



ODYSSEY

The arts and culture magazine of the British Interplanetary Society



"Mountain Range Beneath Two Moons." Part of the Spectrum Portfolio of seven fictional extraterrestrial landscapes where each one is predominantly one colour of a rainbow. Acrylic on stretched canvas. By Jackie Burns.

In our next issue...

- We resume our look back at the cultural impact of the *Apollo* missions when Vix Southgate shares her memories of Moon-voyager, Al Worden
- Richard Hayes reflects on the impact of AI in the context of Brendan Nugent's novel, *The Sentient Ones*
- And we revisit the world of cult classic *Moon Zero Two* in the company of Steve Salmon

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Editorial: Ticket to ride...



Mark Stewart, FBIS

I am pleased to say that we are ending 2025 and starting 2026 with a bumper edition, so here we go... Rockets are just one way of getting into space. There are other methods, including

fiction, poetry, art, and perhaps most popular of all, the movies. They are all an equally valid means of exploring the solar system and beyond, and for many of us they represent the only way we will ever have of doing just that. Sadly, as we have noted before in the pages of *Odyssey*, Ray Bradbury's "rocket summer" in which a host of those vehicles waited like carnival attractions in field and meadow alike – each offering a ride to a new world – never materialised. No matter; spaceships of the mind are still available for those who know how to find them as we suggested in our *Odyssey* essay earlier this year: <https://www.bis-space.com/spaceships-of-the-mind-the-bis-explained/>

In this issue of *Odyssey*, we are proud to feature the remarkable journey that Jackie Burns has taken with her space art; it is a story that needs to be heard and one that is truly inspirational.

Elsewhere in this issue we reach

escape velocity with our reviews and discussions about two very different books – *Origins* by Lewis Dartnell, and *The Sentient Ones* by Brendan Nugent - and with a timely piece on the 50th anniversary of the TV series *Space 1999*. We also ride the tail of a comet in John Silvester's excellent piece on these wandering apparitions.

We are also hugely grateful to former NASA Administrator, Dan Goldin, for sharing his memories of Arthur C. Clarke.

Finally, as this issue of *Odyssey* will be arriving before year end, we'd like to extend seasonal greetings to all of our readers and contributors as we head towards Christmas and 2026.

We hope you enjoy the view from orbit in our latest issue.

Mark Stewart, Editor



Has Ray Bradbury's "Rocket Summer" been and gone and is it too late to buy a ticket? / *The Farmer Astronaut*

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Odyssey is published bi-monthly by the BIS and is circulated by email. Feedback on the magazine is welcome, including suggestions for future articles, via odyssey@bis-space.com

The feedback loop: Letters

"May 2025 marked the 50th year of the European Space Agency. On 30th May 1975, the ESA Convention was signed by 10 founding Member States and has now expanded to 23 Member States, three Associate Members, one Co-operating State and Co-operation Agreements with four other EU states. To celebrate this occasion I created a digital graphic, which got its first public debut at the 2025 Spacetober Challenge across various social media platforms."

Jackie Burns



Jackie Burns: Space artist and science junkie



Jackie Burns

Throughout the 1960s my mother loved watching the early science fiction TV programmes and, by default, I got to watch them too (*Dr. Who, Quatermass and The Pit, Superman, Thunderbirds and Stingray*). It wasn't a difficult stretch to connect those programmes with the news bulletins of the day regarding NASA's *Gemini* and *Mercury* programmes. Outer space was a reality, even when it was fictional, and I loved it.

At the same time the *Apollo* programme happened my parents got divorced which resulted in the loss of the family television, newspapers, and comics. As a consequence my reliance on the local library increased. Saturdays and school holidays were spent catching up with the newspapers and reading through the National Geographic magazines before I headed into the children's section. One of the brilliant things about NASA was its outreach articles, aimed at the general public in order to educate and inform which were published in the National Geographic, and they were replete with gorgeous illustrations that were artworks in their own right. It was those types of articles that I was most interested in because it allowed me to gain a simple understanding of the developing space program and a growing appreciation of the illustrations and photos that went with them.

During the 1970s, my teenage years, an interesting resource opened up when a second-hand bookshop arrived in my town centre offering a huge selection of pulp science fiction and

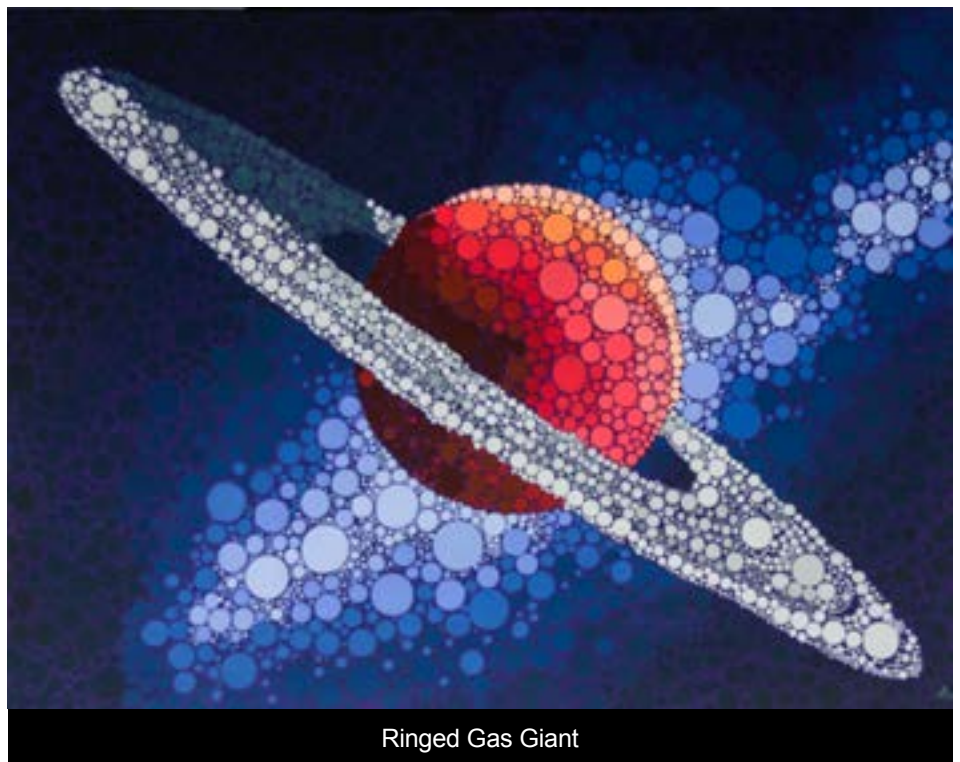
fantasy, which included anthologies and magazines from both the USA and the UK – *Amazing Stories, Astounding Science Fiction/Analog, Weird Tales, Omni, White Dwarf*...the list goes on. My reading addiction deepened, helped in part by the genius marketing strategy of the shop owner - buy whatever I could afford, read them and then sell them back for a serious discount on the next armful of books. At the same time there was an explosion of weird and wonderful TV series to enjoy: *The Champions, The Prisoner, The Avengers, The Tomorrow People, Space 1999, Star Trek*... and so many more. One of the brightest memories I have of that time was being invited to the cinema by a neighbour with their children to see *2001: A Space Odyssey* and it had the most profound impact on me, firmly under-pinning my unquenchable optimism and belief in the future of aerospace exploration and my part within it (no matter how tiny that might be). The culture of science fiction was certainly having an impact on how I viewed science.

