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EDITORIAL

My penultimate edition as Editor of *The Mercury* sees us preparing for another observing season. Summer has been disappointing weather-wise, although the photographs shown on pages 8, 12 and 13 of this issue demonstrate that there is always something to see. Let us hope for clearer skies as the nights draw in.

The new season has some potentially very exciting events with a lecture from Sir Arnold Wolfendale in September, two extra Mayfield meetings in July and August and a potential meteor watch in August, when the Perseid meteor shower will be at its peak (see Forthcoming Meetings on page 23 for details). In addition, there will be an Autumn Moonwatch at the David Marshall Lodge on Friday 7th October.

This edition of *The Mercury* sees an article on Victor Franz Hess by Mark Butterworth on page 2, another on "Food in Space" by Sandi Cayless on page 4, and a short one by myself on my attempts at astrophotography with a cheap webcam on page 7. Chris Davis provides an account of James Biggs's recent Smith lecture "Solar Sailing" on page 9, the second half of Sandi's "Astronomy-ish Quotes" appears on page 14, Derek Banks provides a highly original interpretation of a NASA image of Abell 383 on page 19, while the guest article on page 20 is "Did supernova herald the birth of a king?" by Jennifer Ouellette. The Night Sky, again courtesy of Martin Palmer-Smith, is included on page 11, while Douglas Cooper provides our centrepiece astro-images on pages 12-13. Once again, a big thanks to all contributors.

A final thought: since nobody has come forward as a potential editor for next year, I ask the question: Given that modern alternatives such as blogging exist, is *The Mercury* still relevant? Personally, I believe that it is; but what do you think?

Alex Houston

VICTOR FRANZ HESS (1883 – 1964)

Victor Franz Hess is virtually unheard of today, yet he was a great pioneer of astronomy and nuclear physics at the beginning of the twentieth century. Born on the 24th of June, 1883, in Waldstein Castle, near Peggau in Steiermark, Austria, his father, Vinzens Hess, was a forester in Prince Öttingen-Wallerstein's service and his mother was Serafine Edle von Grossbauer-Waldstätt.

He received his entire education at the Graz Gymnasium (1893-1901), and afterwards Graz University (1901-1905), where he took his doctor's degree in 1910. He went on to work for a short time at the Physical Institute in Vienna, where Professor von Schweidler initiated him in recent discoveries in the field of radioactivity. During 1910-1920 he was Assistant under Stephan Meyer at the Institute of Radium Research of the Viennese Academy of Sciences. In 1919 he received the Lieben Prize for his discovery of what he called "ultra-radiation", and the year after became Extraordinary Professor of Experimental Physics at the Graz University.

From 1921 to 1923, Hess was granted leave of absence, and worked in the United States, where he took a post as Director of the Research Laboratory (created by him) of the U.S. Radium Corporation, at Orange (New Jersey), and as Consulting Physicist for the U.S. Department of the Interior (Bureau of Mines), Washington D.C. He returned to Graz University and in 1925 he was appointed Ordinary Professor of Experimental Physics. In 1931 came his appointment as Professor at Innsbruck University and Director of the newly established Institute of Radiology. He founded the station at the Hafelekar mountain (2,300 m) near Innsbruck for observing and studying “ultra-radiation”.

As well as the Nobel Prize for 1936, which he shared with C.D. Anderson, Hess was awarded the Abbe Memorial Prize and the Abbe Medal of the Carl Zeiss Institute in Jena (1932); he was also Corresponding Member of the Academy of Sciences in Vienna.

Hess's work, which gained him the Nobel Prize, was published in the Proceedings of the Viennese Academy of Sciences. In addition he has published some sixty papers and several books, of which the most important were: "Die Wärmeproduktion des Radiums" (The heat production of radium), 1912; "Konvektionserscheinungen in ionisierten Gasen-Ionenwind" (Convection phenomena in ionized gas-ionwinds), 1919-1920; "The measurement of gamma rays", 1916 (with R.W. Lawson); "The counting of alpha particles emitted from radium", 1918 (also with R. W. Lawson); *Elektrische Leitfähigkeit der Atmosphäre und ihre Ursachen* (book), 1926 (in English: *The Electrical Conductivity of the Atmosphere and Its Causes*, 1928); *Ionenbilanz der Atmosphäre* (The

ionization balance of the atmosphere - book), 1933; *Luftelektrizität* (Electricity of the air - book, with H. Benndorf), 1928; "Lebensdauer der Ionen in der Atmosphäre" (Average life of the ions in the atmosphere), 1927-1928; "Schwankungen der Intensität in den kosmischen Strahlen" (Intensity fluctuations in cosmic rays), 1929-1936.

