Castle Eden Planetarium

Newsletter 2

Incorporating

Transit

(The magazine of the Cleveland and Darlington Astronomical Society)

February, 2001

Located on the Nature Walkway near Thorpe Thewles, Stockton-on-Tees, and jointly founded in 2000 by the Cleveland and Darlington Astronomical Society and Stockton Borough Council, to bring the universe to everyone.

Latest news

Building work continues on the planetarium, the training scheme providing valuable bricklaying skills for young people as well getting our new astronomical facility under way. The line of soldier bricks near the top of the walls has just been finished, adding a pleasing design feature for the eye. Work on the roof should begin soon, and hopes are high that it will not take long. The trench connecting the planetarium to the observatory has been started; conduits will be laid carrying wires for electronic signals. The wonders of the universe will be brought live to planetarium audiences!

The planetarium will use an A1 Spitz planetarium projector, the first model made by the renowned American company. They are now up to model A5, an example of which has just been bought by Jodrell Bank at a cost of a quarter million pounds! The A1 has been granted free of charge to our project on condition that it is fully and properly used, by the Genk planetarium in Belgium where it was used for many years before being superceded.

While the observatory is under repair for long-term rain damage, plans are being considered to enhance its optical capabilities. By a coincidence, the society has been offered at this time a 19-inch mirror, fully figured and polished, at a very reasonable price. We are looking at ways of incorporating this into the observatory while retaining the extant 8-inch refractor, a fine planetary and lunar instrument. Whatever happens, fundraising may well be on the cards for the astronomical society!

Reports: the lunar eclipse of 9th. Jan., 2001

From Paul Money (Boston astronomers)

Over here in good ol' darkest Lincolnshire we had clear skies but with varying haze during the course of the event. Certainly the haze caused some problems using the 10" F5 Newtonian reflector telescope since most of the time, as the Moon got deeper into the shadow, I could not see the dark hemisphere. Once it was almost eclipsed though, the glare from the bright bit diminished enough for me to get a better view of the eclipsed Moon. Definitely was not as red as the media had made out (but then what's new?!) but it still looked dull red and was an enjoyable evening spectacle despite the cold. My colleague Barry was using the 6.25 inch binocular telescope and was able to see all the moon throughout the event so perhaps he had better contrast with the lower magnification used.

From David Weldrake (CaDAS member, about to take up a professional astronomy post in Australia)

Yes, I did manage to spot the eclipse through cloud from the Castle Eden Walkway. When we got there (Darren Bushnall and I), it was about 6/8 cloud but we saw the moon half eclipsed through it. There were about 10 members of the public there. Well, it clouded up totally and started to rain, and everyone left, leaving us there alone. We sat out the rain, VERY heavy with hailstones until it stopped at about 8:35. We could tell the moon was eclipsed as it was real dark, darker than when we arrived. At 8:50 of thereabouts it cleared up

enough and we saw the eclipsed moon just coming out of the umbra, dark brownish red, with a bit of blue. It looked like Mars with a polar cap. Definitely not the red it said it was on the telly. Suffice it to say, it cleared up after totality and by the time the moon was out of the umbra it was a beautiful clear sky, not a cloud anywhere. Typical. The night before and the night after were real clear, I wonder what the odds are of that happening.

From Martin Whipp (York Astronmical Society)

What did we do for the eclipse? You mean you didn't see us on the 6 O'clock national news? Well, apart from that we had a weather link on Look North from our site, a late edition interview with Martin Dawson at 10:25 on Look North, numerous interviews on Radio York, and bits and pieces in the local Press. The event itself was on the York Knavesmire and attracted round about 200 people down to look through the collection of 8 society scopes. Along with ours, people brought their own along, until about half an acre of York Racecourse was filled with tripods and telescopes and such like. And the weather? Fantastic - we saw every minute of it. We also saw a transit of Io across Jupiter, and managed to capture bits of it on film.