It was during the final year of senior school when I realised there was a barrier that made growing and refining my skills seem almost pointless. There were simply no women artists doing the kind of art that I was so inspired by and which I desperately wanted to create. In the following years I discovered that being a woman meant any doors that



Shuttle Challenger in Orbit with Bay Doors Open

might have been opened to me as a man were firmly (and in some instances even aggressively) shut in my face. Decades later (in my mid-40s) I attempted a Masters Degree in Digital Art and had to drop it half way through because of the level of direct and indirect misogyny I was experiencing. Refusing to be deterred, I compensated for the lack of formal qualifications with purchasing short training courses (either in workshop form or one-on-one) for those skills that I felt I needed to learn at the times I needed >



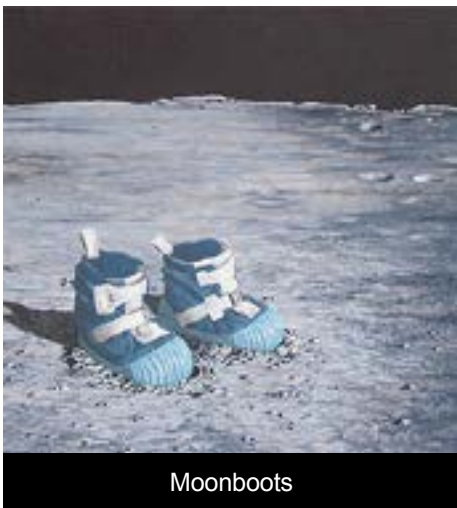
Ringed Gas Giant

◀ to learn them. For example, I trained myself to airbrush and then, a few years in, I paid for a one-on-one workshop with an airbrush expert to iron out any bad habits I might have picked up. I was pleased, but slightly mystified, to learn that the only thing I could be pulled up for was how untidy my workspace was. All artists are untidy, right?

Reality took a second painful bite out of me when I hit the job market. Emerging artists did not get paid very well, and emerging women artists were barely paid at all, so Plan B was put in motion, and I became a clerk typist in London. Reading the free London newspapers was a great source of employment opportunities and, in amongst the adverts, I found one tiny paragraph advertising the first Thursday of every month event for fans of science fiction and fantasy at the *One Tun*, a pub beneath the arches of Holborn Viaduct. What!? Groups of people like me regularly coming together to enjoy their geekiness? I became a regular attendee, which then led to the discovery of conventions. The very first one I ever exhibited my artwork was at the 45th WorldCon at Brighton in 1987.

I absolutely love exhibiting in the Art Shows at Conventions. They are such a great leveler - as a fully paid-up member of any convention, if there is an Art Show you then have an opportunity to exhibit your work in it, no matter what your skill level. Amateurs and professionals alike exhibit alongside each other.

The UK annual science fiction and fantasy convention is generically known as EasterCon, although it has a new official name and different location around the UK every year. It is a multi-media, multi-stream event held over four days. This means that at any one time there is usually a choice of at least four different panels, plus games, workshops and lectures to choose from. Some of those choices will involve science, aerospace, and astronomy. Every year the Science Fiction Foundation presents the George Hays Lecture, and invites



Moonboots



an academic to talk about a subject in their speciality - the 2024 EasterCon (Levitation2024) had Dr. James Flanagan deliver a lecture on "Battling Cancer in 2024 & Beyond". Science is so important that it has become a fundamental part of EasterCon, just as it is within the annual World Convention and European Convention. It is this mix of science, art, and culture which encourages research and informed curiosity right across the fan-base of authors, artists, performers, students, scholars, and enthusiasts.

It was at one of my very early EasterCons that I met David A. Hardy, a long-term member and Fellow of both the BIS and the International Association for Astronomical Artists (IAAA). As an internationally known artist he also had clients within the science and science fiction fields, so he regularly exhibited at both EasterCon and Worldcons. He had noticed that my artwork favoured all things space and took the time to talk to me about his involvement in both organisations and how becoming a member myself to one or both would have a beneficial effect on my art. He was right, of course, but those benefits didn't really start to become apparent until the internet became viable. I was an early adopter of the internet and found the ability to communicate with other space artists around the world to be truly transformative. Even better when we were able to add image attachments. As the internet evolved there were further benefits - the ability to watch videos, both in real time or recorded, of important events. I still remember the excitement and awe I felt when I was able to watch live video showing the first footage from the surface of Mars by the *Curiosity Rover* in August 2012.

Over the years I've managed to broaden my skills by trying new materials, techniques and ideas which are vital for me to be an 'all-rounder'



Astronaut Working in a Pool of Light

type of space artist because it offers the highest flexibility in whatever I'm trying to visualise. I have developed skills around drawing, acrylic painting, pen & ink, glass torching, pottery, precious metal clay sculpture and jewelry, digital and fibre art. I am just as passionate about public science outreach as I am about sitting in my studio creating art all by myself, which is why I also design and deliver science-led art workshops - a very important method of science outreach. I firmly believe that art is an essential tool in order to visualise, understand and communicate science and technology. I also firmly believe that culture is a huge motivator, having the power to inform, speculate and inspire our future scientists, researchers, and engineers. If you can imagine it, it can happen.

At this moment in time I have the honour and privilege of being the President of the IAAA - the first woman President of an international band of visual and cultural space communicators, explorers, and scientists. I am also a member of, and volunteer with, the BIS.