Between 1911 and 1913, Hess undertook the work that won him the 1936 Nobel Prize in Physics. For many years, scientists had been puzzled by the levels of ionizing radiation measured in the atmosphere. The assumption at the time was that the earth was the source of the radiation and levels would decrease as the observer moved further away from the earth. However, early experiments indicated the opposite was true. The higher the observer moved up the atmosphere, the higher the levels of ionizing radiation. The electroscopes used gave an approximate measurement of the radiation, indicating that higher in the atmosphere the level of radiation was more than that on the ground. Hess approached this mystery first by greatly increasing the precision of the measuring equipment, and then by personally taking the equipment aloft in a balloon. He systematically measured the radiation at altitudes up to 5.3 km during 1911-12. The ten daring flights were made both at day and during the night, at significant risk to himself. An ascent made during a solar eclipse showed the same findings, so Hess concluded that the atmospheric radiation was not coming from the Sun, but from outer space itself.

The result of Hess's meticulous work was published in the Proceedings of the Viennese Academy of Sciences, and showed the level of radiation decreased up to an altitude of about 1 km, but above that the level increased considerably, with the radiation detected at 5 km about twice that at sea level. His conclusion was that there was radiation penetrating the atmosphere from outer space which he called “ultra-radiation”, and his discovery was confirmed by Robert Andrews Millikan in 1925, who gave the radiation the name "cosmic rays". Hess's discovery opened the door to many new discoveries in nuclear physics.

Because he was Catholic and his wife was of Jewish ancestry, Hess was banished from scientific work in 1938. While he pondered what to do next, a sympathetic Gestapo officer came to his home, warning that the names of Hess and his wife were on a list of Austrians to be rounded up and taken to the concentration camps. The Hess’s escaped to Switzerland but were forced to leave everything behind, and travelling to America with the equivalent of $10 to their names. Hess worked at Fordham University for the rest of his career, and became a US citizen in 1944.

In 1947 Hess and geologist William T. McNiff developed an "integrating gamma-ray method" for detection of radium in the human body. This new pro-

cedure made it possible to detect radium poisoning before it reached a critical stage. In 1948 Hess visited Europe and was a guest professor at the University of Innsbruck. Two years later, at the request of Mayor William O'Dwyer of New York City, Hess joined five other scientists in investigating the possibility of producing rain artificially in New York State, which at that time was suffering a severe drought.

Another project with which he became involved in 1950 was a United States Air Force study to determine the effects of atomic bomb tests in terms of radioactive fallout. Completed in 1955, the study reported a distinction between artificial and natural radiation and found that since the tests there had been a trace of artificial radiation in the atmosphere.

Hess retired from his Fordham professorship after twenty years of service in 1958 and became a professor emeritus, but he continued to do research in his laboratory at the school. His was one of four laboratories in the United States that conducted tests on measurement of radioactivity in the breath of people who worked with radium, and he tried to establish a more accurate scale of the toleration limits of radioactivity of the human body. Hess found that there are individual differences in the amount of radiation a person can tolerate without serious injury. Research in this area is difficult, he said, for the effects of radioactivity are cumulative and may sometimes take as long as fifty years to make themselves fully felt. For this reason he strongly opposed nuclear weapon testing. "We know too little about radioactivity at this time", he noted "to state definitely that testing underground or above the atmosphere will have no effect on the human body." Hess spent the rest of his working life studying the effects of radiation on human beings.

Hess died in New York in 1964. He wrote one book, The Electrical Conductivity of the Atmosphere and Its Causes, published in 1928 by Constable & Company.

Mark Butterworth

FOOD IN SPACE

There are ovens on the space shuttle and on the space station, hooray, so hot macaroni and cheese is an option. But there are no food storage refrigerators in space, so sadly, no ice cream. Astronauts can enjoy their tomato sauce, taco sauce, mustard and mayonnaise, but salt and pepper are in liquid form, and for a very good reason: a sprinkle of salt or pepper would just float away. Such particulates in a space environment could contaminate equipment, block air vents or, even worse, get into an astronaut's eyes, nose or mouth – atishoo! Pepper is sus-

pended in oil and salt is dissolved in water. So what kind of food can you have in space and how is it prepared and got there?

Breakfast, lunch and dinner are the staple meals aboard a space vehicle or station and astronauts choose their own options from a large selection of food items. These repasts provide astronauts with a balanced diet of the vitamins, minerals and calories they require to function adequately. But what is on offer on the space menu? The healthy options such as fruit and nuts are naturally available but peanut butter, sweets and chocolate brownies are also alternatives. On the meat menu we can find chicken, beef, seafood – and hamburgers. Drinks include tea, coffee, orange juice (the healthy option again) and lemonade, served in a foil laminate package. Soups such as chicken consommé and cream of mushroom can be found on the bill of fare; astronauts can also have macaroni and cheese, chicken and rice, chicken à la king, shrimp cocktail, scrambled eggs or cereals. Space food comes in disposable packaging, some of it cleverly designed to prevent food flying away while the astronaut is trying to manoeuvre it into his or her mouth. Preparation is also taken care of. Teriyaki is a favourite. Fresh fruit and vegetables are available, but must be eaten within the first few days of the flight or they will spoil – the downside of no refrigeration.

Food fights are definitely not permitted in space, but the well known space food game, toss a tortilla, has certainly been played, the objective being to get the tortilla into a fellow astronaut's mouth. Why tortillas and not bread? Well, tortillas produce far fewer crumbs than bread – and crumbs can float around, possibly blocking filters or ending up in an astronaut's eye. And they taste much better too.

