SETP FOUNDATION ORAL HISTORY PROGRAM

OH-2

Buzz Aldrin, Ph.D., (Colonel, USAF, Retired)
NASA Astronaut

September 27, 2003

Dana Marcotte Kilanowski,
Interviewer

INTRODUCTION

The following is an interview with world renowned NASA astronaut, Buzz Aldrin, Ph.D., (Colonel, USAF, Retired), for the Society of Experimental Test Pilots Foundation's Oral History Program, made possible through the generous support of the Northrop Grumman Corporation and individual donors, for the Society of Experimental Test Pilots Foundation, Lancaster, California. In this interview Buzz Aldrin will discuss his experiences as a young boy learning to fly airplanes, his education, Air Force career, selection as a NASA astronaut and his Apollo 11 mission to the moon, becoming the second man to walk on the moon.

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BIOGRAPHY

World renowned NASA astronaut, Buzz Aldrin, Ph.D., (Colonel, USAF Retired), is best known as the second man to walk on the moon, during NASA's Apollo 11 Mission to the Moon, author of nine best selling books for both children and adults on space exploration and an advocate for manned missions to Mars and the manned exploration of space.

Born on January 20, 1930, in Montclair, New Jersey, Colonel Aldrin graduated from the U. S. Military Academy at West Point and joined the Air Force where he flew F-86 Sabre Jets in 66 combat mission in Korea, shot down two MIG-15s, and was decorated with the Distinguished Flying Cross. He earned his Doctorate of Science in Astronautics at MIT and wrote his thesis on Manned Orbital Rendezvous.

Selected by NASA in 1963 into the third group of astronauts, Aldrin was the first with a doctorate and became known as "Dr. Rendezvous." The docking and rendezvous techniques he devised for spacecraft in Earth and lunar orbit became critical to the success of the Gemini and Apollo programs and are still used today. He also pioneered underwater training techniques, as a substitute for zero gravity flights, to simulate spacewalking. In 1966 on the Gemini 12 orbital mission, Aldrin performed the world's first successful spacewalk, setting a new extra-vehicular activity (EVA) record of 5 ½ hours.

On July 20, 1969, Aldrin followed Neil Armstrong onto the lunar surface, completing a 2-hour and 15 minute lunar EVA, becoming the second man to ever walk on the moon. In July 1971, Aldrin resigned from NASA and was assigned as the Commandant of the U. S. Air Force Test Pilot School at Edwards AFB, California. In March 1972, Aldrin retired from the U.S. Air Force after 21 years of active duty. Aldrin has logged 289 hours and 53 minutes in space, of which, 7 hours and 52 minutes were spent in EVA.

Aldrin has been honored with the Presidential Medal for Freedom in 1969, the Robert J. Collier Trophy, the Robert H. Goddard Memorial Trophy, and the Harmon International Trophy in 1967 and the Congressional Gold Medal in 2011. Recently, Buzz Aldrin founded the ShareSpace Foundation, a nonprofit devoted to addressing science literacy for children by igniting their passion for science, technology, engineering, arts and math (STEAM) through delivering hands-on STEAM activities and messages, to inspire younger generations of future space explorers and innovators.

INTERVIEW

Kilanowski: This is Dana Marcotte Kilanowski for the Society of Experimental Test Pilots Oral History Program. This interview is being held during SETP's 100th Celebration of Flight Symposium at the Westin Bonaventure Hotel in Los Angeles. It is Saturday, September 27th, 2003. This is an interview with Apollo Astronaut Buzz Aldrin, and this is the Space Section of the Symposium.

Could you please give me your full name and where you were born and your birth date?

Aldrin: My full legal name is Buzz Aldrin. I was born in Montclair, New Jersey, had my name legally changed about twenty years ago.

Kilanowski: Can you tell me why you chose to receive your science doctorate from MIT in guidance for manned orbital rendezvous?