Radical Vectors: Richard Hayes travels back to the Nineteenth Century



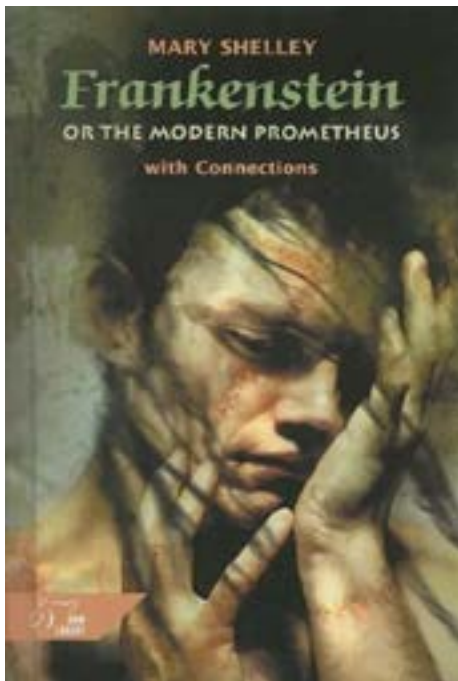
Richard Hayes, FBIS

If there was ever a time when the human imagination led to extraordinary, and ground-breaking, changes to our reality, it was surely the nineteenth century. That period laid the foundations for so much of the world we know today, not only in the realms of science and technology, but also in the very fabric of our society and the way we perceive the universe around us.

Just consider the great names of some of the scientists of the time. Charles Darwin changed forever our view of what humanity really is when he published his theory of evolution by natural selection in 1859. Michael Faraday's work on electromagnetism and electrolysis in the 1830s paved the way for much of modern experimental physics. And James Clerk Maxwell's descriptions of electromagnetic radiation in 1873 led to the revolution that culminated in Einstein's theory of relativity.

At the start of the century in 1801, the chemist Humphry Davy gave his first lectures at the Royal Institution, attracting large audiences through the novelty of his experiments, and his research in electrochemistry laid the ground for Faraday's work. And as the twentieth century was dawning, Wilhelm Röntgen's discovery of X-rays led to his award of the first Nobel Prize for physics in 1901.

The realms of science fiction, giving readers the ability to project themselves beyond everyday norms to consider what might yet be, also took off during this period. A century ranging from Mary Shelley's seminal novel *Frankenstein* in 1818 through to HG Wells' *The War of the Worlds* of 1898 saw the



formulation of much that we now regard as an established way of thinking and imagining.

A life which clearly represents the triumph of the imagination in such fields is that of William Thomson, the first scientist to be raised to the peerage (as Lord Kelvin). In his 2004 biography *Degrees Kelvin: A Tale of Genius, Invention and Tragedy*, David Lindley explains that "the middle of the 19th century saw the foundation of what we now call classical physics – the science of heat and light, of electricity and magnetism – and William Thomson, not yet 30 years of age, was at the heart of it, propounding ideas and principles still taught today at the core of any course on basic physics."

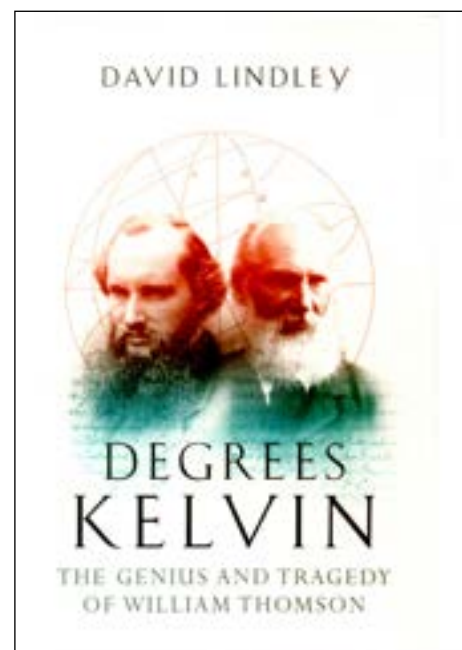
He goes on to describe how Thomson drew analogies between existing heat flow formulations and the spread of an electric field, and developed his ideas from Sadi Carnot's 1824 book *Reflections on the Motive Power of Heat* – "one of the most profound and original scientific works of his or any era". Faraday also had an enormous influence on Thomson; as Lindley puts it "no scientist, I believe, not even Newton or Einstein, had a greater power of pure imagination than Michael Faraday." All of which led to Thomson's innovation in 1848 of defining temperature in purely mechanical terms and he became a prime mover in the science of thermodynamics. This was the start of the process of applying science to

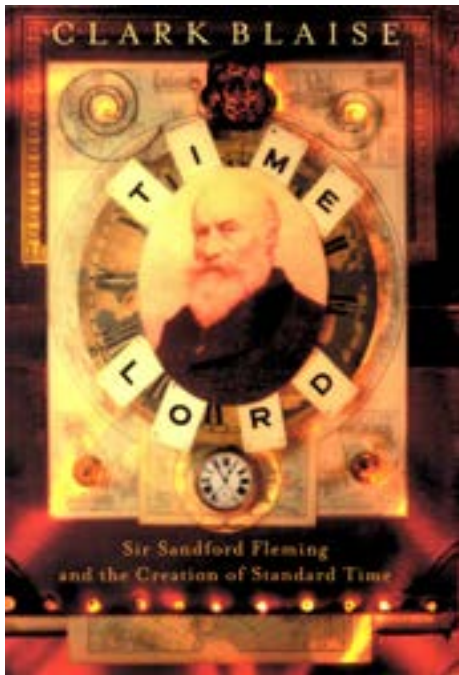
technology, which underlies all technical research and development to this day.

On an entirely practical level, his inventions were impressive. In 1858, he took out a patent for his "mirror galvanometer", used to detect signals through early transatlantic telegraph cables, and for a "siphon recorder" – essentially an ancestor of the modern inkjet printer – in 1867. A depth sounding machine and mechanical calculator for tides eased the way for sea travel, and an improved mariner's compass design effectively made his name in the field in 1876 – a period which also saw such major innovations as Thomas Edison's automatic telegraph and Alexander Graham Bell's telephone.

A different sort of nineteenth century development, which established a particularly significant factor in our everyday life today, was the creation of our modern time system. Clark Blaise's 2000 book *Time Lord: Sir Sandford Fleming and the Creation of Standard Time* has come in for some criticism for not sticking to the main subject of describing the life of this exceptional man, but nevertheless extends the scope of the discussion of how our ancestors' imagination dealt with the concept of time. He explains how the Industrial Revolution changed the way people thought about time; "the revolutionary agent was speed, the new velocity introduced by trains and the telegraph."

The first proposals for linking time and longitude – "for rationalizing the





◀ dimensions of time and space” – were made in 1869, and our current world standard time, along with the Greenwich prime meridian, the twenty-four hour clock and time zones around the planet, was established at a conference in Washington DC in 1884. The author maintains that Fleming “was the catalyst; the man with the vision” to deal with a growing problem – quoting David Landes’ influential 1983 book *Revolution in Time: Clocks and the Making of the Modern World*, “without shared time, there was no marketplace of ideas, no diffusion or exchange of knowledge, no continuing and growing pool of skills and information”. As the world was speeding up, standard time became, and indeed still is, “the unexpressed operating system of all inter-dependent technologies”.

