NOT THAT LONG AGO ON A MOON FAR AWAY

Fifty years on from a moment that changed the course of history forever. **David Britten.**

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Late on a sunny Monday afternoon in July I was in the music room at school with the radiogram playing. However, this time we weren't concentrating on the sounds of a set work for upcoming exams emanating from the LP (vinyl) player. We were listening to the radio.

It was difficult to hear the transmission because it was overlaid with static and interference. This was understandable because this was 1969 and the voices were coming from the Moon!

We were hearing Armstrong's dramatic climb down the ladder of the Eagle lunar lander, his comments on the landscape, then his historic words as he stepped onto the surface.

Our evening newspaper, The Auckland Star, had coverage (on 'Moonday') of the landing and preparations for the moon walk but its afternoon deadline was too early for inclusion of the first steps on the lunar surface.

"The growth of our science and education will be enriched by new knowledge of our Universe and environment, by new techniques of learning and mapping and observation, by new tools and computers for industry, medicine, the home as well as the school."

President John F. Kennedy, 12 September 1962

TV couldn't help either. The Satellite Earth Station at Warkworth was still two years away from commissioning, so we all had to wait for screening of late news after videotape of the event was flown from Australia in an RNZAF Canberra bomber.

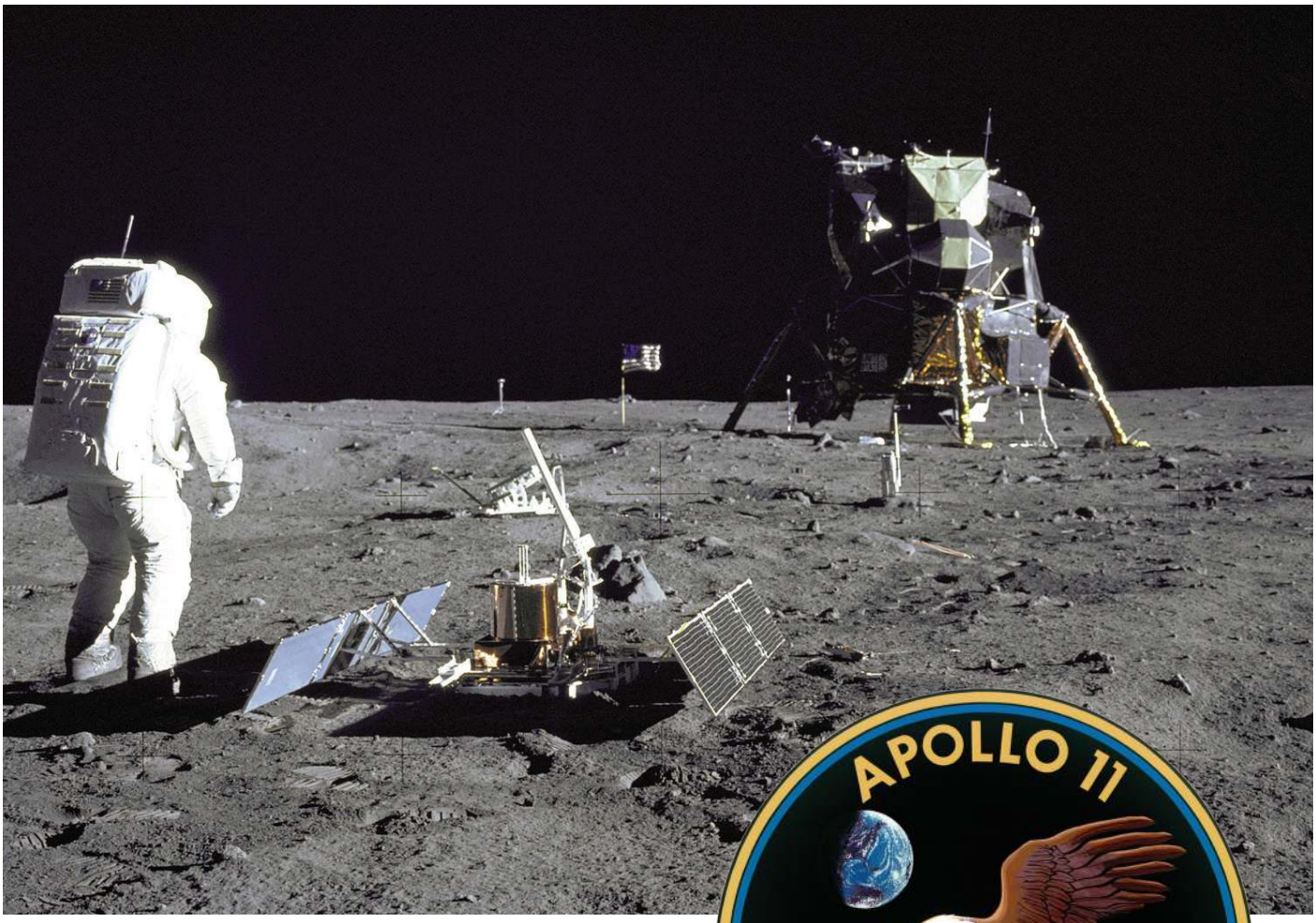
Most people alive today didn't witness this momentous event 50 years ago. Naysayers and conspiracy theorists have come and gone in the intervening years.