Aldrin: Well, I was a graduate of pilot training at the time of the Korean War, and I served a tour of combat in Korea. Then I was at the Air Force Academy for a short while, and then I flew F-100s, and about that time I decided maybe I needed a bit more education.

My father had received a doctor's degree from MIT way back in the early twenties, and he was a very early pioneer and he had a lot of contacts there. The Air Force at that time did have a good program in astronautics that I found out about, so I applied for that program. I got to MIT in 1959. I had a bad case of hepatitis coming back from Europe, but I overcame that and then did fairly well in my first year, so I extended my program for a doctor degree.

Looking over the various subjects that I could possibly investigate that could be useful to an Air Force career in ten or fifteen years, I settled on "Rendezvous in Space" from a manual or pilot control standpoint. This was in 1960 and '61, and we didn't know much about rendezvous, but I could see that that was going to be an essential thing, and it was really a very pioneering opportunity to take a little bit from what different people had been doing and apply it to the end of the Mercury, the beginning of the Gemini Program. And to do over again, I just couldn't imagine making a wiser choice, because that provided me the knowledge and the expertise that evidently made my application, not for the second group, because I hadn't been through test pilot training, but for the third group of astronauts when that was no longer a requirement. So I had a very good background and was selected as part of the third group of astronauts.

Kilanowski: It was extremely farsighted of you to choose that as a major. How were you selected for the astronaut corps in October of 1963?

Aldrin: Well, the Air Force had already had my application in for the astronaut program the previous year, and so had NASA. So when I reapplied again, it was a question of

sorting out the records and the background and then going for a physical exam in San Antonio, interviews and then reporting to Houston.

I participated in an Air Force study of what the future of the Air Force should be in the Gemini Program just before it was announced that I was selected. So I actually was already in Houston working on Air Force experiments for Gemini when I was selected in October of 1963. We started our training in January 1964.

Kilanowski: How rigorous was the training?

Aldrin: Well, after MIT, I can't say that it was really rigorous. It was refreshing. We had a lot of exposure to geology, which was totally new for me, to learn about the rock strata and the volcanic formations and the names of different rock formations. The computer studies and mission analysis was very enlightening. To get a very broad exposure, I could see that it was appropriate with my background to ask for a specialty, an astronaut specialty in mission planning, because as we began to lay out the parts of the Gemini Program, I could see where they could contribute in certain ways to Apollo in '64 and '65.

Then I was waiting for assignment as a crew member, which finally came around in 1966, with Jim Lovell, to back up the Gemini 10 mission. Unfortunately, that would have put us in position to fly three flights later, because they'd had crews for 11 and 12, but there wasn't any 13. So it looked like I was destined not to fly in that Gemini Program.

A very tragic accident took the lives of the primary crew for Gemini 9, Elliot See and Charlie Bassett, so the backup crew took over that mission, and then we became the backup crew for Gemini 9 that had the Astronaut Maneuvering Unit on it. And upon the successful completion of that flight with Tom Stafford and Gene Cernan, why, Jim Lovell and I were put onto Gemini 12, and we began training for spacewalks.

It turned out that I was given the opportunity to be the first astronaut to train underwater in neutral buoyancy for spacewalks. I could see the great benefit of this because I had been a scuba diver for a good number of years before getting into the astronaut program. So foot restraints and neutral buoyancy really gave us the evolutionary tools eventually to overcome some of the difficulties that we'd previously had in spacewalking because of getting overexerted and not being able to control where we were positioned so that you could perform the work adequately.

Gemini 12 was the last mission in that two-man spacecraft. We did several different rendezvous, several different EVAs. I had a total of five and a half hours of successful spacewalking. We did a gravity gradient experiment where I had hooked to the Agena a tether so that when we undocked from the spacecraft, we were over a 100-foot tether connecting the two, and we oscillated around for a while but finally settled in after an orbit or two to a demonstrated gravity gradient. We then did some more rendezvous and

observed an eclipse that was happening over Africa. A number of very exciting different experiments were accomplished on that mission.