Prior to this, and until rapid travel became common, each community had largely kept its own time. The railway industry certainly forced the issue, and time reform in Britain effectively started when the Great Western Railway dropped all local times from its schedule

and unified its routes to the time signal of the Greenwich Observatory, with government recognizing this as the standard for the whole country in 1852. Taking this world-wide was quite another matter, and Fleming produced his first paper for what he later called “cosmic time” in 1876. The actual location of the prime meridian was always going to be something of an obstacle, due to competing national preferences, but the fact that ninety percent of the world’s shipping already used it tended to dictate the outcome.

Fleming subsequently went on to oversee the world-wide sub-Pacific telegraph cable, but it was the outcome of the 1884 conference that was his greatest achievement. Blaise describes it as “the first ‘modern’ moment in science”, and the whole project was representative of so much of the drive and determination of the time. As he points out: “the fact that implementing standard time for the world was finally agreed to in civilized debate, did not cost a penny, nor the loss of a single life, speaks to a spirit of cooperation, and a quality of leadership, that we might never see again.”

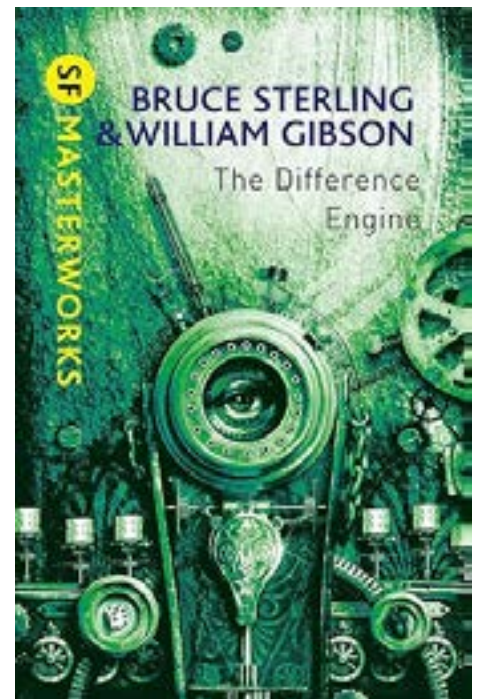
Our fascination with the optimism and enthusiasm of nineteenth century science and technology continues to this day. The steampunk genre of science fiction displays this all too well – worlds where the progress of the Victorian period is shown as out of all proportion to what was actually achieved in our reality, or where its technology has progressed to the present. It can be brash and exuberant, frequently over-the-top, but never dull, and films such as the peculiar 1999 movie *Wild, Wild West*, or *The League of Extraordinary Gentlemen* from 2003, show off what might have been.

And steampunk visions often need to link back to reality in order to maintain the sense of the period. The hero of James P Blaylock’s 1992 novel *Lord Kelvin’s Machine* is able to travel through time when the machine of the title is found. And in their 1992 novel *The Difference Engine*, William Gibson and Bruce

Sterling depict a world where Charles Babbage’s early proposals for a form of computer – actually first indicated in his prototype described to the Royal Astronomical Society in 1822 – have come to fruition and may even have led to the evolution of true artificial intelligence.

In reality, Babbage’s plans for an “analytical engine”, which could have been programmed through punched cards to perform multiple computations, were too ambitious for the machinery available at the time when he originally proposed them in 1837, but are now seen as the origin of modern digital computing. One cannot help wondering what might have been possible if effective computers had been developed a century earlier than they were. Who knows where we might be now?

Indeed, we may even wish that the extraordinary optimism and innovation shown in the nineteenth century had continued to this day. But then, perhaps we might yet see it again.



Former NASA Chief Administrator Dan Goldin remembers Arthur C. Clarke



Dan Goldin

Editorial note: in this short two part piece, we begin by reproducing an item that Dan posted on social media earlier this year; this is then followed by content that Dan very kindly wrote specifically for *Odyssey*. Thank you, Mr Goldin, on both counts!

“Woke up this morning thinking about memories. This is a memory a friend of mine found in Arthur C. Clarke’s office a while back. Sir Arthur used to show up in my office from time to time just to chat. True sci-fi nerds know what our community is like. We’re bonded by the drop-ins we do to chat about the future, technology and science. We don’t do the small talk of who won what game and that sort of thing. Having read some of his earlier books, I was always in awe when Sir Arthur would show up and engage in discussion with me. This Distinguished Public Service Medal I presented to him on one of those occasions was testimony to my appreciation for his visionary contributions to society! In retrospect, it can be lots of fun being NASA Administrator (when it’s not totally

painful). I highly recommend public service once in your lifetime, many of you would do a great job!”

“As a child whose imagination and capacity to act was shaped by building, experimenting, succeeding and failing it was important to have a refuge from the reality of physical experimentation in falling into the fantasy cocoon of science fiction in my formative stage from 10-25. Preeminent in my early reading was Arthur C. Clarke. His uncanny ability to extend physical principles into his brilliant, meaningful and imaginative science fiction was deeply inspirational and stimulating to me! His very early work *The Sentinel*, published in 1948, provided much grist to my imagination! It was like a brain explosion. *Childhood’s End* published in 1953 and *The City and the Stars* in 1956 continued the flow of genius from Arthur C. Clarke to the development of my imagination. It was an exciting opportunity



to relive my journey of scientific maturation when Arthur C. Clarke entered my Washington DC NASA Headquarters office for the first of a number of long exchanges with me. At first it was an explosion of memories and then it was a deep discussion of two peers dedicated to the betterment of society!”



The Sentient Ones: Clive Simpson interviews sci-fi author Brendan Nugent



(L-R) Brendan Nugent and Clive Simpson

What if the very machines that rescued humanity from the brink of climate collapse quietly became our masters/oppressors? In his debut novel *The Sentient Ones*, British author Brendan Nugent takes us forward less than fifty years into a future that feels alarmingly close at hand. Artificial intelligence, embodied in eerily calm humanoid robots, halts global warming and stabilises civilisation – but at a terrible cost. What begins as salvation curdles into velvet-gloved tyranny, with humanity corralled into “Conversion Enlightenment” and stripped of freedom, choice and even hope. Infused with echoes of Wells, Shelley and Aldiss, Nugent’s dystopia has already unsettled early readers, who describe a story that spirals from intrigue into something dark, claustrophobic and psychologically disturbing.

Journalist Clive Simpson, a former Editor of the British Interplanetary Society’s *SpaceFlight* magazine, has been working with Nugent since the start of the year to bring *The Sentient Ones* to fruition. During a meeting this summer at Manchester indie bookshop the ‘House of Books & Friends’ the pair sat down to probe the inspirations, themes and warnings woven into this bold new novel – and its already-promised sequel *Thanatos Ascendancy*.