From Ian Miles (CaDAS)

I was at a fishing match on Seaham beach (nr. Sunderland). Despite the cloud and rain elsewhere, I did see good portions of the eclipse, from start to finish. The 2 o'clock area of the Moon was last to go and throughout totality, the brighter (and whiter) part of the Moon travelled around the limb anti clockwise, eventually becoming the first part of the un-eclipsed limb at around the 8 o'clock position. Totality was the usual burnt-red colour, particularly away from the brighter limb. Not the darkest eclipse I've seen, nor the reddest. The Moon did not travel through the centre of the umbra.

From John McCue (CaDAS)

My GCSE Astronomy class of pupils from Ian Ramsey School, Stockton-on-Tees, were disappointed with the cloudy weather during the early evening. All keyed up to use the eclipse as a vital coursework towards their final grade, they resorted to following it on the Internet; not the same, but they still obtained some images. Some of the pupils observed the eclipse after they had returned home, the skies clearing a little.

From David Graham (CaDAS)

Driving south from my work place in Darlington late yesterday afternoon (Tuesday, January 9, 2001) circumstances for observing the total eclipse of the Moon did not look promising, with overcast skies prevailing as far south as Catterick, but fortunately on arrival at my home in Ripon, North Yorkshire, the sky had largely cleared. The umbral phases took place approximately between 18h45m and 22h15m UT and the event was observed with my 150mm Maksutov-Cassegrain. The Moon lay a little south and west of Castor and Pollux in Gemini. Some cloud did interfere with the observing session from time to time, but never for long enough to obscure any important stage of the eclipse. The Moon moved through a fairly rich starfield and one stellar occultation was seen. Some parties had predicted a bright eclipse during totality but I did not consider this to be the case, though the Moon remained visible to the naked-eye throughout. Of interest was the topography of the limb of the Moon, which displayed several valleys, peaks and craters on the circumference of the limb. Also of interest was simply to follow the advance and retreat of the Earth's shadow and to look at familiar formations in the copper-brown hue of totality. An enjoyable event, the last total eclipse of the Moon visible from Britain on January 21, 2000, was also observed from this site.

Geminid meteor shower, by Darran Summerfield (Cleveland and Darlington Astronomical Society)

Wed/Thurs 13/14 Dec.

With damaging gales shaking the country, and a bright waning Moon, I thought my chances of seeing any Geminids this year were slim. I had to take the afternoon off work to fix my fence; this turned out to be a more difficult task than I had expected, had to dig out the concrete foundations for one of the broken fence posts with a pickaxe, in the dark and in the rain. But an early Christmas dinner raised my spirits. To my surprise I discovered that the sky had cleared. So I put on several layers of clothing, got out the camp bed and ventured outside. Despite occasional fast moving cloud and the Moon I did see many meteors over a one and a half-hour period. Most were bright, slow moving and without trails, one magnificent magnitude zero meteor streaked down the full length of Andromeda. For a change I decided to count the seconds between meteors. On average I saw one about every minute to every minute and a half. Twice there

were pairs of meteors within five seconds of each other. On the whole the view was very satisfying considering the conditions.

Thomas Wright Trophy

From Neil Haggath

This year, CaDAS has had to temporarily relinquish its hold on the Thomas Wright Trophy, which is now in the hands of our friends from Durham A.S. The way that we have run the quiz competition in recent years, as a NAGAS event, has attracted little interest, so this year we decided to revert to the original format of a "panel" quiz, with each team entering a team of three people. The quiz was held at our 8 December meeting; the societies taking part were ourselves, Durham, South Shields and York. Durham and South Shields are our traditional rivals; York were invited back after an absence of several years, having competed in the past in pre-NAGAS days. The Questionmaster was Yours Truly. The home team began at something of a disadvantage. All the visiting societies had chosen their teams well in advance, and the contestants had prepared themselves for the competition. In our case, a couple of people who had intended to compete were not able to make it on the night, so we had to ask for three volunteers at the start of the meeting, in order to make up a team. Those dropped in it were old hands Jack Youdale and David Bayliss, and one of our newer members, Mark Rice. After a hard-fought contest, Durham took the trophy home, with the home team being beaten into third place. The final scores were:

Durham	38
York	33
CaDAS	27
South Shields	23

Congratulations to the Durham team, and thanks to all those who took part – especially to Jack, David and Mark for stepping in at the last minute. York A.S. have kindly volunteered to host next year's competition. It has been suggested that the date should be moved forward to October, as bad weather tends to put people off travelling in December.

