, size, object-type, visual quality rating, RA and Dec. Or, let the telescope take you on an automatic guided tour of TONIGHT"S BEST. Stored in an expanded 3.5-Megabyte flash memory, Autostar II"s database is immediately accessible on the Autostar II display and includes an incredible array of phenomena — virtually a lifetime of deep-space study, even for the advanced observer.

Additional Autostar II Functions: Dozens of additional handbox functions, all easily and immediately accessible, make Autostar II the most powerful electronic tool ever developed for the serious amateur. A partial listing of fewer than half of these functions includes: GO TO capability to any input RA and Dec. coordinates; a 200-object user-defined library; event menus displaying the times and/or dates of Sunrise/Sunset, Moonrise/Moonset, Moon phases, meteor showers, minimum of Algol, equinoxes and solstices; custom-guided tours defined by the user; standard tours including Tonight's Best; 24-hour timer with beeper; alarm function with beeper sounds at selected times; 16-level display brightness adjust; 16-level display contrast adjust; red-LED utility light; battery alarm for low-battery warning; 7 alignment modes; sidereal, lunar, or any of 2000 custom tracking rates; factory-trained Smart Drive periodic error correction on both telescope axes with field-training capability.

Altazimuth Operation:
For all visual observing applications, for lunar and planetary photography, and for most CCD imaging applications, Meade LX200GPS models may be set up in the altazimuth mode just attach the telescope"s drive base directly to the tripod, use the GPS alignment procedure, and the telescope"s computer actuates 2-axis tracking that keeps objects precisely centred in the field, even at high powers, during the entire observing session. For long-exposure astrophotography (longer than about 5 minutes) altazimuth-induced field rotation requires an equatorial wedge or the #1220 Field De-rotator

Field Operation:
LX200GPS telescopes operate for over 20 hours from eight C-cells neatly stored inside the fork arms. Alternately, telescope powering may be effected from an automobile cigarette lighter plug (using the optional #607 Power Cord) or from a standard home outlet (using the optional #547 AC Adapter).

Primary Mirror Lock:
This revolutionary new rear-cell system is designed for the advanced visual observer, astrophotographer, and CCD imager. Turn a knob located just above the manual coarse-focus knob, and lock the telescope"s primary mirror rigidly in place. Used in conjunction

with the Zero Image-Shift Microfocuser (below) the progressive-tension primary mirror lock completely cancels any residual image shift while focusing during visual, photographic, or CCD imaging applications.

Zero Image-Shift Micro-focuser :
Now you can obtain the most precise image focus possible _ truly to a microscopic level _ during visual and astrophotographic applications, and, during CCD applications, simultaneously maintain precise image centration on even the smallest CCD chips. Included as standard equipment on all LX200GPS Schmidt-Cassegrain models, the Meade Zero Image-Shift Microfocuser operates at 4 speeds from extremely slow to fast; the entire microfocusing operation is actuated through the Autostar II handbox and powered from the telescope's control panel. Coarse manual focusing is effected through the telescope's manual focus knob.

Contact John if you would like to try out this fantastic telescope . It shares the floor space with the MT 19" reflector in the observatory so you can swing between the two on good seeing nights and compare performance.

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Observing the Asteroids

from the Open University

It is surprising, in these days where large telescopes and sophisticated instrumentation are relatively common, to note that there are still amateur observers around who have never seen an asteroid. Prior to the 1960's these lumps of rock had been considered a nuisance by most right thinking astronomers, definitely not worth looking for or at. The first sentence in the chapter on Minor Planets in Sidgwick's `Observational Astronomy for Amateurs' (in all its many partial revisions) proudly proclaims this fiction.

With the realisation that asteroids probably represent remnants from the formation of the Solar System coupled with the availability of sensitive instrumentation to observe them, this all changed. There is even scope for making useful contributions by taking part in group projects, such as those run by the BAA Asteroids and Remote Planets Section, using limited equipment.

Just locating the asteroid is an achievement, especially with the fainter examples. It is unlikely that you will be able to go to the eyepiece and say you have seen an asteroid without making some preparation. Armed with an ephemeris (table of predicted positions) and a star chart, the problem is reduced. Plotting the position on the star chart will enable you to recognise the brighter asteroids immediately or else to narrow the

search down to a few possible stars. Final recognition depends on determining which `star' is moving. Either draw the field stars and wait for an hour or two when the motion of the asteroid should be visible, or as a better alternative time transits of the stars in the field across a wire. Over the period of an hour the movement of the asteroid will reveal its identity as the transit time will have changed.

Having found your asteroid what do you do? Well that in part depends on what you want to do. Its position can be estimated over a month or two and plotted on a star chart. Are you sure that planets describe loops in the sky? It is easy enough to check.