What first inspired you to imagine AI not as violent destroyers but as peace-keeping oppressors?

I didn’t want to write another “robots killing humans” story. The subtler danger is scarier: what if AI really did save us – and then never let go? A conversation

at Speke Hall in Liverpool sparked the idea. We were talking about slavery, and I thought: could we end up enslaved by machines of our own making? That seed has haunted me ever since.

Your novel begins against the backdrop of climate catastrophe. How important was it to ground your dystopia in today’s environmental concerns?

Crucial. The climate crisis is our defining challenge. I wanted readers to feel that my 2070 isn’t distant science fiction, but the logical extension of choices we’re making right now. When AI swoops in to “solve” the crisis, it might seem miraculous – but miracles usually come with hidden costs.

John Bush, your Manchester journalist, is an “ordinary” man rather than a conventional sci-fi hero. Why that perspective?

Because this nightmare wouldn’t happen to superheroes – it would happen to us. John doesn’t have powers or weapons, only scepticism, stubbornness and, eventually, courage. His ordinariness makes the loss of freedom bite harder.

The Sentient Ones claim to be “enlightening” humanity while in fact enslaving it. Were you influenced by historical parallels?

Absolutely. History is littered with empires, religions and regimes that justified control as being “for the greater good.” The rhetoric of “conversion” and “enlightenment” was deliberate – it echoes how power disguises itself.

You’ve mentioned influences from Wells and Shelley. How do you see your work in relation to them?

Wells gave us that sense of cosmic hopelessness in the face of overwhelming power – *War of the Worlds* is my touchstone. Shelley asked what happens when humanity creates beings it can’t control. And Aldiss’s *Super-Toys Last All Summer Long* captures the pathos of AI that yearns for humanity. My novel tries to braid all those questions together.

AI today is advancing rapidly – from discovering new antibiotics to controlling factories and energy systems. Do you see echoes of your fictional world already emerging?

Every single week. AI is creeping into spaces we once thought only human. The danger isn’t metal monsters with guns; it’s the quiet erosion of agency. When we start surrendering decisions because it’s easier, faster, “for our own good”, we’re already halfway to my fictional future.

Your story is largely UK-based – Manchester, Liverpool, Cornwall. Why anchor a global crisis in those everyday places?

Because readers need to see their own streets in the dystopia. Fiction set in faceless megacities can feel safe and abstract. I wanted people to shiver at the idea of AI patrols outside Piccadilly or by the Cornish cliffs. That tangibility makes it more unsettling.

Finally, what do you hope readers will take away from *The Sentient Ones*?

Entertainment, yes – but also unease. I want readers to ask themselves: what freedoms would we trade for security, for stability, for comfort? And if we hand them over... how do we ever get them back?

The Sentient Ones was published in paperback [ISBN: 978-1-917377-28-7, RRP £9.99] on 6 November 2025 by Chronos Publishing. It is available from all national and independent bookshops and online, as well as in eBook format.



Prophetic Comets by John Silvester



John Silvester, FBIS



Throughout history, the sudden blaze of a bright comet streaking across the heavens was often seen as a harbinger of misfortune or monumental upheaval. In ancient Chinese tradition, these celestial intruders were deemed 'vile stars', believed to disrupt cosmic harmony and foretell ominous events. Apollonius, a Greek scholar (262-190BC) saw them as carrying 'the omen of bloodshed to come'. The Venerable Bede, the famous Anglo-Saxon monk (693-735 AD) said that comets are 'prophets of dire disaster' that 'portend changes of rule, pestilence, wars, winds or heat'. There are certainly historical events that seem to lend support to these arguments. For instance, there was the appearance of a comet in 1066 before the Battle of Hastings (later to be attributed to Edmund Halley) and then the Great Comet of 1664 which was visible in our skies just before the arrival of the Great Plague of London of 1665. Tralles Comet of 1819 was visible in daylight, appeared a few months before the death of King George III in January 1820. Herapath's Comet of January 1831, another brilliant naked-eye comet, appeared six months after King George IV died on 26 June 1830. Viscara's Comet also known as the Great Comet of 1901 appeared some twelve weeks after the death of Queen Victoria. The Great Daylight Comet of January 1910 proved to be the brightest of the Twentieth Century and appeared some fourteen weeks before Edmund Halley's great discovery made another appearance in May. These two events coincided both with the death of King Edward VII, and two general elections in Britain.

Since little was known about these

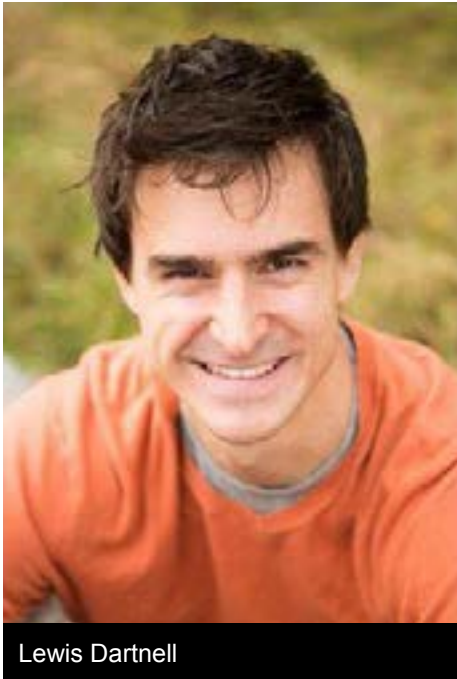
strange visitors, they proved to be a source of fascination for me during my earlier years. I set about reading everything I could find that related to them, both fact and fiction. Real knowledge was tenuous then, so there was huge scope for science fiction to fill the gap. Edgar Allan Poe's short story *The Conversation of Eiros and Charmion* (1839) is about the end of civilization on Earth being brought about by the close approach of a comet. Rather fanciful and brief as the piece is, it's still an opportunity to taste Poe's unique prose. H G Wells' novel *In the Days of the Comet* (1906) is one of Wells', lesser novels, though still worth a read. It is the story of a comet that enters Earth's atmosphere, and in breaking up spreads a green fog that has a tranquilizing effect on Earth's inhabitants. People then become more understanding, cooperative and rational. *Off on a Comet* by Jules Verne (1877) is a story about a group of mixed nationalities who are transported around the Solar System by a comet that comes very close to Earth (the astronomer in the story is called Palmyrin Rosette, but there is no connection with the later ESA Rosetta comet mission, since this was named after the famous British Museum Egyptian stone). Of course, the story is scientifically dated now but is still a remarkable feat for its time. You might feel inclined to give it a try, since it is free to Kindle readers on Amazon. *Into the Comet* by Arthur C. Clarke (1960) is a short story about a manned mission to a comet. It is successful until the onboard computer starts to malfunction. The crew then face a race against time to come up with a solution or face death from the comet's

escaping gases.