What seems to be often forgotten is that this didn't just suddenly happen! The landing was the culmination of a long decade of increasing technology and daring involving hundreds of thousands of workers. It was witnessed by millions around the world.

NASA's single-astronaut Mercury programme learnt how humans dealt with travel into space. The two-man Gemini missions developed the techniques needed for a return journey to the Moon, such as rendezvous and space walks. Finally, it was the Apollo missions with crews of three that allowed for more complicated operations, such as a landing on the lunar surface.

Along the way there were mishaps. Armstrong narrowly escaped death when his training 'flying bedstead' lurched out of control and crashed. Tragically, three astronauts perished in the Apollo 1 launch pad fire.

The 'Space Race' sustained the public relations battle during the height of the Cold War. The secretive Soviets managed to stay a step ahead of the public American programme right up until their failed attempt to pre-empt the US with an unmanned lunar sample return mission ahead of Apollo 11.



ALDRIN LOCATES A DEPLOYMENT SITE FOR THE LASER REFLECTOR AND PASSIVE SEISMOMETER THEN SETS THEM UP 14 AND 19 METRES RESPECTIVELY SOUTH OF THE LUNAR MODULE. CREDIT: NASA/PROJECT APOLLO ARCHIVE

LEGACY

Inspiration

Reaching the Moon and returning safely by 1970 was truly a 'space race', fuelled by the political rivalry of the Cold War between the US and the USSR. President Kennedy set the objective of reaching the Moon in 1961 just 43 days after Yuri Gagarin became the first person launched into space and to orbit Earth.

Nevertheless, achieving that goal inspired generations of those who wanted to be part of such an awesome endeavour – 'conquering' space and exploring our Solar System.

Space exploration, astronomy, science and engineering in general all experienced unprecedented levels of interest and support. "I'm not a rocket scientist" quickly became high praise for those involved.

In the US almost 800 planetariums were opened between the time of Kennedy's speech and the Moon Landing of 1969! Over $1billion in federal funds were allocated to boost education in science and mathematics.

Origins of Moon-Earth

Astronauts Armstrong and Aldrin retrieved 22 kilograms of lunar rock samples. The next five Apollo missions returned a further 360 kilograms of samples from carefully identified locations. The lunar rocks did not match anything on Earth. They showed tiny meteoroid pittings, as well as the ravages over billions of years from cosmic rays and solar radiation in a dry, airless environment with extreme temperatures. Detailed analyses by hundreds of scientists over many years allowed the geological history of the Moon to be pieced together. Most importantly, this led to an understanding of the formation of the Moon following a catastrophic impact of a small planet with Earth during the violent phase of planet formation in the primordial Solar System. More knowledge is still being obtained from those priceless samples as new research technologies are developed.