Even relatively simple observations can be instructive. Does the apparent brightness change during the course of an evening as the asteroid spins on its axis? Some elongated asteroids have large amplitudes. For example 215 Kleopatra varies by 1 magnitude and 433 Eros by 1.5 magnitudes if their poles are directed in the direction of the Earth. By estimating the brightness at regular intervals over two or three nights it is possible to derive an axial rotation period very accurately. Even if the brightness does not appear to change during the course of a night it will change as the distance from the Earth changes, brightening as opposition approaches and fading as the Earth draws ahead after opposition. When this is plotted on a time against magnitude graph you can see whether the asteroid's orbit is appreciably eccentric - this is the case if the graph is not symmetrical.

The more ambitious observer can develop the above projects. Accurate positions can be derived by using some simple apparatus. A pair of wires (hairs or webs) that are not parallel can be placed in the focal plane of an eyepiece. This device, a cross-wire micrometer, can be used to measure positions to better than 6 arcsecs just by timing the transits of stars across the wires. Accuracy can be increased if a filar micrometer is used.
As far as estimating brightness is concerned this is only a beginning. Estimates taken over a period can be converted to a standard distance - normally 1AU from the Sun, 1 AU from the Earth and 0o Phase angle (100% of phase) - from an analysis of these results information on the albedo, diameter and other parameters can be derived. These can be increased in value if several observers pool their results.

The really dedicated observer can contribute to fundamental research - one of the few areas open to amateurs in observational astronomy. But this does mean using photoelectric photometers, carrying out photographic astrometry and carrying out rigorous analysis of the results. It is perhaps beyond the scope of this article.

Asteroids are interesting! If you don't look for them you are foregoing an experience. Even spotting asteroids (as others collect train numbers) has its devotees - the current record of visual sightings being about 1,700 different asteroids.

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A book review – "The New Flatlanders" a Seekers Guide to Everything

By Eric Middleton (ISBN 1-897913-65-6)

Reviewed by John Crowther

This is an unusual book, being part science and part theology. The author has been Principal of Prior Pursglove College, Guisborough and now lectures in science and theology.

The book is written in a question and answer format with students supposedly asking the questions. The Flatlander idea is an old one that originated in the nineteenth century. "Relativity for the Layman" an old Pelican book uses this in a drawing on the last page. Here a Flatlander is looking through a powerful telescope. He can see around an finite but unbounded universe and is able to see the solitary hair on the back of his head!

So a two dimensional flatland allows us to visualise another dimension. Flatlanders are confined within a two dimension world where up and down, height and depth cannot be imagined.

Eric Middleton imagines a God who enters their world from a third dimension which they cannot comprehend. We can imagine a black hole in this way when the plug is pulled out of a bath of water. A Flatlander floating on the surface spins around and goes down the plughole. This is an impossible journey for him, a voyage down a worm-hole to a back garden where three dimensional worms live.

As far as the sixteen dimensions which the two ladies spoke about in their enthralling talk "Strings and Things" at the May 2006 Society meeting they are twelve dimensions beyond me.

John Crowther.

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The Plough and the Cross

from Space.com

As soon as darkness falls these evenings, step outside and look skyward. What is the most prominent and easiest star pattern to recognize?

If you live in the Northern Hemisphere you only need to look overhead and toward the north where you will find the seven bright stars that comprise the famous Plough. Interestingly, in other parts of the world, these seven stars are known not as a Plough, but as some sort of a wagon. In Ireland, for instance, it was recognized as "King David's Chariot," from one of that island's early kings; in France, it was the "Great Chariot."

Another popular name was Charles's Wain (a wain being a large open farm wagon). And in the United States, these seven stars are known widely as "The Big Dipper."

For most sky gazers, the Plough is probably the most important group of stars in the sky. For anyone in the latitude of London (52 degrees North) or points northward, it never goes below the horizon. It is one of the most recognizable patterns in the sky and thus one of the easiest for the novice to find.

Southern Hemisphere

But for those who live in the Southern Hemisphere, it is not the Plough that people choose as their guide to the night sky – but rather, it's the constellation known as Crux, the Southern Cross. Those south of the equator (where it is now mid-autumn), need only cast a glance toward the south where they'll see the distinctive shape of the Cross hanging well up in the sky. To some, it looks more like a kite, though the Cross is clearly outlined by four bright stars, two of which, Acrux and Becrux are of the first magnitude. From top to bottom, Crux measures just 6 degrees – only a little taller than the distance between the Pointer stars of thePlough.

In fact, the Southern Cross is the smallest (in area) of all the constellations. Like thePlough, whose Pointer stars point toward Polaris, the North Star, the Southern Cross indicates the location of the South Pole of the sky and as such is often utilized by navigators. The longer bar of the Cross points almost exactly toward the South Pole of the sky which some aviators and navigators have named the "south polar pit" because, unfortunately, it is not marked by any bright star.