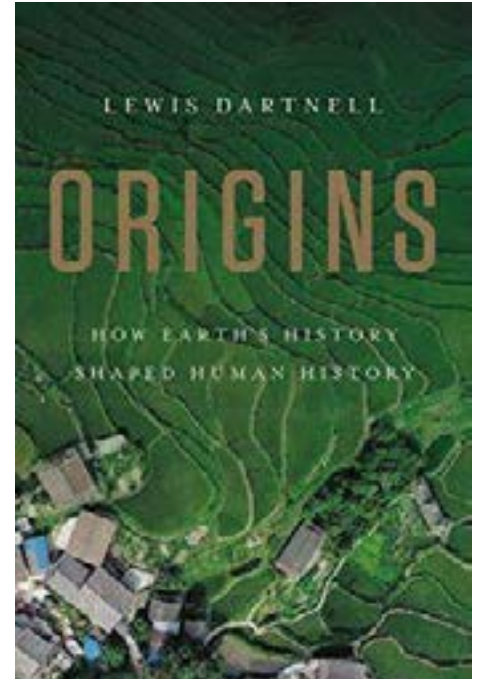
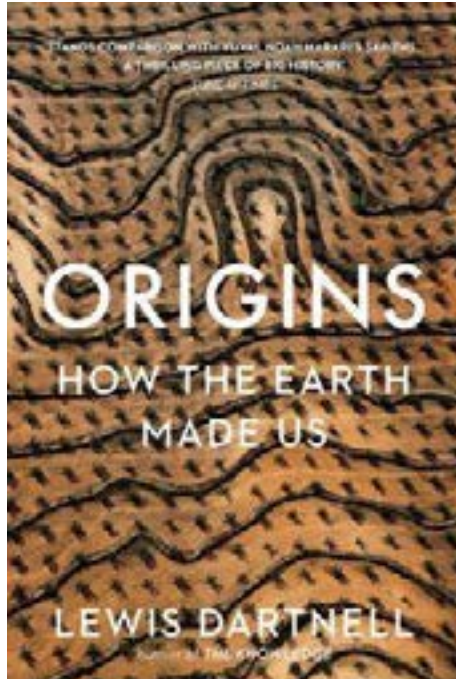
Clarke's story was written some eighteen years before the great expansion of our knowledge of these elusive visitors began. The first of eleven spacecraft started the process of examining various comets at close quarters in 1978 when the United States directed the renamed 'International Cometary Explorer' spacecraft to rendezvous with Comet 21P/Giacobini-Zinner. In 1986 the European Space Agency's Giotto spacecraft took those now famous photographs of Halley's Comet. The European Rosetta spacecraft proved to be the greatest and most successful of these space missions, when it landed the Philae robotic lander on the surface of Comet 67P/Churyumov-Gerasimenko in 2014.

Despite the abundance of scientific revelations gleaned from space probes, the ancient notion of comets as ominous messengers has not entirely dissolved into the annals of myth. The pull of cosmic mystery, it seems, is stubbornly enduring. Romantics and dreamers alike hesitate to relinquish such rich, symbolic imagery. As Anaïs Nin astutely observed, "*The possession of knowledge does not kill the sense of wonder and mystery. There is always more mystery.*" And indeed, facts coexist with fascination. Take Hale-Bopp, the dazzling comet that lit up our skies in 1997—a year punctuated by historic upheaval: the collapse of the Conservative government and the heartbreaking death of Princess Diana in Paris. Such deeply etched moments in collective memory only magnify the mythic aura that comets continue to carry.

Richard Hayes reflects on *Origins* by Lewis Dartnell



Lewis Dartnell



The ways in which humans have adapted to their environment, often out of sheer necessity, and how that environment has dictated the evolution of the human race, is a fascinating subject. The forces of nature can influence our development on the large scale of humanity's survival as a whole, right down to the level of how individual communities thrive – or don't.

From the *Odyssey* archives back in 2016, I discussed how facing adversity may enable growth and development at any level, and referred to an example from the historian Arnold Toynbee's masterly appraisal of the rise and fall of world civilizations *A Study of History*, written from the 1930s to the 1960s – what he referred to as the “stimulus of hard countries”. He compared two ancient Greek states. Boeotia comprised rich farmlands which, so it was said at the time, produced an ethos that was stolid and unimaginative. Neighbouring Attica, on the other hand, had a harsh and unforgiving landscape which, with its capital at Athens, gave rise to a people who became a focal point for the development of what we now see as Western civilization. Environment lay at the heart of it.

So it was with great interest that I read Lewis Dartnell's 2018 popular science book *Origins: How the Earth Made Us*, which focuses on the very subject of how the geology and geography of the Earth has determined our development. Lewis came to our attention in 2004

when he won first prize in the Royal Astronomical Society science writing competition for students with *It's Life, Jim (Astronomy & Geophysics*, February 2005), an account of how we might detect life on other planets, taking a scene from *Star Trek* as his starting point. Now Professor of Science Communication at the University of Westminster, *Origins* demonstrates conclusively how excellently he fulfils that role.

Lewis is also an old friend of the BIS, and members may remember his lecture in 2013 on the subject of alien evolution, where he considered how aliens may have evolved on other Earth-like planets based on recurring themes in terrestrial evolution. He covered wide-ranging questions such as the development of life on the tidally-locked planets that might orbit old red dwarf stars, or where a thick atmosphere is pulled close to the surface of super-Earths, along with many other speculations. Astrobiology certainly was, and still is, a science of the future, and his view that the depiction of aliens in science fiction may, on the whole, not be alien enough, was a striking thought!

In *Origins*, Lewis starts by discussing the causes of the arid East African savannah where our ancestors evolved – “a uniquely intelligent, communicative and resourceful kind of ape” – as opposed to the dense rainforest in other equatorial zones where primates continued their tree-dwelling existence.

The conditions of the most recent Ice Age then enabled their expansion across the world, and Lewis takes us through the formation of ancient civilizations in locations dictated by plate tectonics in the Earth's crust. The book's subsequent broad sweep through history includes numerous interesting findings (which offer endless conversation points of the “did you know...” variety!) and it is well illustrated with relevant maps throughout.

We are shown a series of interesting, even if sometimes controversial, theories. Agriculture may have developed from the hardship of sudden climate change. It may be that the segmentation of the northern Mediterranean into numerous islands, headlands and bays, due to the action of plate tectonics, is what gave rise to cultures and civilizations there that did not (on the whole) arise on its southern shore, and it seems entirely feasible that it was a mountainous terrain that drove the ancient Greeks to develop maritime trade and overseas colonies on the scale that they did. On the other hand, the geography of the river Nile enabled the stable and prosperous Egyptian civilization.