That was a real fighter pilot's, real test pilot's type of a program, because each mission, about every two or three months in the Gemini Program, was advancing our knowledge in preparation for Apollo. There were really four major objectives in the Gemini Program. First was long duration of ten to fourteen days. Then we needed to demonstrate rendezvous in space. We started doing that in Gemini 6 and several other rendezvous. So we really ended up knowing how to do rendezvous really well. Then we had to demonstrate the ability to do spacewalks, and we finally were able to do that. And the fourth demonstration in the Gemini Program was computer-controlled reentry guidance to landing. All those gave us the working tools to confidently move into the Apollo Program.

Kilanowski: I think you had the record for EVA at five and a half hours.

Aldrin: Mm-hmm.

Kilanowski: The technological hurdles that you had to solve before you could successfully do that, I'm sure were daunting.

Aldrin: Well, they were pretty much common sense. You had to anchor your feet so that you wouldn't move as you used your hands to do things. You could anchor yourself with waist tethers, but they weren't quite as successful. We started out with just inadequate attention to the foot connections. We tried to use Velcro, then we tried to use little hoops to put your feet in, but they would slide out. Then we canted those so that you could put your feet in and sort of act like you're squeezing—you're riding a horse, where you put your heels down, but that didn't seem to work either. So we finally had a slipper where you could put your shoe in and then turn it and there was just no way you were going to come out. One foot in the foot restraint would let you just move all around with just one foot anchored very securely.

So it was a question of going through a learning process. We looked at several different maneuvering units. Handheld maneuvering units were a little imprecise and they were not quite as useful as we felt a backpack maneuvering unit would be. We were intending to fly that twice, on Gemini 9 and 12, but the spacewalk was not successful on Gemini 9, and then because of inadequate progress, why, before we even took off on Gemini 12, my first regret in the Space Program was to allow NASA to cancel the Air Force backpack maneuvering unit, because I felt that for sure I could demonstrate step by step successfully how to don that backpack unit, deploy it, maneuver around, and then jettison it and get back in the spacecraft.

Kilanowski: We talked to Gene Cernan this morning. Trying to get back into the spacecraft was really a chore. Did you experience the same types of problems that he did?

Aldrin: Well, the taller you are, the more problems you had getting your feet down underneath the instrument panel and then to sort of use your knees to wedge yourself down so that you could close the hatch. Now, Ed White was the first one to discover that problem, and he was a pretty tall guy. So the next flights, we used a ratchet where you could get the hatch partly closed and then you could crank it closed. I forget exactly how the levers worked, but they were quite effective.

Kilanowski: When you started your egress from the spacecraft, when you had your first EVA, what was that like? What were you thinking? What was that experience like?

Aldrin: The first EVA was really a prolonged standup EVA, taking pictures forward as Jim Lovell would maneuver the spacecraft at night during the night pass. We had an ultraviolet camera, so for two successive night passes, the primary purpose was to take these ultraviolet pictures. So that gave me the freedom during the intervening day pass to sort of wander around and make myself comfortable.

We deployed a bar that connected from the Gemini spacecraft up to the Agena that we were attached to, so that then after I closed the hatch and got back in on that EVA, the next EVA we opened the hatch—this was a day later—and then I went hand over hand up to the front of the Gemini spacecraft where the Agena was. There were several different experiments that were deployed on the Agena, and eventually on the way back, I connected the tether from the Agena to the docking bar of the Gemini spacecraft. Then went to the back of the spacecraft where there were, again, instead of the maneuvering unit, there were the foot restraints and a lot of different part-time tasks, small tasks to be performed one after another.