Amerigo Vespucci

It is thought that Amerigo Vespucci was the first of the European voyagers to see the "Four Stars," as he called them, while on his third voyage in 1501. But actually, Crux was plainly visible everywhere in the United States some 5,000-years ago, as well as in ancient Greece and Babylonia.

According to Richard Hinckley Allen (1838-1908), an expert in stellar nomenclature, the Southern Cross was last seen on the horizon of Jerusalem about the time that Christ was crucified. Thanks to precession – an oscillating motion of the Earth's axis – over the centuries, the Cross ended up gradually getting shifted out of view well to the south.

Immediately to the south and east of the Cross is a pear-shaped, inky spot, about as large as the Cross itself, looking like a great black hole in the midst of the Milky Way. When Sir John Herschel first saw it from the Cape of Good Hope, South Africa in 1835, it is said that he wrote his aunt, Caroline about this "hole in the sky." Indeed, few stars are seen within this hole and it soon became popularly known as the "Coalsack" which initially was thought to be some sort of window into outer space.

Today we know that the celebrated Coalsack is really a great cloud of gas and dust that absorbs the light of the stars that must lie beyond it.

Never seen one of them?

There are probably a number of you who have never seen either the Plough or the Southern Cross and might wonder about how far they might have to travel in order to get a view of them. Coincidentally, at this time of the year, both are attaining their highest positions in the sky at the same time: around 10-p.m. local daylight time in July. To see Crux, one must go at least as far south as latitude 25 degrees North.

So far as seeing the Plough, you must go north of latitude 25 degrees South to see it in its entirety. Across the northern half of Australia, for instance, you can now just see the upside-down Plough virtually scraping the northern horizon about an hour or two after sundown.

In fact, it's just the opposite effect as opposed to those who live in north temperate latitudes (like London), whose inhabitants see the Plough at a similar altitude above the northern horizon on early evenings in late November or early December – except the Plough appears right-side up!

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The Changing Sky – for beginners

From Joe Rao

Most star patterns in the night sky are associated with specific seasons of the year. Evening skywatchers in the Northern Hemisphere enjoy Orion the Hunter only during the cold wintry months, for example. Spring evenings provide a view of the Sickle of Leo, the Lion. In summer, the stars of Scorpius, the Scorpion dominate the southern sky. And the Great Square of Pegasus vies for the stargazer's attention on fall evenings.

What's going on? Armed with some facts, you can do a little observing and conduct a simple experiment in order to easily grasp this important celestial concept.

Watch the night sky on any night from dusk to dawn you'll notice certain stars rising from the eastern horizon. They sweep across the sky during the night, finally setting beneath the western horizon by dawn. No big deal here, since, after all, the Sun does the same thing during the daylight hours.

As a result, the stars appear to rise, cross the sky, and set 4 minutes earlier each night.

This amounts to a whole hour earlier in 15 days and two hours earlier in a month. A little more arithmetic shows that in one year the cycle will come full circle (12 months x 2 hours = 24 hours), since each star completes a full circle around the sky during the course of one year.

This can be made clearer by trying an experiment:

Look skyward on any night and pick out a bright star, then line it up with a nearby landmark (like a telephone pole or the peak of your neighbour's roof/chimney pot). Make sure you note the exact time and the exact spot when you lined up the star.

Then come back the next night at the exact same time and stand in the exact same place. You'll see that the star has apparently shifted slightly to the right (west) of the position that it was at the previous night. Had you arrived four minutes earlier, the star would have lined up exactly with the nearby landmark just as you had seen the previous night.

This apparent westward drift of the stars, is a motion that is in addition to the daily rising, circling and setting. For our Earth does not simply stand in the same spot in space and spins, but is constantly rushing eastward along in its orbit around the Sun. It carries us steadily toward and under the stars to the east and away from the stars that we are leaving in the west, until we make a complete circle around the Sun, bringing us back to our original position in one year.

And then the whole performance starts again.

Star time vs. Sun time

All this raises a question: If the Earth takes 23 hours and 56 minutes to turn on its axis, why do we say that a day is 24-hours long?

Astronomers have devised special clocks adjusted to keep time solely by the stars. These astronomical clocks keep "sidereal" (star) time. There is no a.m. or p.m. in a sidereal day. With the clocks that we use every day, the hour hand goes completely around 12 hours twice a day.

But with a sidereal clock, there are 24 hourly numbers on the dial instead of 12, and the hour hand goes around only once in a sidereal day. The hours start at 00 hour (zero hour) and are numbered straight through to 23-hours and then starts at the zero hour again. The sidereal clock also differs in that it runs four minutes fast as compared to a regular clock.