Space foods are created as *formulations* rather than *recipes*, as these are more reproducible. They use percentages and weights rather than the typical cups and teaspoons of familiar American recipes: the latter are more subjective and more susceptible to user error. The Space Food Systems Laboratory at the Johnson Space Center (JSC) in Houston, Texas is responsible for the foods that find their way onto US space missions and the formulations are researched and developed by food scientists, dieticians and engineers.

Space food formulations incorporate considerable flavouring to compensate for the freeze-drying process used in their preparation. But where does the water come from to rehydrate them? During a space shuttle flight, the water generated by the shuttle fuel cells is added back to the food just before it is eaten. However, electrical power for the International Space Station (ISS) is generated from solar panels rather than from fuel cells, so there is no additional water generated on board. Water *is* recycled from cabin air, but is not sufficient

for significant use in the food system. The ISS food system is similar to the shuttle system but over time, the percentage of foods that need rehydration will decrease and the percentage of thermostabilised foods will increase.

Shuttle astronauts select their menu about five months before their flight. Menus are finalised and sent to the shuttle food contractor in Houston three months pre-launch. The food is packaged and stowed in refrigerated locker trays at JSC about one month pre-launch, then about a week later the food lockers are shipped to Kennedy Space Center in Florida, where they are refrigerated until installation in the shuttle two to three days before launch. Shuttle astronauts also have a fresh food locker containing things such as tortillas, breakfast rolls, apples, bananas, oranges and carrot sticks, packed at KSC and installed on the shuttle 24 - 36 hours before launch. Yum. For space station expeditions, menu planning is based on when the next food for the crew is scheduled to launch, so, when a new crew arrives on board, a fair portion of its food is already there. International Space Station crewmembers taste all the US food items and score them according to their liking for them. Then while training in Russia, they repeat the procedure for Russian food items. Russian and US dieticians use the scores to plan menus for each Expedition; ISS crews have a menu cycle that repeats every eight days. The American half of the menu is prepared in Houston and shipped to Florida or Russia depending upon launch site. The Russian half of the menu is prepared on site and launched on the Progress vehicle, with most of the food stored in the Zarya and Node 2 modules in Russian food boxes. Fresh items are delivered to ISS when either a shuttle or a Progress docks.

The space shuttle galley is installed on the orbiter's middeck. It is a modular unit containing a water dispenser and an oven. Once prepared, the food containers are set out on a meal tray, which can be attached to an astronaut's lap by a strap or attached to a wall. The meal tray is the astronaut's dinner plate and holds several foods at once, keeping the packages in place. Eating irons and food trays are cleaned with pre-dampened, sanitising towelettes – yes, you cannot get away from the washing up, even in space. Aboard the ISS, the food preparation area is based in the Russian Zvezda service module. It has a fold-down table that can seat three crewmembers. Food warmers that can heat Russian cans and packages are built into the table but US foods cannot fit into the slots (doh!), so a suitcase-like food warmer is used. Used food packaging is bagged and put into a Progress cargo vehicle, which eventually jettisons it to burn up on re-entry into Earth's atmosphere – so the next fireball you see may not be a space rock on its final journey but the detritus of a series of breakfasts, lunches and dinners from ISS.

References

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NASA (2002) Food For Space Flight: Space Food History. Internet, at: http://spaceflight.nasa.gov/shuttle/reference/factsheets/food.html

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Sandi Cayless

WEBCAM PHOTOGRAPHY

I have recently been attempting webcam photography using an inexpensive Logitech QuickCam adapted for astrophotography and attached at prime focus to a Skywatcher Evostar-100 ED2 PRO apochromatic refractor fitted with a 2x apochromatic Barlow lens. One of my first photographs, taken without the Barlow lens, featured in the last edition of *The Mercury*. On the next page, you will find two more photographs taken with the Barlow lens fitted.

The Logictech QuickCam software allows you to acquire at a rate of 15 frames/sec and a resolution of 640x480. For both images on the next page, acquisition lasted for 90 seconds producing 1350 frames which were then processed using the freely obtainable RegiStax software.

Adapting a webcam for astrophotography and using RegiStax for processing are both relatively straightforward and there are numerous tutorials on YouTube for learning how to do both. These can be accessed via Google or the YouTube search facility

Given that the webcam cost me less than £10, I was very pleased with the outcome and it has encouraged me to take this to the next stage. Before the next observing season begins, I hope to invest in an Imaging Source DMK 41AU02.AS monochrome planetary camera with LRGB filters unless, of course, someone at the Society advises me otherwise. Unfortunately, my garden is north-facing; however, I live in a bungalow at the top of a hill so my view of the Moon and planets is quite good. Living between Stirling and Alloa my observing conditions are not perfect, but neither are they too bad.

With other members of the Society's astrophotography group achieving impressive results with CCD cameras, spectrographs and image processing software, I hope to contribute something different to this marvellous hobby.

