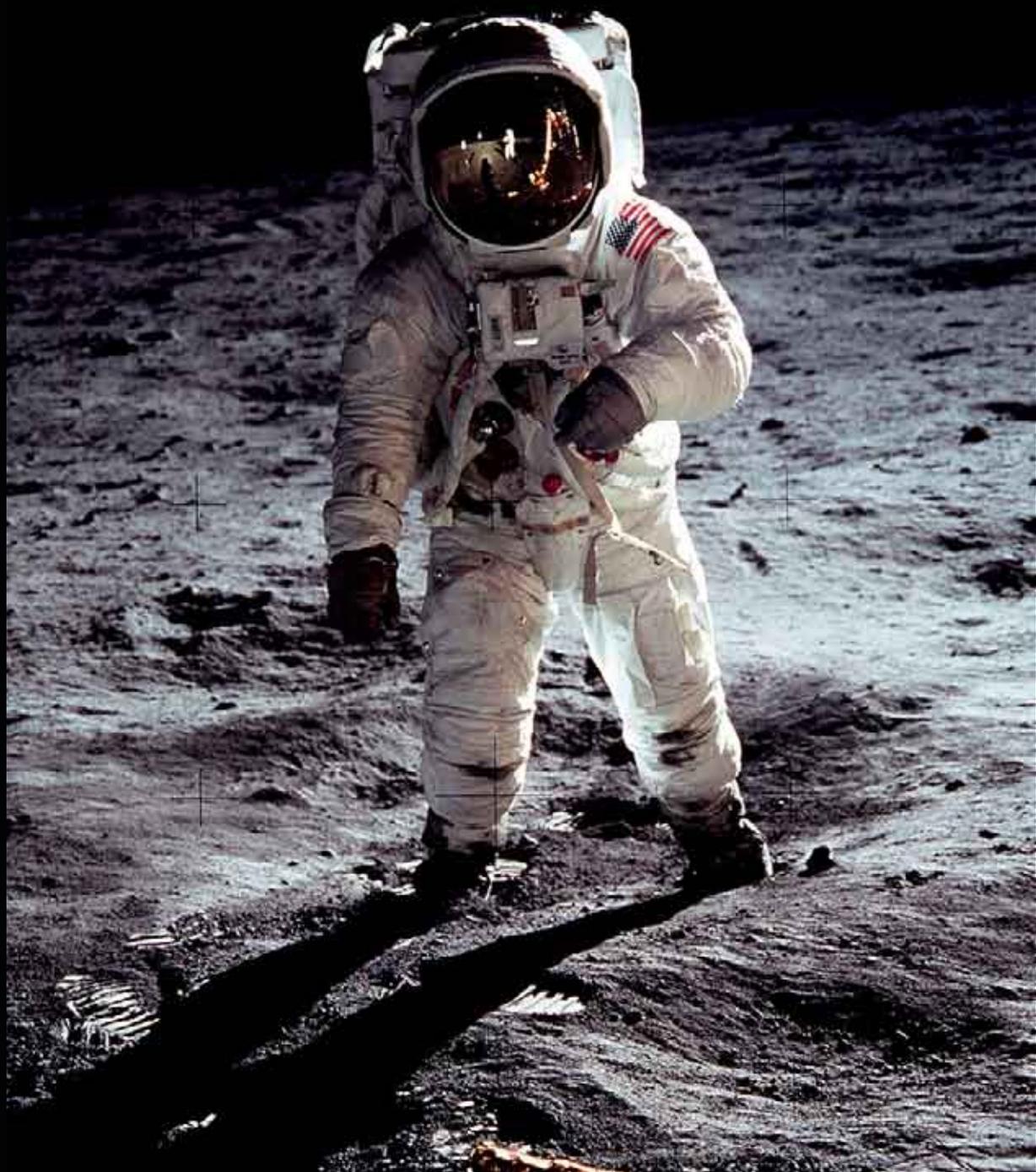


TO INFINITY AND BEYOND

WORDS David Lichtneker

Space. Some call it the final frontier. But what once seemed impossible is now becoming a reality – the universe is being opened up for daytrips and excursions. We speak to former astronaut Buzz Aldrin, who explains why he's such a keen supporter of space tourism and claims that it won't be long before we see human life on Mars.



