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Apollo 11



## Apollo ... the dream that fell to Earth

It is 40 years since the words, 'The Eagle has landed,' sent a thrill around the world. The Apollo moon missions were to herald a new dawn of space exploration, of lunar bases, manned missions to Mars, and more. But in the decades since - and after the Shuttle disasters - America's appetite for interplanetary flight dwindled. The moon landings marked not the beginning, but the end, of our space dreams

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Buzz Aldrin stands on moon, with astronaut Neil Armstrong & lunar module reflected in helmet visor, during historic 1st walk on lunar surface. Photograph: NASA/Time & Life Pictures/Getty Images

It was the most audacious act of exploration ever carried out by a human being. On 21 July, 1969, astronaut Neil Armstrong stepped onto the lunar surface to become the first person in history to set foot on another world. A quarter of a million miles away, in downtown bars, in neighbours' homes, in village halls and in gathering places across the planet, men, women and children watched the world's greatest TV spectacle unfold. Grainy, black-and-white images showed the astronaut clamber outside the Eagle, Apollo 11's lunar lander; drop on to the soil of the Sea of Tranquillity; and tell Earth that he had just taken "one small step for man; one giant leap for mankind."

Those words have become the most widely known botched phrase in modern times. Armstrong - in missing out the indefinite article before "man" - made a tautological mess of his historic pronouncement, an understandable error given what must have been on his mind. Over the following few hours, the astronauts would have to survive on a dead, airless world, collect soil samples, set up suites of instruments, switch them on,

then blast off into space with fellow moonwalker Buzz Aldrin, on their spindly lunar module. If its engine failed to burn for a minimum of seven minutes and 10 seconds, the pair would be marooned in space. Faced with these prospects, who would care about the odd pronoun?

In any case, Armstrong's words still resonate - for they so neatly sum up the hopes of those heady days. After all, in only eight years - the first manned space flight was in 1961 - humans had developed the means to journey from one world to another. We had left our cradle and the universe awaited.

And that is the problem. The universe is still waiting. There has been no great leap. Indeed, the United States, which next month celebrates Apollo 11's 40th anniversary, will soon have no way of putting men and women into space at all. Its replacement for Apollo, the space shuttle, has turned out to be a death-trap that has so far claimed the lives of 14 astronauts, the crews of shuttles Challenger and Columbia, and is to be retired next year. It is unclear whether President Barack Obama, who has shown little enthusiasm for manned space projects so far, will back Nasa's plans for replacement spacecraft.

That is the real significance of next month's moon landing anniversary. The landing marked the end, not the beginning, of our dreams of space exploration. The prospects of creating permanent lunar bases, sending manned missions to Mars and blasting astronauts round the solar system died the moment Armstrong set foot on the moon. America had got there before the Russians and the nation could now forget the place.

"The great tragedy of the effort was that the best of American technology and billions of American dollars were devoted to a project of minuscule benefit to anyone," says historian Gerard DeGroot, of St Andrew's University. "Armstrong's small step did nothing for mankind." Indeed, the quest now "seems as strange as stuffing fraternity brothers into phone booths, swallowing goldfish or listening to the 1910 Fruitgum Company," he states. These are harsh words, but you can see DeGroot's point.

America had been inspired by President Kennedy's wish, announced in 1961, of "achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to Earth." After his assassination in 1963, the idea became a homage to him, a way of showing the world what the United States would have achieved had he lived. Within days of the Apollo 11 astronauts' safe return to Earth, someone put a message on Kennedy's grave: "Mr President, the Eagle has landed." Job done, in other words.

Certainly, the speed with which the US became tired of space flight after Apollo 11 was remarkable. By April 1970, TV coverage of the Apollo 13 mission was cancelled in favour of the Doris Day Show. (It was quickly switched back once the mission went wrong, of course.) The Soviet Union had been beaten and that was all that mattered. Two years later, the axe fell. Apollos 18, 19 and 20 were cancelled and Apollo 17 astronauts Gene Cernan and Jack Schmitt became the last men to walk on the Moon. On 14 December, 1972, after taking several lengthy tours round the Sea of Serenity in the mission's lunar rover when they collected more than 100lb of rocks, they prepared for departure. "We leave as we came and, God willing, as we shall return, with peace and hope for all mankind," announced Cernan. Then he switched off his microphone and turned to Schmitt. "OK, Jack, let's get this mother outta here." Thus humans left the only other world they had ever conquered.