Alex Houston

MORE WEBCAM PHOTOGRAPHS

Saturn *Photo by Alex Houston*

Montes Apenninus on the Moon *Photo by Alex Houston*

SOLAR SAILING
Smith lecture, 13th May 2011
Dr. James Biggs, Strathclyde University.

Dr. Biggs began by outlining the principle of solar sailing. He said that despite the fact photons are massless it can be shown from Maxwell's equations for electromagnetism that a momentum exchange can occur when a photon reflects off a mirror surface. (From discussions at the subsequent Mayfield meeting, one can imagine photons as electromagnetic pulses giving a kick to the negatively charged electrons on the surface of the sail as the photons are reflected.) Therefore a large area of thin mirror film in space bathed in sunlight would experience a force away from the Sun. (Certainly as amateur astronomers we see that the dust from a comet is blown out as a tail pointing away from the Sun, regardless of the comet's direction of movement. This demonstrates the presence of an outward force.) Since the force is there space engineers are working out ways to exploit it.

Compared with the force from a chemical rocket, solar light pressure is minuscule: it cannot possibly be used to launch spacecraft from Earth's surface. On the other hand it is continuous and requires no fuel to be carried by the spacecraft. It has been calculated that a solar-sailed probe, once launched away from Earth, could reach the edge of the solar system and be travelling at hundreds of thousands of kilometres an hour, whereas even a huge chemical rocket would run out of momentum against the Sun's gravity long before it reached the edge of the solar system. (The only way the Voyager craft got beyond Neptune was from repeated sling-shot manoeuvres exploiting the gravity and momentum of the giant planets.)

Making a solar sail is an engineering challenge. What is needed is a large area of flat reflective surface with negligible mass so that the small photon force causes as much acceleration as possible. All of the reflective sail has to be foldable into a canister that will survive a chemical rocket launch into space, then be able to unfurl back into a large flat sheet.

Dr. Biggs showed us a video of a simulation of the Japanese IKAROS craft system, which has done a successful flyby of Venus. The craft became a spinning drum which threw out four zigzag folded triangles of reflective sheet. The four sheets unfolded to form a spinning rectangle which stayed flat under the influence of the spin.

The sails of IKAROS are 20m across but only deliver a force of about 0.3 Newtons which is about 30 grams, while IKAROS has a total mass of 35 Kg.

The resulting acceleration is just 0.1mm/sec/sec, but it is continuous hour after hour, day after day for months, and accumulates. Greater acceleration would be achieved with thinner sheets, For IKAROS it was 7.5 microns thick compared with about 75 microns for the diameter of a human hair. For interstellar solar sailing a film of just one micron would be needed to give the necessary acceleration of 3mm/sec/sec.

There are some space observatory projects which will uniquely operate from the Lagrangian points L1 and L2. The net gravity in the region of L1 is near zero because it is at the distance between the Sun and the Earth where their opposing gravitational pulls cancel out. This means a space craft can hold station there with minimal use of thrusters, and give Earth early warning of incoming storms of particles from solar mass ejections. Fitted with a solar sail the early warning beacon could hold station indefinitely; what is more it could hold position much nearer the Sun where the solar gravity is slightly stronger but could be counteracted by the continuous thrust of the Sun's radiation pressure. This would give even earlier warning of approaching mass ejections from a position which would quickly expend the steering thruster fuel of a conventional probe.

Being able to hold position way off the centre of Lagrangian points would make it feasible to station Earth-observing satellites out of the ecliptic plane looking down on Earth's poles from L1 (or L2). Conventional satellites cannot do this because of the continuous consumption of fuel that would be required.

Steering solar sails at Lagrangian locations, or for any flight, could be achieved by moving the centre of gravity so that the light half of the sail accelerates faster than the heavy half causing the whole thing to tilt relative to the Sun making the craft go in the direction of the tilt.

With the technology matured on near-Earth projects like IKAROS, deep space exploration missions can be imagined with giant reflectors sailing off majestically into the void beyond the solar system just as the adventuring galleons of marine history sailed over the horizons of the great oceans.

Chris Davis

Editor's Footnote: A special thank you is due to Chris for producing this article while not in the best of health due to a recent cycling accident. I am sure that I speak for all members of the Society in wishing Chris a full and speedy recovery.

