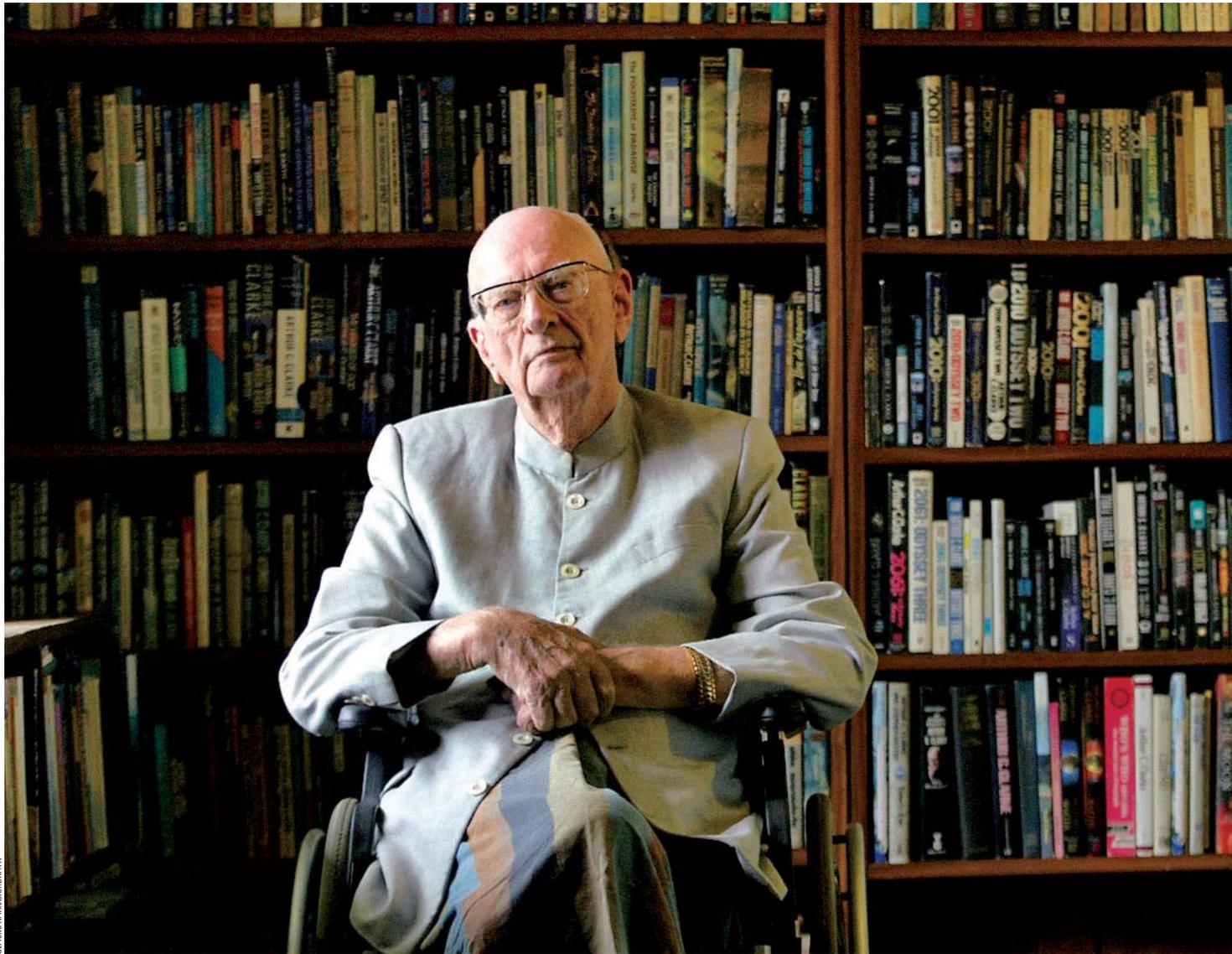


Arthur C. Clarke is best known for his science fiction, but his contribution to science goes much further: many of his ideas still shape crucial new space technologies. On the eve of his 90th birthday, Andrew Robinson looks at the life of this ever-enthusiastic visionary

Still looking at the stars



GERHARD AMADIO/GETTY IMAGES

“I BET Arthur has forgotten this,” British astronomer Patrick Moore tells me before launching into a story about Arthur C. Clarke, his old friend from the heyday of the British Interplanetary Society. In those cold-war times, a group such as the BIS – which advocated space travel and collaboration with the Russians – was the object of official suspicion, not to mention derision from scientists working for the establishment. (In 1956, no less a figure than Richard Woolley, the UK’s astronomer royal, asserted: “All this writing about going to the moon is utter bilge.”)