It all seemed so different on 16 July, 1969. More than a million people had gathered

around Cape Canaveral to watch the giant Saturn V carry the Apollo 11 astronauts into space. The Saturn V was the most powerful rocket ever built. At lift-off its five giant engines burned more than 1,000 gallons of fuel a second and made the air vibrate so intensely that spectators could feel their skin shake. Many were overcome by the experience. "At lift-off, I cried for the first time in 20 years, and prayed for the first time in 40," Arthur C Clarke recalled. Walter Cronkite, the urbane CBS anchorman, found himself, for the first time in his professional life, at a loss for words, a condition that was probably exacerbated by the rocket's vibrations which had shaken the roof off his temporary office.

For the next three days, Armstrong, Aldrin and Michael Collins - who would pilot Apollo 11's command module while his two crewmates descended to the lunar surface - guided their craft using sextants, slide-rules and a computer that had less power than a modern mobile phone. On 20 July, Armstrong and Aldrin climbed into the Lunar Module, a "tissue-paper spacecraft" as astronauts labelled the lightweight lander, and the real drama began.

The module, the Eagle, dropped slowly towards the moon as Armstrong fired its descent engines to control its velocity. Then the capsule's yellow master alarm started to flash. For half a minute, as the lander burned precious fuel, the mission seemed doomed. Then the alarm stopped and the Eagle continued to sweep over the moon. With 60 seconds of fuel left, the Eagle had still not touched down as Armstrong, as ever icy-cool, picked his landing spot with care. Finally, he selected his ground and the Eagle settled on a tiny corner of the Sea of Tranquillity with only seconds of fuel left in its tank. "Our eyes met," recalled Aldrin. "I remember just patting him on the back." Oddly, Armstrong has a different memory. "We shook hands," he insisted on BBC TV recently. "Maybe it was both," added Aldrin.

In fact, the landing was so perfectly executed and so gentle that it failed to shake loose the Eagle's external ladder to its full extension. So Armstrong, after he left the craft, had to jump several feet down onto the lunar surface. Thus he neither took a giant leap for mankind nor a small step for himself. His achievement was stunning nevertheless: "the most mind-blowing theatre ever created," according to Apollo astronaut biographer Andrew Smith.

After that, Armstrong and Aldrin spent a couple of hours of the moon, safely blasted their way back to the command module, and headed home in a spacecraft that offered less space, and worse toilet facilities, than a minivan. When the capsule splashed down in the Pacific, the frogman who opened its door was sent reeling by the smell. The job - of hatch-opening after touchdown - became the programme's most dangerous.

Not that Richard Nixon, then US President, cared. The mission was simply the greatest story since the Creation, he announced, while Werner von Braun, former V2 designer for Hitler and creator of those mighty Saturn V rockets, argued that the mission was as important as "the moment in evolution when aquatic life came crawling up on the land". Such inflated claims now look ludicrous. The Apollo programme was a dead end, though it was certainly a stunning technological achievement and a testament to the bravery and skill of Armstrong, Aldrin and Collins.

It was also an extraordinarily expensive project, it should be noted. The entire Apollo programme cost \$24bn in 1960s money - around \$1 trillion in today's - and for several years was swallowing up almost 5 per cent of the US federal budget. In addition, there was also a considerable emotional cost to the missions, a point stressed by Christopher Riley, co-producer of the 2007 documentary *In the Shadow of the Moon*. "A great many

Americans suffered premature heart attacks and strokes from their efforts in making the Apollo project succeed. More than 400,000 workers were employed by private contractors to build capsules, rocket engines, space suits, and computers for Apollo and the vast majority worked flat out, over weekends and holidays, much of the time for free, for several years to make sure the programme succeeded."

For example, at the Grumman factory in New Jersey, where the lunar module was built, staff would clock off at 5pm, leave by the front door, walk round to the back and work for free until midnight. Similarly, employees at the International Latex Corporation - which made the suits worn by the Apollo astronauts - worked with equally obsessive intensity. In a recent documentary, the company's senior seamstress, Eleanor Foraker, recalled working 80-hour weeks without days off or holidays for three continuous years, suffering two nervous breakdowns in the process. "I would leave the plant at five o'clock in the morning and be back by seven. But it was worth it, it really was."

This widespread public commitment has largely been forgotten and is all the more striking given the abruptness with which Americans turned their backs on the Apollo programme once it had achieved its primary goal. So what, in the end, did the US get for all that money and effort? What was achieved?

The list is intriguing but not lengthy. Apollo astronauts flew nine missions to the moon, of which six landed on its surface. A total of 24 astronauts took part in those missions, with three - Jim Lovell, Gene Cernan and John Young - flying twice. A dozen men - of whom nine are still alive - landed, while the remainder flew over its surface. Each of those 12 moonwalkers was American; each flew between the Christmases of 1968 and 1972; and each was either an eldest sibling or an only son. For good measure, three-quarters chose country-and-western tapes to listen to on their voyage.