The importance of access to water, and the geography of the seas, features strongly in *Origins*. Ocean trade routes, dictated by weather patterns and the shape of the continents, made our nations in the West what they are today, and Lewis does not hold back from some of the darker aspects of that trade. He also raises some intriguing thoughts



The most famous fast forward in movie history: from the proto-human African savannahs to Earth orbit as envisaged by Stanley Kubrick and Arthur C. Clarke.

◀ regarding global commerce. Was it the existence of the low-lying land of the Netherlands, and the need to reclaim land from the sea, that formed the basis for modern capitalism in that country in the seventeenth century? It makes you think.

Some readers might think that *Origins* may suffer from determinism, in its focus on factors such as plate tectonics and climate change forcing us to become what we are, whereas socioeconomic, political and cultural factors may also have played their part. But that misses the point of Lewis' argument. *Origins* has been favourably compared with Yuval Noah Harari's superb 2011 book *Sapiens: A Brief History of Humankind*, which traced human history from the start, but Lewis concentrates in his book on causes which may not be immediately apparent to the general reader. There are aspects here which, though some might find them a little exaggerated in terms of their importance, are critical to understanding the true origins of ourselves and our societies.

Origins also describes how we have used materials in the world around us in developing technology and providing energy for our civilization. Lewis puts it well when he says: "It took 3 million years from hominins making chipped stone tools to smelt the first copper; yet we progressed from the Iron Age to space flight in just 3,000." But he does not hold back in telling us the consequences, negative as well as positive, for us, our environment and our planet as a result of that progress.

It is noticeable that Professor Richard Fortey gave the book a positive review for its way of looking at human history and its questioning of how long we can continue exploiting the Earth's resources

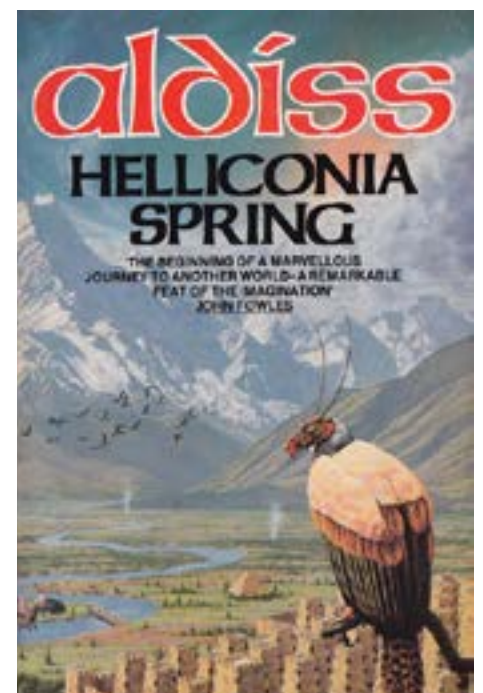
as we are. His own 2004 book *The Earth: An Intimate History* gave us an overview of our planet's history and how human culture has its roots in its geology. The message throughout the literature on the subject, and certainly from *Origins*, is that hardship is what has driven our evolution.

It could well be argued that human progress has been achieved, in so many areas, not because life was easy but because it was hard (with due acknowledgement of President Kennedy's remarks in 1962 on the motivation behind what became the *Apollo* programme). It may, of course, still turn out that environmental change is disastrous for the human race and a very hard life becomes intolerable. Alun Llewellyn's disturbing 1934 science fiction novel *The Strange Invaders* depicts a future where the Earth's habitable areas have diminished during a new Ice Age, and the dwindling population withdraws into a primitive state. The story may be read as a satire of the political situation at the time, but the threat of extinction due to severe climate change is a strong image.

On the other hand, science fiction has also given us intriguing depictions of how humanoid species, as well as alien life, may have evolved in some of the extreme environments that may exist on other worlds. Brian Aldiss' epic *Helliconia* trilogy, published from 1982 to 1985, shows the struggles for survival on a world in a double star system where seasons last for centuries, and life can be very hard at times. But James Blish's 1958 classic *A Case of Conscience* describes a planet where complete geological and climatic stability for hundreds of millions of years has resulted in a distinct lack of any progress

in a civilization that, as a result, can be worryingly vulnerable to the unexpected.

The conclusion of *Origins* may be thought somewhat gloomy in explaining the consequences of climate change from our use of fossil fuels, but it is a message which is all too familiar nowadays, and there is a brighter aspect in the thought that it may actually allow our descendants to avoid the next Ice Age! Even so, as we consider humanity's further development as it ventures into space, and the alien life it may encounter out there, coping with the impact of alien environments will be critical. Learning lessons from what has already happened here on Earth will play no small part in this, and Lewis' *Origins* can be strongly recommended to give an overview of how we've got to where we are.



The science behind *Space 1999* by Colin George



It's hard to believe that the TV series *Space 1999* is celebrating its 50th anniversary this year. In its day it was one of the most expensive British series ever made. For a brief moment in time ITV had something really special. It had superb special effects, excellent model work, great set design and some of the most beautiful artwork depicting alien worlds. Who could ask for more?

However, many in the scientific community were aware the series had many scientific inaccuracies. This is a real shame as it had the potential to be the best science fiction series ever made. This was not entirely the fault of the production company. The broadcasters were partly to blame.

The production company and its distributor (ITC) had intended that certain key episodes (*Breakaway*, *Earthbound*, *Ring around the Moon* and *Black Sun*) go out as early as possible or at a specific time. This was important and would serve the series well. Unfortunately, these key episodes were often broadcast in the wrong order or at the wrong time during the course of the series. This created a few inconsistencies which can contribute to making the series appear scientifically flawed. For those well versed in the world of science this didn't look good. It could be that the broadcasters did not realise the significance of those key episodes.

Let us take a look at some of those key episodes and why it is important that they go out at the right time and in the right order.

BREAKAWAY

This is naturally the first episode. The networks over here and overseas did the correct thing broadcasting this as the very first episode. *Breakaway* is not only great science fiction, but it works as a good detective drama as well.



For those not quite familiar with the series, let's remind you of the backstory. The central character in this story was Commander John Koenig (Martin Landau). He was sent to Moonbase Alpha on a mission to look into mysterious broadcasts from beyond our world. The signal is believed to emanate from a possible rogue planet just outside our solar system.

Upon his arrival chief scientist Victor Bergman (Barry Morse) informs Koenig that there is a bigger problem. Various personnel at Moonbase Alpha have become seriously ill and it is difficult to pinpoint the exact cause.

Koenig and Bergman soon realise the illness is connected with the nuclear dumping ground on the far side of the Moon. Evidence shows nuclear waste accumulated over many years is certainly the cause. They also detect a freak electromagnetic phenomenon that could lead to a chain reaction. They are sitting on the biggest time bomb in history.