THE NIGHT SKY

Jul 1	*New Moon (08:54)*
Jul 1	*Partial eclipse of the Sun visible from Southern Indian ocean*
Jul 4	*Earth at aphelion (15 hrs)*
Jul 8	*First quarter Moon (06:29)*
Jul 10	*Uranus stationary (morning object)*
Jul 15	*Full Moon (06:40)*
Jul 20	*Mercury (evening object) at greatest elongation, 27° E*
Jul 23	*Last quarter Moon (05:02)*
Jul 27	*Occultation of Mars by the moon, visible in South Pacific and South America (17:00)*
Jul 28 + 29	*Delta Aquarid meteor shower maximum (20/hr). Moon 4%*
Jul 30	*New Moon (18:40)*
Aug 1	*Algol at minimum (04:21)*
Aug 4	*Algol at minimum (01:10)*
Aug 6	*First quarter Moon (11:08)*
Aug 13	*Full Moon (18:58)*
Aug 12 + 13	*Perseid meteor shower maximum (60/hr). Moon 99%*
Aug 16	*Venus at superior conjunction*
Aug 17	*Mercury at inferior conjunction*
Aug 21	*Last quarter Moon (21:55)*
Aug 22	*Neptune at opposition*
Aug 24	*Algol at minimum (02:50)*
Aug 26	*Algol at minimum (23:39)*
Aug 29	*New Moon (03:04)*
Aug 30	*Jupiter stationary (morning object)*
Sep 3	*Mercury (morning object) at greatest elongation, 18° W*
Sep 4	*First quarter Moon (17:39)*
Sep 12	*Full Moon (09:27)*
Sep 16	*Algol at minimum (01:19)*
Sep 16	*Pluto stationary (evening object)*
Sep 18	*Algol at minimum (22:08)*
Sep 23	*Northern autumnal equinox (09:05), with equal amounts of daylight and night*
Sep 26	*Uranus at opposition*
Sep 27	*New Moon (11:09)*
Sep 28	*Mercury at superior conjunction*

Courtesy of Martin Palmer-Smith and his website “Astronomical Calendar” at: *http://astronomical-calendar.org.uk* . Times are UT.
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NLC PHOTOGRAPHS BY DOUGLAS COOPER

DEEP SKY PHOTOGRAPHS BY DOUGLAS COOPER

M27
Dumbell Nebula

M57
Ring Nebula

Sadr Area
Cygnus

ASTRONOMY-ISH QUOTES (PART 2: K-Z)

Kelvin, Lord (1824-1907)

In science there is only physics; all the rest is stamp collecting.

Kepler, Johannes (1571-1630)

The treasures hidden in the heavens are so rich that the human mind shall never be lacking in fresh nourishment.

I demonstrate by means of philosophy that the earth is round, and is inhabited on all sides; that it is insignificantly small, and is borne through the stars.

Truth is the daughter of time, and I feel no shame in being her midwife.

Kilby, Jack (1923-2005)

There was a space program before there was integrated circuits.

King, Martin Luther Jr. (1929-1968)

As marvellous as the stars is the mind of the person who studies them.

Laozi (Chinese philosopher, dates unknown)

For the wise man looks into space and he knows there is no limited dimensions.

Levy, David H. (1948-)

Comets are like cats: they have tails, and they do precisely what they want.

Lewis, C. S. (1898-1963)

Aim at heaven and you will get earth thrown in. Aim at earth and you get neither.

Lindbergh, Anne Morrow (1906-2001)

We walk up the beach under the stars. And when we are tired of walking, we lie flat on the sand under a bowl of stars.

Mach, Ernst (1838-1916)

Similarly, many a young man, hearing for the first time of the refraction of stellar light, has thought that doubt was cast on the whole of astronomy, whereas nothing is required but an easily effected and unimportant correction to put everything right again.

Magnus, Albertus (1193-1280)

Do there exist many worlds, or is there but a single world? This is one of the most noble and exalted questions in the study of Nature.

Marconi, Guglielmo (1874-1937)

Every day sees humanity more victorious in the struggle with space and time.

Metrodorus of Chios (4th century BC)

To consider the Earth as the only populated world in infinite space is as absurd as to assert that in an entire field of millet, only one grain will grow.

Mitchell, Maria (1818-1889)

Do not look at stars as bright spots only. Try to take in the vastness of the universe.

I have just gone over my comet computations again, and it is humiliating to perceive how very little more I know than I did seven years ago when I first did this kind of work.

Newton, Sir Isaac (1642-1727)

I don't know what I may seem to the world, but, as to myself, I seem to have been only like a boy playing on the sea shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.

I can calculate the motion of heavenly bodies, but not the madness of people.

Overbye, Dennis (1944-)

Few sights in science are sadder than astronomers standing in the rain. (New York Times Article, Grasping for Light of Distant Worlds, June 22, 2004)

Peltier, Leslie C. (1900-1980)

I have watched a dozen comets, hitherto unknown, slowly creep across the sky as each one signed its sweeping flourish in the guest book of the sun.

Were I to write out one prescription designed to help alleviate at least some of the self-made miseries of mankind, it would read like this:
One gentle dose of starlight
To be taken each clear night
Just before retiring

Plato (427-347 BC)

For everyone... must see that astronomy compels the soul to look upwards and leads us from this world to another.

Pythagoras (582-497 BC)

Above the cloud with its shadow is the star with its light.

There is geometry in the humming of the strings, there is music in the spacing of the spheres.

Ride, Sally (1951-)

When you're getting ready to launch into space, you're sitting on a big explosion waiting to happen.

Roszak, Theodore (1933-)

Nature composes some of her loveliest poems for the microscope and the telescope. (Where the Wasteland Ends, 1972)

Russell, Mark (1932-)

The scientific theory I like best is that the rings of Saturn are composed entirely of lost airline luggage.