As for the moon, it was left 118 tonnes heavier from its encounters with America thanks to the crashed robot probes, lander components, TV cameras, and lunar rover vehicles - not to mention the flags, footprints, old food trays and litter - that were dumped there. Even valuable Hasselblad cameras were left behind to save weight and fuel. Untouched by wind or rain or bacteria, these piles of detritus remain as they were left by humans 40 years ago. One day they may even provide alien visitors with valuable clues about the strange species that stayed so briefly on this dead world.

To balance that lunar deposit, there was one major withdrawal: 842lb of rocks brought back to Earth by the Apollo moonwalkers. Most of these remain in a pristine condition and are stored at the lunar sample building at the Johnson Space Centre in Texas in conditions that would do justice to Fort Knox - which is scarcely surprising considering the worth of lunar soil. In 1993, Russia, which had sent back tiny moon rock samples from its robot Luna lander-probes, auctioned three small fragments, that weighed 0.2g in total, for \$442,000. Gold is cheap, by comparison.

These specimens - bits of breccia chipped from boulders and lumps of basalt lifted from the lunar terrain - are kept in elevated vaults to protect them from any flooding that might be triggered by hurricanes or tornadoes and are constantly purged with highly pure nitrogen to protect them from chemical reactions.

Surprisingly, this lunar detritus is still studied by scientists, although most agree that they long ago gave up their greatest secrets. These studies indicate that the moon was created when an errant asteroid struck our planet billions of years ago, hurtling a vast blob of material into space. This solidified to become the moon.

Then there are measurements carried out by scientists based at the McDonald

Observatory in Texas. Almost every day for the past 40 years, they have fired laser pulses at mirror targets on the moon. One of those was left behind by Armstrong and Aldrin and from the reflected laser light received at the observatory astronomers, led by Peter Shelus, have studied the moon's orbit with unprecedented precision. "The moon pulls a body of water round the Earth that forms the ocean tides," says Shelus. "But that mass of water acts on the moon as well, slowing it down and causing the diameter of its orbit to lengthen. Essentially, every year, the moon moves 2½ inches away from the Earth."

Such work is intriguing but does not impress Nasa's growing number of critics, including Professor Amitai Etzioni, of George Washington University. "If you look at 100-year-old maps of the moon in old encyclopedias, you can see they are not that different from the maps we have made after Apollo. We have discovered a lot of very interesting nuggets about the moon but at an enormous cost. It is time to stop. If people want to do this sort of thing in future, they should pay private enterprise to do it, as Richard Branson is doing with his Virgin Galactic spacecraft."

Alternatively, we could spend money on robot craft like the Hubble Space Telescope, or the Galileo and Cassini missions to Jupiter and Saturn, whose costs are a fraction of those of manned missions but which return far more important data, say other critics.

In the end, the real problem for Nasa is that it did the hardest thing first. Kennedy's pledge to fly to the moon within a decade was made when its astronauts had clocked up exactly 20 minutes' experience of manned spaceflight. "We wondered what the heck he was talking about," recalls Nasa flight director Gene Kranz. To get there before the Russians the agency was obliged to design craft that were highly specific to the task. Hence the Saturn V, the Apollo capsule and the lunar module. Unfortunately, these vehicles were fairly useless at anything else in space - such as building a space station - and Nasa, having nearly broken the bank with Apollo, had to start again on budgets that dwindled dramatically as the decades passed.

Now Nasa's manned space programme hangs by a thread. The US is to ground its shuttle fleet because they are now considered so dangerous. New rockets are being designed to be ready for launch around 2016 and are intended to carry men, and this time women, to the moon before heading off to Mars, a programme announced by former president George W Bush several years ago.

But Bush offered no extra money for this programme - known as Constellation - and President Obama has asked for a review of its costs and goals. White House officials, at Senate hearings last week, made reassuring noises about manned space-flight but given the US now has a budget deficit of around \$1.7 trillion, there are not many expecting a thumbs-up.

The conclusion is therefore inescapable. Kennedy's great vision and Armstrong's lunar footsteps killed off deep-space manned missions for 40 years - and probably for many decades to come. As DeGroot says: "Hubris took America to the moon, a barren, soulless place where humans do not belong and cannot flourish. If the voyage has had any positive benefit at all, it has reminded us that everything good resides here on Earth."

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## Myths and moonshine

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The Apollo moon landings have acquired their myths over the decades and key among

these is the claim that the missions never occurred in the first place. The Apollo astronauts only flew into Earth orbit, it is alleged, and those moon scenes of rock-collecting, playing golf and riding lunar rovers were filmed in studios on Earth.