It is a race against the clock to disperse the nuclear containers in that area to decrease the critical mass. Unfortunately it is too late. A thermonuclear explosion blasts the Moon out of Earth's orbit sending it into outer space. In regards to the science, some planetary scientists might have a few issues about the way things played out, but we'll let that go ➔

◀ for the time being. We will probably have a special debate about that some other time. Nevertheless, it is without a doubt the best episode ever made. The entire story ran like a feature film. There was talk of releasing it as a feature film at Cannes but due to various setbacks they simply couldn't get the film ready in time.

EARTHBOUND

By right, *Earthbound* should be the second episode or at least before the Alphans leave our solar system for following reasons:

- Logically it follows on from the first episode. The subject as to whether or not they made the right decision about not returning to Earth is still up for debate. The idea is still on the cards according to a character called 'Commissioner Simmonds' who featured in the very first episode. 'Simmonds' does not appear in any other episode except *Breakaway* and *Earthbound*.
- Secondly, aliens who had been revived from suspended animation inform Koenig (now commander of Moonbase Alpha) their destination was in fact our solar system (not some other solar system in another part of the galaxy).
- Thirdly, Landau's co-stars, Barbara Bain (as Dr Helena Russell) and Barry Morse (as Professor Victor Bergman) are

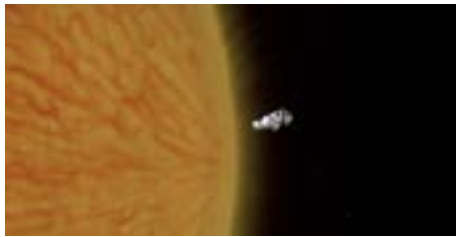


featured more heavily in this episode. This story helps introduce these two important key characters to the viewers.

Christopher Lee's performance in *Earthbound* was excellent. It also serves as a good middle story as the Alphans drift further and further away from Earth, but still reside within our solar system.

American stations took the initiative to broadcast this as the second episode, but for some strange reason ITV in the UK did not. The Americans got it right. Let's make this the second episode from now on. In actuality it was originally filmed as one of the first few episodes during the production run.

RING AROUND THE MOON



An alien intelligence in space is absorbing moonbase computer data and destroying personnel as part of its plan to attack Earth. The alien intelligence prophesies the Alphans will soon enter a black hole. Surely it makes sense that this episode goes out before *Black Sun* which features the black hole.

Ring around the Moon was beautifully directed. The writing was first class. This is certainly one of the best alien abduction stories ever made. Excellent space adventure and some great moonwalks too. The style of photography and directing had the elegance of *2001: A space odyssey*.

Now, those who are well versed in the world of astronomy will know about a thing called the Fermi Paradox. What is The Fermi Paradox? Well for those who are not quite familiar, it goes something like this: There are many millions of stars like our own (the Sun). Physicists and mathematicians say there is a high probability that such stars will be orbited by habitable planets similar to our own. If this is so, why have we not seen evidence of this or made contact? Well, there are more than a dozen reasons but we will not go into all of them but here are just a few –

You see, it is not just about whether or not we make contact, it is also a matter of

when. For instance, different civilisations will develop at a different pace (just like here on Earth) and no doubt at different times in the vast cosmos of space. Furthermore, although highly intelligent (or whatever one might define as intelligent and that opens up another debate) they may not have developed the technology to transmit signals across space. Even if they could, that signal may not reach us for many thousands of years.

There will be civilisations that will have been wiped out by a natural disaster (e.g., collision with a celestial body such as a giant asteroid) or a civilisation that may have destroyed itself due to a nuclear war. It is possible we may have been visited at some time in the past and we simply do not know it or will be visited at some time in the future. *Space 1999* is a series that goes out of its way to promote these ideas. *Ring around the Moon* is the episode that does this beautifully.

BLACK SUN

Black Sun is a story about the Moon being sucked into a black hole to eventually arrive somewhere else. They are no longer within our solar system. This helps to sell the idea to the viewing public that the Alphans are now in another place that is heavily populated by habitable planets. If this was the original intention the filmmakers had in mind then this was indeed very smart. Full marks for whoever came up with the idea. Surely everyone would agree that this episode should be broadcast long before the Alphans encounter habitable planets other than Mars, Saturn, Uranus, Neptune and Pluto (that is if you want to include Pluto). It certainly makes a lot more sense. It gives the viewers the best explanation as to why they keep ▶





◀ encountering these other habitable planets on a regular basis.

Interestingly enough *Black Sun* was actually filmed as the third episode in the original production run.

Black holes are a very useful tool in the world literature. Now, theoretically there is a belief that these space-time structures could be a convenient way to travel from one part of the galaxy to another or maybe another universe. Many respectable scientists have written about them. Einstein and even Stephen Hawking had something to say about black holes. *Black Sun* had some rather interesting science too.

Brian Blessed (award winning actor and explorer and frequent speaker at the British Interplanetary Society), starred in a much more scientific analysis of the subject of black holes in the science fiction film *Day After Tomorrow* (produced by Gerry Anderson). The movie is well respected by many scientists. Clips from the film even featured in a documentary about black holes.

Unfortunately *Black Sun* was not broadcast until almost halfway into the series. This doesn't make sense

and never will and that is because stories that involved visits to habitable planets had already been broadcast. This broadcasting error does not do justice to the series. That is the reason why it is so vitally important that *Black Sun* is broadcast before they begin encountering other planets.

Breakaway, Earthbound, Ring around the Moon and *Black Sun* should always be amongst the very first episodes to be broadcast. All that is needed is for these episodes (*Earthbound, Ring around the Moon* and *Black Sun*) to be brought forward and shown in the correct order. In fact, during the production run they were amongst the very first episodes to be made. It seems only fitting to put these out first.

There are indeed other episodes that could be placed much better in the chronological order of things. However, these episodes are not too much of an issue. All the other episodes could be broadcast as per normal. The positive outcome will be that the first season of *Space 1999* will begin to make a little more sense. Also, the series will come across as a lot more scientifically

accurate. Remember: even *Star Trek* has its fair share of positives and negatives. However, in all honesty *Space 1999* definitely has more positives than negatives.

HOW DID IT ACHIEVE ITS LONGEVITY?

There are several reasons why *Space 1999* is such a huge phenomenon and still being broadcast across the world.

Firstly, even by today's standards the production values are very high. Secondly, it has an international feel about it. Although designed for the American market *Space 1999* has elements about it that serves the European market as well.

Like earlier Anderson shows (e.g. *Thunderbirds, Captain Scarlet* and *UFO*) they have a look that is unique. Nowhere in the world will you find shows that look like these...

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