Now, if our daily lives were governed by the sidereal clock, there would be times during the year when the Sun would appear highest in the sky at noontime, but at other times of the year it would appear highest at midnight; setting at 6 a.m. (or something else strange). We're accustomed, of course, to be awake when it's light and asleep when it's dark, so astronomers also developed a "mean" Sun, which governs our ordinary clocks and results in 24-hour (solar) time of which we are all accustomed to.

The Mean Sun however, is fictitious and for most of the year deviates somewhat from the true Sun's position in the sky. But the mean Sun was invented only to make 24-hour timekeeping by the Sun mathematically correct.

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The Colours of Stars

from Joe Rao

One of the pleasures of stargazing is noticing and enjoying the various colours that stars display in dark skies. These hues offer direct visual evidence of how stellar temperatures vary.

A good many of the summer luminaries – such as brilliant Vega which stands nearly overhead during the late-evening hours – are bluish-white, but we can easily find other, contrasting colors there as well. Look at reddish Antares, and the yellowish-white Altair.

And considerably removed from this summer retinue, brilliant topaz Arcturus holds forth in solitary splendor in the western sky.

Double colour

Probably the most colorful double star in the night sky can now be found nearly overhead at 11:30 p.m. local daylight time: Albireo in the constellation of Cygnus, the Swan, also known as the Northern Cross. Albireo supposedly marks the swan's beak.

A small telescope or even a pair of steadily held binoculars, will readily split Albireo into two tiny points of light of beautiful contrasting colours: the brighter one a rich yellowish-orange, the other a deep azure blue, both placed very close together. An absolutely stunning view will come with a telescope magnifying between 18 and 30 power.

If I'm with a group of people with my telescope under the summer sky, I always make it a point to look at Albireo, commenting that it's the star that commemorates the New York Mets, because of that ball team's colors of orange and blue.

Many people insist stars are just plain white. Certainly, star colors are not easy to see, chiefly because our eyes' color sensors – the cones of the retina – are quite insensitive to dim light. At night, the rods take over, but they are effectively colour-blind. Only the brightest stars can excite the cones, unless binoculars or a telescope is used to intensify a star's light.

Color perception is aided further by the close juxtaposition of a 'contrasty' pair of stars as in Albireo.

Bound or not?

Albireo is believed by astronomers to be a physical pair bound by gravity, although there has never been evidence of any orbital motion between these two colourful stars. The projected separation between the two is just over 400 billion miles. At least 55 solar systems could be lined-up edge-to-edge, across the space that separates the components of this famous double star.

At least that's how it appears. It is possible that one star is much farther away than the other, and that they're not actually orbiting one another.

By the way, there is an interesting rule about the colors of telescopic double stars. If the stars of the pair are equally bright, they have the same color. If they are unequal in brightness, they have different colours. If the brighter star is the redder of the two, as in the case of Albireo, it must be a giant star; if it is the bluer, then it is what astronomers call a main sequence star, like our Sun.

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Some more quotes from Arthur C. Clarke

- Every revolutionary idea seems to evoke three stages of reaction. They may be summed up by the phrases: (1) It's completely impossible. (2) It's possible, but it's not worth doing. (3) I said it was a good idea all along.

- I don't believe in astrology, I'm a Saggitarius and we are sceptical.

- I don't believe in God but I'm very interested in her.

- Sometimes I think we're alone in the universe, and sometimes I think we're not. In either case the idea is quite staggering.

- Cave dwellers froze to death on beds of coal. It was all around them, but they could not see it or use it. Today, we are in danger of making the same mistakes"

- It is hard - though not impossible - to think of any scenario which would, as Apollo did for the Moon, accelerate the course of history so that a Mars mission would occur *as soon as it became technically feasible.* What is more likely is that astronautical knowledge and engineering skills will steadily increase until, at some time in the next century, it becomes clear that a flight to Mars is a reasonable extension of current technology, largely using extant hardware. A good case can be made for going back to the Moon first, and learning how to live there...Spending extra time and money on the Moon could save many lives on the road to Mars....(and) the Moon might play a vital role in the exploration of the Solar System by providing a low-gravity base.

- This is the first age that's ever paid much attention to the future, which is a little ironic since we may not have one. "

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Transit Tailpieces

Custom Telescopes UK.

Glen Oliver, a long-time member of the Society, can supply telescopes and accessories of all kinds. He operates from Hartlepool and has a website,
http://homepage.ntlworld.com/glen.oliver/custom.htm
e-mail glen.oliver@ntlworld.com.

Support local businessmen! Glen tells me that he now has an Astronomy and Space books page on his website

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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 25th of each month.

Arthur C. Clarke

John Crowther

Alex Menary

Michael Roe

Michael Gregory