According to one poll, carried out at the time of the 30th Apollo 11 anniversary, 6% of Americans believe Nasa faked the whole business. For evidence, believers point to misplaced shadows (from studio lights), lack of stars in the background of lunar surface shots and claims that the flag planted by Armstrong and Aldrin can be seen flapping, even though the moon is airless.

None of these claims stands up to scrutiny. There are no misplaced shadows, the lunar landings all took place during daytime which explains the lack of stars and there is no sign of a flag flapping. Nor do the allegations make sense. As Charlie Duke, lunar module pilot for Apollo 16, has pointed out, if Nasa faked the first landing, why did it bother to do it another five times?

In 2002, Buzz Aldrin showed exactly what he thought of the claims when he was confronted by film-maker Bart Sibrel who accused him of faking his lunar landing and of being "a thief, liar and coward". Buzz, who was 72 at the time, punched him in the face.

And then there are the other stories, including the glorious urban myth told about Neil Armstrong. As he climbs on his Apollo 11 spaceship to return to Earth, he mutters: "This one's for you, Jablonski." The message is taped and stored by Nasa. Years later, a baffled space historian tries to make sense of it and fails. So he contacts Armstrong. "Ah," says the astronaut, "It's simple, really. I grew up in Ohio. Mr Jablonski lived next door and one night I heard his wife shout, 'Oral sex! You want oral sex! You'll get oral sex on the day that the kid next door walks on the moon!' I just wanted to tell him the good news."

Unfortunately, it, too, is untrue.

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## The 12 men who walked on the moon

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### **Neil Armstrong**

#### **Apollo 11, 1969**

Born in 1930, in Wapakoneta, Ohio, Armstrong was a navy pilot during the Korean war before becoming an astronaut. He has since worked both in business and academia. Since 1994 he has refused to give any autographs after discovering that his signature was being sold for thousands of dollars to collectors. In 2005 he also sued his barber for selling his hair to space fans.

### **Edwin "Buzz" Aldrin**

#### **Apollo 11**

Aldrin also fought in the Korean war as a fighter pilot before becoming an astronaut. After his moon flight, he suffered bouts of severe depression and alcoholism which he chronicled in *Return to Earth* and in his latest memoir *Magnificent Desolation*. Aldrin remains an ardent advocate of manned space flight.

### **Charles "Pete" Conrad**

#### **Apollo 12, 1969**

The third man on the moon, Conrad was a flight instructor for the US navy before becoming an astronaut. He was killed in 1999 after a motorcycle accident in California. He was 69.

**Alan Bean****Apollo 12**

Like Armstrong, Bean claimed Scottish ancestry and even took a piece of the McBean tartan to the moon. Bean quit Nasa to become an artist in Houston. He paints only space scenes.

**Alan Shepard****Apollo 14, 1971**

America's first man in space, in 1961, Shepard made front pages round the world after playing golf on the moon. He was made a rear admiral before retiring, and died in 1998 of leukaemia.

**Edgar Mitchell****Apollo 14**

A former naval pilot, Mitchell conducted private psychic experiments while on the moon and later founded the Institute of Noetic Sciences to conduct experiments into consciousness and other paranormal events.

**David Scott****Apollo 15, 1971**

After his mission, Nasa refused to let Scott fly again after it was discovered he had taken commemorative stamps to the moon which he later sold to dealers. He also made headlines, in 2003, when he became engaged, briefly, to British newsreader Anna Ford.

**James Irwin****Apollo 15**

After his moon flight, Irwin founded the High Flight Foundation, an evangelical organisation in Colorado Springs, and later led expeditions to Turkey's Mount Ararat in search of Noah's ark. He died in 1991, aged 61.

**John Young****Apollo 16, 1972**

Young flew on Gemini, Apollo and space shuttle missions. He was openly critical of Nasa in the wake of the shuttle Challenger disaster but continued to work for the agency. He retired in 2004.

**Charles Duke****Apollo 16**

The youngest of the 12 men who walked on the moon, Duke will be 74 in October. After he returned from his lunar journey, Duke discovered God and became involved in prison ministry.

**Harrison "Jack" Schmitt****Apollo 17, 1972**

The only moonwalker who was never a member of the US armed forces, Schmitt - a geologist - turned to politics after his mission and was elected Republican senator for New Mexico. He was defeated after one term in 1982.

**Eugene Cernan****Apollo 17**

The last man to walk on the moon, Cernan was a naval pilot and then an astronaut, flying on Gemini and Apollo missions. He later started his own consultation company, the Cernan Corporation, and became chairman of Johnson Engineering which handles flight crew systems development for Nasa's Johnson Space Centre.

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