Sagan, Carl (1934-1996)

For me, it is far better to grasp the Universe as it really is than to persist in delusion, however satisfying and reassuring.

In order to make an apple pie from scratch, you must first create the universe.

Who are we? We find that we live on an insignificant planet of a humdrum star lost in a galaxy tucked away in some forgotten corner of a universe in which there are far more galaxies than people.

Schultz, Dwight (1947-)

Today's particle physics describe light as a crumple in space, and we may have deformed space in such a way that they noticed something peculiar - and they had the ability to investigate it.

Seneca (8 BC-65 AD)

Many discoveries are reserved for ages still to come... Our universe is a sorry little affair unless it has in it something for every age to investigate...

Shakespeare, William (1564-1616)

Thoughts... which ten times faster glide than the sun's beams...

Shepard, Alan (1923-1998)

It's a very sobering feeling to be up in space and realize that one's safety factor was determined by the lowest bidder on a government contract.

Streep, Meryl (1949-)

There are improbable things suspended in space, like the earth.

Thoreau, Henry David (1817-1862)

The stars are the jewels of the night and perchance surpass anything which day has to show.

Many men walk by day; few walk by night. It is a different season.

Yes, I am a dreamer. For a dreamer is one who can find his way by moonlight, and see the dawn before the rest of the world.

Tsiolkovsky, Konstantin (1857-1935)

Earth is the cradle of humanity, but one cannot remain in the cradle forever.

Unknown

Newton's Fourth Law: Physicists congregate periodically in obscure European cities to have their picture taken and then quickly disperse.

Van Gogh, Vincent (1853-1890)

For my part I know nothing with any certainty but the sight of the stars makes me dream.

Vaughan, Bill (1915-1977)

Man is the animal that intends to shoot himself out into interplanetary space, after having given up on the problem of an efficient way to get himself five miles to work and back each day.

Verne, Jules (1828-1905)

Reality provides us with facts so romantic that imagination itself could add nothing to them.

von Braun, Wernher (1912-1977)

For my confirmation, I didn't get a watch and my first pair of long pants, like most Lutheran boys. I got a telescope. My mother thought it would make the

best gift.

There is just one thing I can promise you about the outer-space program - your tax-dollar will go further.

Wells, H. G. (1866-1946)

Life begins perpetually.... Life, forever dying to be born afresh, forever young and eager, will presently stand upon this earth as upon a footstool, and stretch out its realm amidst the stars.

Wilde, Oscar (1854-1900)

We are all lying in the gutter, but some of us are looking at the stars.

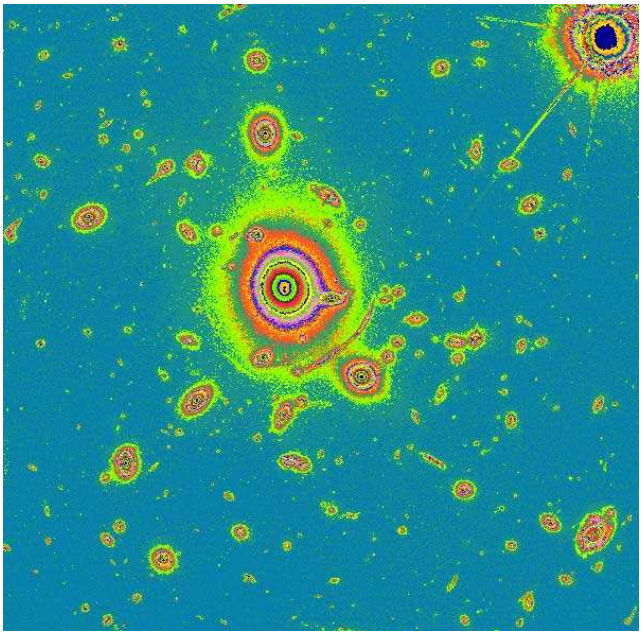
Sandi Cayless

Editor's Footnote: Thanks, Sandi, for such a comprehensive list of quotations covering all things astronomical. It really deserved an entire issue.

ABELL 383

Society member Derek Banks recently presented a lecture on astronomical image processing and display entitled "Classification of Images in Astronomy and Science" at the Smith. He has also been very active within the Society's astrophotography group circulating many interesting photographs on a variety of astronomical subjects from the Moon to deep sky astrophotography. One of these images was of Abell 383, details of which are documented below.