What does it feel like to go into space and land on the moon? It's the one question former astronaut Buzz Aldrin gets asked the most. It's also a question many more people could soon be able to answer now that commercial exploration of the so-called final frontier is about to open up the universe to tourists.

Aldrin, the second human to set foot on the moon, is now approaching his 80s. But he remains one of the world's foremost figures when it comes to promoting man's further exploration – and eventual habitation – of space. Still highly active and in demand across the globe, he's long been convinced that excursions to celestial hotels will one day become a reality. He also claims that it's not the moon which offers the best hope of establishing permanently manned off-world habitats. Because it would make far more sense to put human life on Mars.

It may sound like someone's seen one episode of *Star Trek* too many, but the first so-called tourists have already been into orbit, paying mindboggling amounts of money for the privilege of visiting the International Space Station. Sir Richard Branson, meanwhile, is about to take things one step further. His somewhat less exclusive Virgin Galactic organization is preparing to send its first fee-paying enthusiasts on sub-orbital space flights within the next two years.

Then there's the not insignificant fact that the Bush administration has charged NASA with sending astronauts back to the moon by 2020. The plan is to eventually set up a semi-permanent lunar outpost, itself a proving ground for more distant Mars missions. It quickly becomes apparent, therefore, that Aldrin – who was 39 when he followed Neil Armstrong onto the lunar surface during that historic Apollo XI mission in 1969 – has remained well ahead of the game.

"We're about to explore further than ever before – to the moon, Mars and beyond," he says. "My mission now is to invite new generations to share the wonders of space and to foster affordable space travel for all. So I'm very supportive of expanding our access to orbital capabilities around the Earth. Towards and around the moon for example; to near Earth objects such as asteroids; and to a likely second habitat for the people on our planet, which right now seems most likely to be Mars."

Humans will undoubtedly return to the moon, states Aldrin, but with the express aim of learning how to support excursions to more habitable otherworldly locations. "The surface of Mars is a far better place to establish a growing permanence than the moon," he continues. "Unless the moon's occupancy can be justified by the commercial return of some products, whether it's oxygen, rocket fuel, fusion materials or building materials that >



Above: Buzz Aldrin and the rest of the Apollo 11 crew set off on their historic journey; and Aldrin as he is today.

Left: The famous photograph of Aldrin standing on the lunar surface, taken by Commander Neil Armstrong.



Top: Richard Branson's Spaceport America, designed by Norman Foster, will operate out of the desert in New Mexico.

Above: Virgin Galactic unveiled designs for its SpaceShipTwo craft early this year. It will be carried by the White Knight Two mothership before being launched into sub-orbital space.

Right: Only 12 astronauts set foot on the moon during the Apollo missions.



> enable a profit-making industry. But there are many stepping stones to negotiate before we get there."

Such is Aldrin's passion for giving other people the opportunity to reach for the stars that he's set up his own non-profit ShareSpace Foundation. "It's dedicated to informing the public about the benefits of past exploration and the promises of future exploration," he explains. "Our aim is facilitate space flight experiences, advance science education and expand human exploration of space." Through the Foundation, Aldrin is also working on launching a SpaceStakes selection process, which will award a non-transferable grand prize of zero-gravity, suborbital and orbital space flights.

But, if all goes to plan, it's Branson's sub-orbital flights which are likely to be first off the launch pad. Operating out of the desert in New Mexico, he's aiming to eventually offer at least one flight per day to the general public. For a fee of around \$200,000, paying passengers receive three days of pre-flight preparation and training, followed by the actual three-hour excursion. This flight, to an altitude of 70 miles (110 kilometers) above sea level, will include around five minutes of weightlessness. Virgin Galactic say passengers will be able to see 1,000 miles in any direction, as well as the curved blue line of the Earth's atmosphere against the black sky of space. The vessel will carry six people and two pilots, with the company expecting to become profitable within the first three years of flying.