Moore recalls that around 1950, Clarke went into a museum – it may have been London’s Science Museum – carrying a

suitcase. “Knowing that he was a member of the BIS, one of the attendant officers insisted on looking into the suitcase to make sure it didn’t contain a bomb.”

Clarke has indeed forgotten the suitcase incident when I mention it over lunch on the veranda of his house in Sri Lanka, where he has lived for almost half a century, and where I first met him in the 1980s. This is hardly surprising, given that he turns 90 on 16 December. His memory, he says ruefully, has undergone a “data dump”, even if his mind ranges as swiftly and eclectically as ever. But he is curious to know what was in the suitcase. Perhaps, we speculate, it contained some futuristic, though no doubt technically sound, designs for a rocket put forward by the precocious enthusiasts of the BIS.

Clarke’s fascination with rockets goes back to his teenage years in England, when he launched home-made ones from his mother’s farm in his native Somerset. His father, a post office engineer, died when Arthur was 13, from the lingering effects of being gassed in the first world war. Space rockets became possible, at least technically, with the launch of Germany’s V2 rocket during the second world war, when Clarke was serving in the Royal Air Force, working on radar. Looking back, that feels like the “Jurassic” period of his life, he says. Even the start of the space age 50 years ago is “sort of ancient history – the Battle of Hastings so far as I’m concerned”.

By then he had fully embarked on his tireless advocacy of space travel in both fiction and non-fiction, through books such as *The Sands of Mars*, *A Fall of Moondust*, *The Exploration of Space* and *Profiles of the Future*. Nevertheless, he was amazed that the moon landing happened so soon, in 1969. He had not expected to see it in his lifetime. “And then I was also surprised, and disappointed, that it wasn’t followed up. We abandoned space for decades.” Clarke’s screenplay and companion novel for the movie *2001: A Space Odyssey*, made by Stanley Kubrick in 1968, had imagined the construction of a moon base in the 1990s.

He still expects the establishment of scientific bases and perhaps colonies on the moon and in other parts of the solar system by the end of the century. But will people go to live in these outposts and regard them as their home planets? They probably will, Clarke says, pointing out that this has already happened on Earth in very “improbable”, inhospitable places. “With the technologies we have, or should have, I’d expect people to live, most certainly, on Mercury, Venus and Mars, the satellites of Jupiter and quite a few asteroids.” As he once remarked, twisting

Oscar Wilde: “We have to clean up the gutters in which we are now walking – but we must not lose sight of the stars.”

There is an element of faith in Clarke’s attitude to space, though not the religious type. His attitude is more like a boundless optimism in the power of intelligence. Such optimism underlies his best-known novels, *Childhood’s End*, *2001* and *Rendezvous with Rama*. Kubrick, who tended to be sparing with his praise, once said of his collaborator: “Arthur somehow manages to capture the hopeless but admirable human desire to know things that can really never be known.”

This visionary hopefulness is Clarke’s chief appeal to his legion of non-scientist admirers. These include Rupert Murdoch and Steven Spielberg, and a host of science fiction writers such as Ray Bradbury, Stephen Baxter and the late Gene Roddenberry, the brain behind the TV series *Star Trek*. Ronald Reagan was also an admirer, despite Clarke’s opposition to his “Star Wars” strategic defence initiative in the 1980s.

Many scientists – and astronauts – go further in their admiration, respecting Clarke for his unique combination of scientific knowledge, intellectual originality and literary flair. J. B. S. Haldane, Wernher von Braun, Luis Alvarez, Isaac Asimov and Carl Sagan were all personal friends of Clarke, as well as fans of his writing. As a high-school

“Clarke has a boundless optimism in the power of intelligence”

student in the early 1950s, Sagan decided to become an astronomer after reading *Interplanetary Flight*, Clarke’s first book.

Moore considers the greatest science fiction books to be *Last and First Men* and *Star Maker* by Olaf Stapledon, but “these were Stapledon’s only two great books, which is why on balance I must make him number two to Arthur”. Martin Rees, the UK’s current astronomer royal, agrees: “The geostationary satellite idea – just one of his far-sighted concepts – was ‘rediscovered’ after Sputnik, and soon became reality. But his other concepts still lie far ahead – some, indeed, in a post-human future billions of years hence... Scientists can derive more benefit and stimulus from him than from routine science fact.”