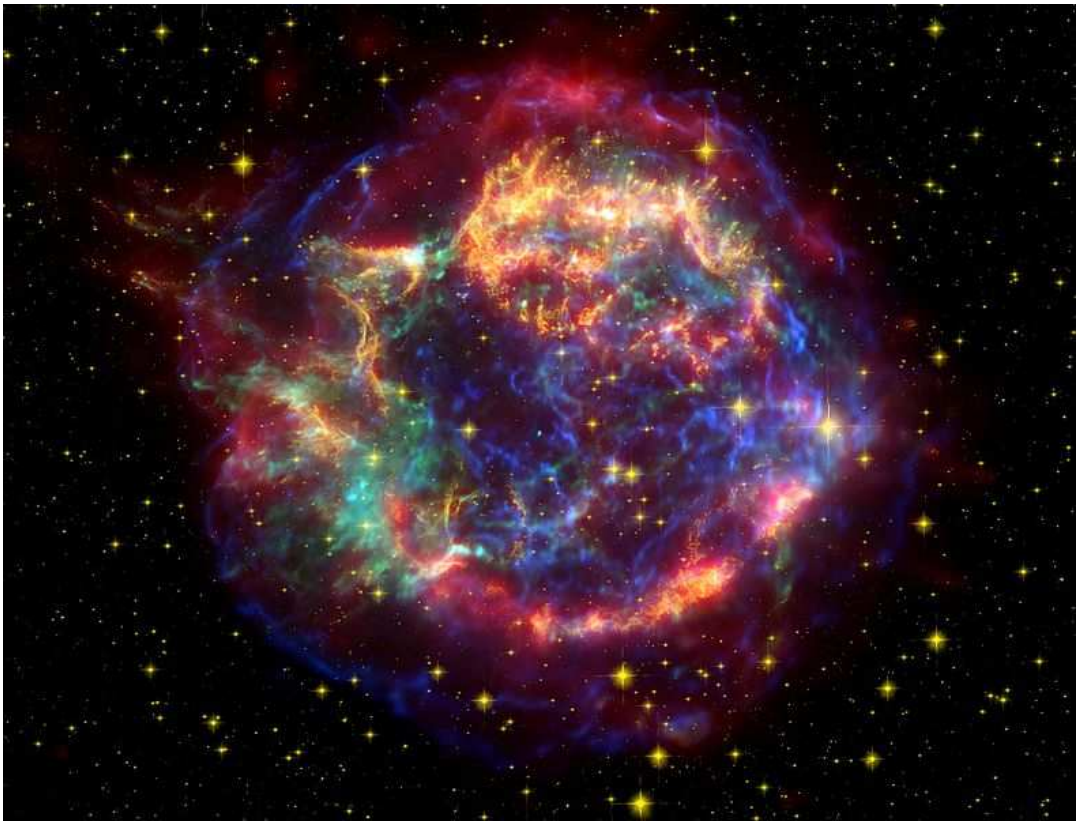
Derek generated 17 output images from a downloaded 24-bit (2417 x 2380 TIFF) version of the recent NASA Hubble image of the most remote galaxy yet imaged (ABELL 383). The image shown on the next page is based on an 8-bit close approximation to the input image. It was derived in 2 stages. In the first stage the palette used is adaptive, that is the palette colours are adjusted by cluster analysis to fit the 24-bit image as closely as possible with at most 256 colours. As a result the best palette is image-dependent. In the second stage the adaptive palette is replaced by a randomised version of a false colour palette, which gives the contours. Pixels with the same colour in the 8-bit image have very similar 24-bit colours. Any interested parties can contact Derek via the SAS website for more details.



Abell 383

Processing and display by Derek Banks

GUEST ARTICLE: DID SUPERNOVA HERALD THE BIRTH OF A KING?



The jaw-dropping picture above -- courtesy of the Spitzer Space Telescope -- is Cassiopeia A (Cas A), a supernova remnant that is one of the brightest sources of radio waves in the night sky.

Astronomers believe light from this stellar explosion reached the Earth in the late 17th century. But a new hypothesis presented at this week's meeting of the Royal Astronomical Society in Wales contends that Cas A might have been observed much earlier -- say, May 19, 1630.

That date is historically significant as the birthday of the future King Charles II of England. Legend has it that a bright new "noon day star" appeared in the heavens to mark this auspicious occasion.

Granted, it's tempting to write off this minor detail as mere Restoration propaganda, especially since most of the historical sources mentioning it were written a good 30 years after the fact. But there might be something to it after all.

Charles II's father, Charles I, was executed by Oliver Cromwell's followers, and he didn't return to England as king until he was 30, when the monarchy was restored after the death of Cromwell. Part of the public relations campaign to win the hearts and minds of British subjects involved painting as rosy a picture as possible of the new king -- why, even the heavens approved of bringing back this wrongfully exiled son of the House of Stuart!

Working with US historian Lila Rakoczy, astronomer Martin Lunn -- formerly Curator of Astronomy at the Yorkshire Museum -- has uncovered new evidence that suggests the "bright star" really did appear in 1630, and that it was a *bona fide* sighting of Cas A's explosion.

Lunn was kind enough to email me specifics of their findings. He readily concedes that most of the historical sources on Charles II have what one might call "credibility issues." Any good historian will tell you that the most accurate accounts are likely to be those written as close to the events being described as possible, not 20-30 years afterward.

There are no accounts of such a star sighting in the 1640s, mostly likely because England was mired in civil war at the time. Historians had other concerns. It didn't re-emerge until the early 1660s, when the monarchy was restored, and the "noon day star" anecdote became central to Restoration propaganda efforts.