Once flights to the very limits of the atmosphere have become established, the next step, according to Aldrin, will be voyages orbiting the Earth and back. "I think we will be busy taking visitors into space for the foreseeable future. This will probably include circumlunar flights – a free return around the moon – which offers significant ultimate adventure excursions. Further progress is unlikely to happen quickly unless some major breakthroughs occur in moving huge payloads of equipment and humans to increased velocities and distances."

Aldrin, who has logged 4,500 hours of flying time, 290 of them in space, has some firm views regarding what needs to be done in order to make long distance space travel viable. And these aren't just opinions. Because not only does he run a rocket design company (Starcraft Boosters, Inc.), but in 1993 he also received a US patent for a permanent space station he designed. So he can speak with a certain amount of authority when he talks about how spacecraft development needs to progress in order to bring about the giant leaps which need to be made.

"We need an international effort to devise a lifting body spacecraft which, when it comes back to Earth, can land on a conventional runway instead of landing with a parachute in >



This shot of Buzz Aldrin's boot print remains one of the most iconic images associated with the Apollo moon landings.



will be in danger from calamities in space," warns Aldrin. "We also have to face up to the realities of diminishing resources. Some of this could be alleviated by space activities that can capture the sun's energy and beam it back in convertible energy to electricity. We could even bring certain materials back from the moon, or asteroids which contain minerals that can quite easily supplant the diminishing resources here on Earth. But any extended human presence on the moon should be justified by strict examination of the economics of supporting human habitation there."

Richard Branson is also mindful of the need to consider what space could offer an Earth in crisis. "It was Stephen Hawking who first got me thinking about this issue," he pointed out during the official presentation of plans for Virgin Galactic's SpaceShipTwo craft. "He was explaining that mankind had no option but to get to space as quickly as possible and start doing things up there that we have been doing on planet Earth, but in a much more efficient manner. Our population is now heading to nine billion people by the middle of this century – that's three times more than when I was born. With the end of the oil era approaching, and climate change progressing faster than most models have been predicting, the utilization of space is essential not only for communications, but also for the logistics of survival through things such as weather satellites, agricultural monitoring, GPS and climate science."

Stephen Hawking. It's a name which often comes up when discussing space and pushing the boundaries of man's capabilities. So it comes as no surprise when he is also referenced by Aldrin in response to a question about funding for the further exploration of the universe. "Hawking recently gave a lecture in Washington which highly recommended ten times the expenditures aimed at colonizing the moon and Mars. That's a very brilliant mind, which looks into the future, and I believe that he has to be acknowledged, not for his own self, or his own remuneration, but for the benefit of mankind."

The first signs that the US is preparing to plough significant funds into further space exploration came when recent reports revealed that NASA is investigating the possibility of landing a crew on the 2000SG344 asteroid. Barely the size of a yacht, the object has the explosive power of 84 Hiroshimas. But a mission to the 1.1 million ton hunk of rock could be a crucial stepping stone to venturing deeper into the solar system with a crewed voyage to Mars. It could also help scientists learn more about how to best defend the Earth against asteroids that veer into our planet's path. So the recent landing of the Phoenix probe on the Martian surface could well be a sign of things to come.

Such fantastical possibilities are light years ahead of Aldrin's history-making mission, a life-changing event which he is only

> the ocean or on some unprepared surface. So we need to replace the Russian Soyuz as soon as possible. With the Shuttle we developed runway landings, which have been taking place now since 1981. It would be a shame not to retain that capability for a smaller, much more modern spacecraft which would be used exclusively for personnel delivery." He adds that such a craft could transport people not only to space stations, but also to galactic hotels, such as the expandable modules being developed by Bigelow Aerospace. These facilities – which have a flexible outer shell – are taken into orbit, where they are then inflated to create more living space. Two prototype habitats – Genesis I and II – have already been launched and their performance is being extensively monitored.