Clarke’s influence on the development of satellites is profound. John Pierce and Harold Rosen, the two engineers principally responsible for the design of communications satellites in the 1960s, regarded him as the “father” of satellite communications on ▶





Arthur C. Clarke's first satellite dish, built at his home in Sri Lanka, was a gift from the government of India

the strength of his technical article "Extraterrestrial relays", published in *Wireless World* in late 1945 while its 27-year-old author was still in the RAF. This acknowledgement has now entered encyclopedias – much to the satisfaction of Clarke, who regards the article as "the most important thing I ever wrote", even above his novels. Though he has never been one to downplay his science fiction, or indeed any of his achievements – witness his annual self-styled "Egogram" newsletter to friends and acquaintances – Clarke is probably right about his "comsat" idea: it will be his most enduring legacy.

He cannot recall exactly how the basic idea came to him, though he says it emerged from a combination of his family's connection with post office engineering, his passion for rockets and his work during the war on ground-controlled radar, later fictionalised in *Glide Path*. "While working on radar I remember thinking: could the beam be powerful enough not just to detect the other guy but also to shoot his plane down? Power-beaming was one of the ingredients in the comsat idea, I'm sure." But deferring to the engineers who made his 1945 concept a reality, he prefers to style himself not as the father of satellite communication but as its godfather. "If I hadn't written that paper in October 1945, 10 people would have done it the next year."

While this may be uncharacteristically modest, it is true that a similar idea had been discussed by others before 1945, and that

Pierce's first paper on the subject was published a decade later without knowledge of Clarke's pioneering proposal.

One irony of all this is that Clarke now depends on comsats, since he can no longer travel far due to the debilitating effects of post-polio syndrome. For years, he has sent video messages via satellite to conferences across the globe – most recently on the 60th anniversary of his 1945 article. Yet as a "failed recluse" addicted to email, he is ambivalent about the benefits of everyone being able to

"He styles himself as godfather to satellite communications"

communicate instantaneously. "It's the fractal future," he says. "Although everybody is ultimately connected to everybody else, the branches of the fractal universe are so many orders of magnitude away from each other that really nobody knows anyone else. We will have no common universe of discourse. You and I can talk together because we know when I mention poets and so on who they are. But in another generation this sort of conversation may be impossible because everyone will have an enormously wide but shallow background of experience that overlaps by only a few per cent."

Prescient though many of his ideas are,

Clarke is aware he is as vulnerable as anyone to what he calls "the perils of prophecy". In his 1945 article he assumed that the three geostationary space satellites required for a global communications service would need a crew, with supplies ferried up by a "regular rocket service". The radar he was in charge of in 1945 contained over 1000 vacuum tubes, at least one of which burned out every day, so it seemed inconceivable to him that any complex piece of electronic equipment could function in space without on-the-spot engineers. "Well, along came the transistor, and then the microchip. So within a decade, electronic equipment that was once as large as a house could be put in a hatbox."

The other major scientific idea that makes him proud is the space elevator – an energy-efficient alternative to rockets, which envisions carbon-fibre ribbons stretching from the Earth's surface to a geostationary orbital station some 36,000 kilometres up. Unlike comsats, Clarke didn't invent the space elevator; it was conceived in 1960 by Russian engineer Yuri Artsutanov (who called it a "heavenly funicular"). It was independently reinvented at least four times by American scientists in the 1960s and 1970s. But it was Clarke who brought it to popular attention with his 1979 novel *The Fountains of Paradise*, in which the elevator rises from the summit of a sacred mountain on an equatorial island remarkably similar to his adopted home. The novel, and his subsequent technical writing on the elevator, helped to spawn a large new field of study. There is now an annual competition to encourage the development of a workable space elevator – the Spaceward Games, organised by the Spaceward Foundation and NASA's Centennial Challenges programme.

It may sound like outlandish fantasy, but in 1945 so did communication satellites and landing on the moon. He doesn't always get it right, however: in 1999 he predicted the last coal mine would close in 2006. Nevertheless, Clarke maintains that the space elevator will be built "50 years after everyone stops laughing" – probably sometime this century. Whenever this fabulous structure is finally constructed, some aspect of it will surely be named after him. Sir Arthur – who already has a geostationary orbit and an asteroid for namesakes – would expect no less. ●

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