But Lunn and Rakoczy rest their case on an account of Charles II's birth contained in a different historical source: a book called *Britanniae Natalis*, written in 1630. Furthermore, it was written by over 100 authors, all Oxford University academics from a wide range of

disciplines, political leanings and social backgrounds -- what Lunn calls "the cream of British intelligentsia" of that era. It is a far more credible source.

If Lunn and Rakoczy are right, astronomers may have to re-examine their current method for dating supernovae, or at least take a fresh look at the underlying assumptions made when dating Cas A.

"Our 1630 source forces astronomers to explain what was seen," Lunn says. "Since other natural phenomena can easily be ruled out, that leaves a supernova as the most likely explanation, with Cas A becoming the most likely suspect. And if it is Cas A, then the current calibrations for distance need to be revisited."

The Royal Society press release describes Lunn and Rakoczy's presentation as "controversial." It's undeniably speculative, which frankly is part of the fun. (Confession: I'm a sucker for these kinds of stories.) But it's not crackpottery, either. I checked with Caltech astronomer Mike Brown, a.k.a. "Pluto Killer", who knows a little something about violent events in the cosmos. He confirmed that, indeed, the dating of supernova Cas-A "is pretty iffy."

Astronomers currently date supernovae by looking at the gassy remnants, specifically, how fast that remnant is expanding. Cas A is a tricky one, however, since data from the Hubble Space Telescope indicate the remnant hasn't expanded as uniformly as previously assumed. That would throw off the calculations showing the first light from Cas A's explosion would have reached Earth around 1667.

Still, says Brown, being off by 50-60 years is a rather large discrepancy, so if Lunn and Rakozy turned out to be correct, it would be a bit surprising. "It'll be interesting to see what the evidence is," he says. "If it could be shown that it appeared in the right spot in the sky at the right time," for instance, or "If it could be shown to have been seen by many people distributed around the world -- records of bright occurrences in the sky were pretty good by then -- it would become convincing."

That is precisely what Lunn recommends as a next step. "A lot more attention should be paid to archival collections from the 1630s, not just in Britain, but in countries around the world," he says. "Researchers out there might be coming across references to this star and not realize its potential astronomical significance." In fact, there might be other, different supernovae sightings buried in the historical record that are escaping notice because researchers are looking for them at the wrong time in history.

Which is why Lunn advocates a more open dialogue between astronomy and historians in the future. He emphasizes that the intent of his work is not to promote controversy or dismiss prior work by astronomers on Cas A. "I see our

role as adding new evidence to the impressive and important body of work already done, and hopefully getting the scientific community to reconsider some of their assumptions about their dating methods," he says.

As for the "bright new star" being an omen for Charles II's reign, well, he was known as the "Merrie Monarch," restoring an appreciation for art, music, and theatre, which must have been a huge relief to England after the dour Puritanism of the Cromwell regime. The happy coincidence of a "noon day star" ended up being surprisingly apt.

Jennifer Ouellette

Jennifer Ouellette's blog *Discovery Space* is at
http://news.discovery.com/contributors/jennifer-ouellette/

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FORTHCOMING MEETINGS (July - September)

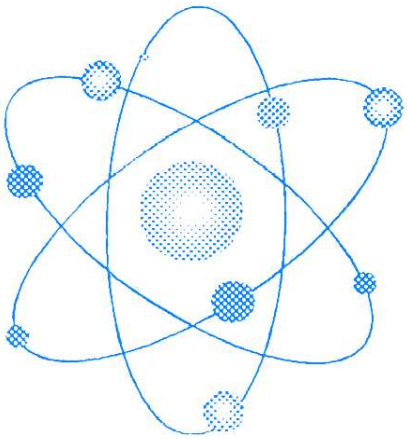
Meetings at the Smith (7.30pm—9.30pm) - open to all

9th September 2011
Speaker - Sir Arnold Wolfendale FRS FRAS Emeritus Professor of Physics and former Astronomer Royal, Durham University
Title - "Intelligent Life in the Universe"

Meetings at the Mayfield (7.30pm—9.30pm) - members only

29th July 2011: extra meeting to organise Perseid Meteor Watch (note that it will be Full Moon) and discuss purchase of a telescope for new members who are considering such a purchase.
26th August 2011: extra meeting to present Perseid report, discuss Summer observations and photography including noctilucent clouds, consider plans for Autumn Moonwatch at David Marshall Lodge on Friday, 7th October, and discuss publicity for next meeting at the Smith. The future of *The Mercury* could also feature on the agenda.
30th September: normal meeting

Meteor Watch: Saturday 13th August: provisional - check Society website for details



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Thanks to all contributors. Please think about pieces, articles and images for the next October issue. Items describing events or the activities of the Society, or of individual members or groups of members, are especially welcome. Advanced notification of future events and activities can be included, particularly as *The Mercury* can now be accessed on the web.

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Copy can be in clear handwriting, typescript, images for scanning, e-mail attachments, or on floppy disk or CD. Contributions should normally not be more than about 750 to 1000 words in length. Please try to have material ready by the beginning of September for the October 2011 issue of *The Mercury*.