Learner's Diary - Seeing

From Alex Menarry (CaDAS member)

In the last 100 milliseconds of a journey lasting maybe billions of years, light travels through the atmosphere. And that is not all good news. The poor old photons now suffer scattering, absorption, refraction and all manner of indignities. From our point of view, on the end of a telescope, the worst indignity is probably the effect of an unstable atmosphere – the dreaded turbulence. This brings with it distortion of the wavefront on very short time scales making the image dance about, leading to "bad seeing" – and bad temper, no doubt. I have to admit that, for the fun viewing I do with my 8 inch Newtonian reflector, the effects have not been all that disastrous, so far. I have rarely used a telescope bigger than this but I am told the effects are dire. Twinkling stars dance around, making mock of the theoretical resolving power of very expensive optics. It seems that the 'Fried Parameter', the size of the convection cells giving the problem, are about 10 centimetres in the visible wavelengths. So, if the telescope aperture is less than this, bad seeing is not too bad. The parameter is bigger and less of a problem for the infrared. But we amateurs don't usually operate in that wavelength. Seeing is what we do! It's what it's all about. Now if you are the operator of a large, terrestrial telescope, you have serious problems. Even on the highest mountains the seeing can wreck an observation programme. Design effort has routinely gone into the best optics, temperature control of the enclosure and mirrors, high detail cameras and all that. Increasingly nowadays design effort also goes into active and adaptive optics. We were asked to write an essay on these things for the course I am doing with the University of Central Lancashire. It was the first I'd heard of it all. Active optics? What's that about? Well, apparently big primary mirrors have hundreds of actuators under them to adjust the reflecting surface on a continuous basis. As a big mirror moves, the huge weight distorts the shape and the active optics keep it perfect. The time scale of this part of the business is relatively slow – say seconds or minutes. Clever enough but the truly mind-boggling part is the adaptive optics. Nowadays there are wavefront detectors, which watch out for turbulent changes on remarkable time-scales. They talk about kiloherz frequencies! A monitored star in the field of view provides an image for correction signals to the target image. 50 or 100 elements in the detector and bimorph (distortable) secondary mirror allow adjustments on the right time and size scale to correct for bad seeing. Remember the jargon initials for wave front sensor - WFS. It sounds wild fictional science to me but by all accounts it works. The basic research has been going on for years as part of the Star Wars programme in the USA. To hit an enemy satellite or rocket in orbit, it's necessary to see it reasonably accurately, it seems.

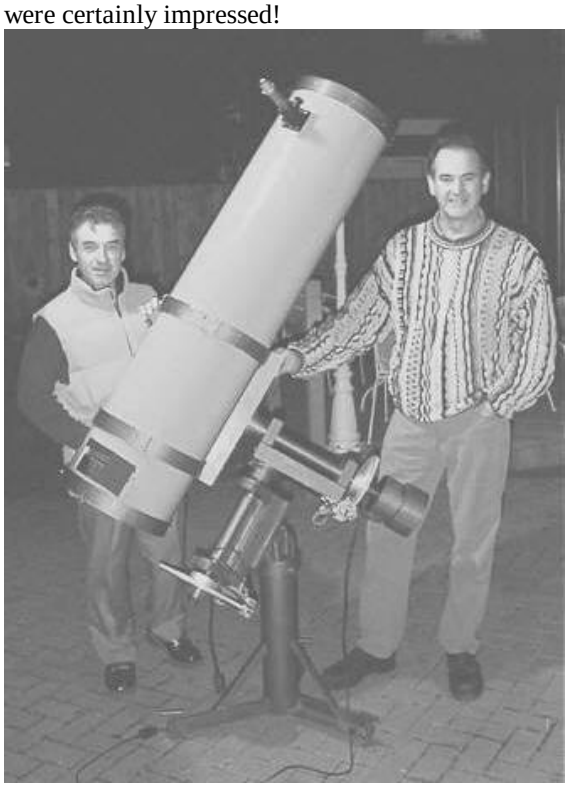
The example given to us was the Gemini Project; two 8 metre telescopes of the same design, one in Hawaii and one in Chile, both at very high altitude. First light (as we