But this determination to make space more accessible isn't only being driven by a fascination for adventure and exploration. There's a growing belief that, one day, it might become a necessity. "We need to start focusing international awareness on the fact that, at some point in the future, the Earth

able to partly recollect. “My memories are kind of spotty,” he admits. “It gets renewed by replaying the films and voice recordings. Looking at the spacecraft and pictures also helps. It’s a great stimulus for the blank, staring memory.” After becoming an instant household name, Aldrin – one of only 12 men to have set foot on the moon – inevitably had to cope with the fame and adulation which followed. Something he wasn’t entirely prepared for. “I didn’t really relish the thought of being highly visible or subject to a loss of privacy. There were also certain expectations from people for us to perform in certain ways. I then had to deal with my own personal recovery from depression and alcoholism at a crucial time in life. However, having maintained a degree of stability, I now really enjoy the continued opportunities that have been afforded to me by being a visible, successful past achiever.”

Aldrin’s heroic endeavors came when space was headline news all over the planet. As enthralling as they were mindblowing, those Apollo missions had people all over the world holding their breath. Both young and old alike were utterly transfixed by what was taking place. Then the fascination faded. “When it began to become more routine not so many people were getting excited,” notes the former astronaut. But we’re now standing on the edge of a new era of exploration, when space is once again the center of attention. “We have opened up the potential of departing the planet and going elsewhere to neighboring objects or creating our own islands in space,” says Aldrin. “I think that holds great attraction, inspiration and motivation for young people and new generations. Exploration is about to reach a new frontier.” **A**

THE HEAT IS ON

Technology has taken incredible quantum leaps since man last set foot on the moon in 1972. But the challenges brought about by our enduring fascination with the cosmos simply demand that innovation keeps pace with imagination.

For example, the construction of any permanent lunar structures will require the use of an array of fantastical equipment and materials, most of which probably hasn’t even been invented yet. The same can be said for future spacecraft design, although NASA has already ordered construction of the Orion – described in 2005 as being “Apollo on steroids.” The craft is designed to take a crew of six to the International Space Station and later a group of four to the moon.

A larger cargo rocket – Ares V – is also being planned. It will be able to lift as much as 150 tons into orbit, including the booster rocket, lander and other hardware needed for a moon

expedition. It means the space shuttle’s days are numbered, with the remaining orbiters (Discovery, Atlantis and Endeavor) due to be retired by the end of 2010.

So what happens now? What lessons learned from the last two decades of space travel can be applied to future exploration? One area where AkzoNobel is qualified to speculate is in the field of fire-protective coatings. The company’s Chartek® range of products is based on technology which was not only used during the Apollo missions, but which has also been employed by the space shuttle program. The Chartek Fireproofing formulation has since been adopted by the oil and gas industries, while AkzoNobel has also introduced a new intumescent (expanding) coating called Interchar®, geared more towards high-rise buildings and public structures.

“Cosmic travel involves severe shifts in extreme temperatures, from the cold of space itself to the intense heat of reentry,” explains Richard Holliday, Business Development Manager for the Chartek product line within the company’s Marine and Protective Coatings business. “So as well as being incredibly lightweight, any coating used on a new spacecraft with similar reuse capabilities such as the shuttle must be able to withstand the thermal shocks of both very low and very high temperatures. Existing fire protection coating technology such as Chartek gets consumed while it’s providing the fire protection; it’s absorbing the energy as well as swelling up and insulating against the heat of the fire. So the challenge for space tourism would be to develop a reusable fire resistant coating. That would certainly be the Holy Grail, a type of coating which you could burn again and again.”

The temperature produced on reentry into the Earth’s atmosphere has been known to reach 5,000° Fahrenheit, more than half the surface temperature of the sun. So heat-shielding will always be needed. But there are also other considerations, such as what coatings might be needed for buildings on the moon. “Any communities, be they in space or on the surface of the moon, would need fire protection in the way that any normal building structures have fire protection,” continues Holliday. “But you start getting into a whole new realm, because other types of coatings would also be worth thinking about. For example, depending on the environment, they could have insulating or heat reflective properties. So there are various applications which would be worth serious investigation.”