Distance from Earth

Reflectors left on the surface by Apollo 11, 14 and 15 astronauts have allowed the Earth-Moon distance to be accurately measured with laser pulses sent from observatories on Earth. Among other findings, this ongoing experiment directly confirmed that the Moon is drifting 3.8 centimetres further from Earth each year. That's about the same speed that your fingernails grow!

ASTRONAUT BUZZ ALDRIN DESCENDS THE LADDER TO THE LUNAR SURFACE FOR THE FIRST TIME. CREDIT: NASA/PROJECT APOLLO ARCHIVE

APOLLO 11 ASTRONAUTS AFTER THEIR RETURN TO EARTH IN 1969. FROM THE LEFT ARE NEIL ARMSTRONG, MICHAEL COLLINS AND BUZZ ALDRIN. CREDIT: NASA/ PROJECT APOLLO ARCHIVE

Lunar Litter

Each Apollo descent stage stayed in place and the ascent stages were de-orbited to crash back on the surface after transferring the astronauts and their precious lunar rock cargo onto the waiting Command Module. Souvenirs, including plaques, patches, flags, medals, cameras, golf balls, a feather, portrait, bible and a photograph were left on the surface.

To allow the heavy rock samples to be lifted up to lunar orbit, the three lunar rovers, a wide assortment of miscellaneous equipment, tools, clothing etc and a large number of artefacts, large and small, were left behind on the surface. In addition, there are all the experiments. These include the three laser reflectors, six seismometers, gravimeters and magnetometers.

Perhaps the first items any future astronauts returning to the six landing sites might retrieve are the faecal and urine bags. The 'Defecation Collection Devices' left by each landing party had a germicidal liquid pouch that was ruptured inside the containment bag to sterilise the contents.

Apollo 12 astronauts returned with the camera recovered from nearby Surveyor 3 lander. It was found to still have viable bacteria after nearly three years exposed to the extremely hostile environment of the Moon's surface. So some microbes may have yet survived in the waste left by the astronauts. Even the wet wipes left behind may retain viable microbial and DNA material for future scientists to study.

Human Space Exploration

The decade of the 1960s engendered utopian dreams of lunar colonies with mining, industry, tourism and science. Stanley Kubrick's haunting depiction of Arthur C. Clarke's vision of space discoveries in 2001 set a benchmark for future expectations.

Soon after Apollo 11, most people would have thought this article would be about how the conquering of the Moon led to the success of colonies on Mars. We would be well on our way to the moons of Jupiter and beyond!

But no one has set foot on the Moon since the last lunar visit of Apollo 17 in 1972. No proposal for returning a people to the Moon has yet reached the planning stages.

However, over the intervening 47 years there have been about three dozen robotic missions to the Moon from six space agencies. Five are still operational. Of course, unmanned missions also explored most of the rest of the Solar System in that period.

Unmanned prospects for the Moon are rosy. Two dozen robotic missions from a dozen space agencies, universities or companies are under development, with launches planned from late 2018 through to the mid-2020s.

However, the earliest, and only active, crewed mission is a manned test in 2023 of NASA's Orion spacecraft in lunar orbit. Proposed crewed missions from Russia, Japan and China from 2028 to 2036 are as yet not confirmed.

CONCLUSION

Someone had to be first to step onto the Moon. I'm glad they were people who took a global view, celebrating the achievement on behalf of all mankind. I'm glad they were brave, honest, highly skilled and humbled by what they experienced.

New Zealand is now a fledgling space nation. At the time of writing, Rocket Lab has sent two missions into orbit, with plans for regular commercial launches in the near future.

We also have a Space Agency, under the aegis of the Ministry of Business, Innovation & Employment (MBIE). In 2019, up to four students with scholarships awarded by MBIE will be fulfilling internships with NASA in a joint programme at NASA Ames Research Center in California, working with a mentor on a NASA research mission or project.

I hope that all future visitors to the Moon are as honourable and curious as the first.

ALDRIN PLANTS HIS BOOT IN THE SOIL FOR THE BOOT PENETRATION (SOIL MECHANICS) TASK AND RECORDS THE RESULT A FEW METRES IN FRONT OF THE LUNAR MODULE. CREDIT: NASA/PROJECT APOLLO ARCHIVE