astronomers say) at the Mauna Kea Gemini was this year. The results, comparing a corrected image with an uncorrected one, are outstanding. They use the system mostly with infra-red wavelengths, where the problem is a bit easier, producing pictures of the centre of the Galaxy never seen before. If the system works as well as the designers hope, these adaptive optics will make ground based telescopes compete very well with space telescopes. It sounds as if it can be retro-fitted, too. Then space telescopes can concentrate on science at the wavelengths which don't penetrate the atmosphere.

From the observatory

By John McCue (CaDAS)

Observing at Castle Eden, while the rain damage is being repaired, has been restricted recently to the use of portable telescopes from the car park. Our society members have stepped into the breach admirably with clear nights viewed with a variety of large and small telescopes, members of the public moving from telescope to another. Last Friday (26th. Jan) however, with the atmosphere so steady, I could not resist using the 8-inch refractor in the observatory to study Jupiter and Saturn. Visitors were treated to views of such clarity it took their breath away. The equatorial cloud belts of Jupiter were subdivided into finer belts and showed smaller spots and whirls within them. Some of the visitors with their families had never seen through a telescope before, and were certainly impressed!



The telescope shown, a 12-inch reflector, has just been purchased by my colleague Russ Grief. He intends to recoat the main mirror at David Sinden's Optical Workshops in Newcastle

George Alcock

The world lost one of its foremost amateur astronomers with the death of George Eric Deacon Alcock on December 15th. He was 88. A schoolteacher from Peterborough, England, Alcock blazed into the annals of British astronomy in 1959 by discovering Comet 1959e on August 25th of that year using a pair of Zeiss 25x105 binoculars. Five days later, on August 30th, he swept up his second one, Comet 1959f. Despite Britain's frequently cloudy skies and increasing light pollution, Alcock went on to visually discover three more comets and five novae. His last comet discovery in 1983 was his most famous Comet IRAS-Araki-Alcock. He found it with 15x80 binoculars while observing indoors, through the closed, double-glazed window of his upstairs bedroom! On May 11th the naked-eye comet skimmed past the Earth at only 12 times the Moon's distance (about 4.5 million kilometers), closer than any other cometary visitor since Comet Lexell in 1770. Alcock's discoveries put him in a class with another renowned English amateur, Caroline Herschel, who had a lifetime total of eight comet finds from 1786 to 1797. An avid weather observer and bird watcher, Alcock received major awards from astronomical organizations, including the naming of asteroid 3174 Alcock in his honor by the International Astronomical Union. A profile of him can be found in the May 1999 Sky & Telescope, page 84.

Touchdown on Eros

On Feb. 12, NASA makes history when mission controllers attempt to bring a spacecraft down to the surface of an asteroid for the first time. Controllers will send commands to the NEAR Shoemaker spacecraft to initiate a four-hour series of engine burns designed to set the spacecraft down gently on the asteroid Eros at about 3:01 p.m. EST. The target site is on a saddle-shaped area known as Himeros on the Manhattan-sized asteroid. The goal is to obtain high-resolution imagery asNEAR Shoemaker, which has completed its one-year orbital mission of Eros, slowly drops to the surface.

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