Between each of the series of tasks, I would have a little rest period, so I would sort of look around and see where the Earth was. One time it would be down here, and I thought, "Well, that's kind of peculiar," because to me this is up and the Earth's down here. But Lovell was sitting in a different direction, and to him the Earth is in a different position because we were going around the Earth this way inertially. Then maybe ten or fifteen minutes later, I had to have another rest period, so I'd lean back and look to see where the Earth was. It wasn't there. It was up here somewhere. And it was intriguing but not disturbing.

After a number of experiences of orientation change, I have eventually concluded that the visual and orientation psychology is what causes space adaptation syndrome or nausea. It's the conflict that arises. And there are differences between individuals. In my theory, some people have a coordinate frame within themselves, making it an egocentric coordinate frame. Other people have an exocentric, outside. The people with the exocentric orientation tendency have a wonderful sense of direction here down on the surface of the Earth. The egocentric people like myself, we get lost. We turn a couple of corners and we forget, and thus we memorize things. But it turns out when you go into space, the person who's egocentric, that has to memorize, has a lousy sense of direction, doesn't end up with a conflict in space the way that the exocentric. If you can understand that, why, I think we need to move in those directions instead of looking at the inner ear

as being a problem for space sickness or the fluid balance because of the blood not draining down to your feet, it tends to reside more in the center of your body or up here. But that doesn't seem to be the problem. To me, it's visual and psychological. And using drugs is just not the correct way to deal with that, in my estimation. You can train people to be able to adapt to it. Most people, when they're exposed to zero gravity, after two or three days they adapt to it and they don't have any discomfort afterward. That indicates to me that if you expose them to the right kind of experiences before flight, you can train those experiences out of the individual so he won't have sensory conflicts.
And we might have some of the nausea experiences that the Soviets have had, and, of course, we did, not in the first mission, but in Apollo 7, but in Apollo 8 en route to the moon, the crew members got sick.

Kilanowski: I'd like to talk now about your Apollo 11 mission. That was July 16th through the 24th, 1969. Can you describe that mission beginning with suiting up and—

Aldrin: Not in ten or fifteen minutes. [laughter]

Kilanowski: No, no, I understand. But if you can hit the highlights of that mission.

Aldrin: All three of us, Mike Collins, Neil Armstrong, and myself, had had a previous flight in the Gemini Program and we were associated with the Apollo 8 mission. Neil and I were backing up two members of that flight. Neil was backing up Frank Borman and I was backing up Jim Lovell. So we had a fair amount of experience in the fact that this mission was going to be going to the moon and the orbits were going to be very similar, but we were going to do surface activities, and that took a significant additional burden of training, even though it was a pretty short surface EVA that was anticipated.

There were a number of other things which put an unusual burden on the commander as far as his training went, and I think that's why it appeared as though there might be some reason to continue to do what we had done in previous spacewalks, and that is that the commander stayed inside and the other junior person did the spacewalk. So there were reasons why a majority of the surface activities might be relegated to the junior member of the crew to be the first person out. There were, obviously, other more symbolic reasons for the decision to go the other way. And I think, in retrospect, it was a very, very wise decision. Otherwise, it would just have been inappropriate for the commander of the mission to have stayed inside for thirty minutes while the junior person went out and did all the sensational first steps on the moon. That would not have been very appropriate.

So I think the pre-flight decisions were wise in many respects. We also decided that the first moments after touchdown on the moon, we would concentrate on being ready to depart if there was something wrong. There are several discrete times in the first minute or two or three minutes after you touch down when if something's wrong, if something is leaking, you can lift off and still rendezvous and catch up to the other spacecraft before it gets too far around the moon. So we could still catch Mike Collins if we needed t

So the first couple of minutes after the rather nail-biting—if you could bite your nails through the gloves—final approach where Neil took over and moved us over the rocks and the craters to a smoother spot, why, we landed long and with only about fifteen seconds of fuel when we finally touched down. But then shortly after we touched down, we made that rather famous transmission, Neil did, "Houston, Tranquility Base, the Eagle has landed." I thought that that was interrupting these very intense couple of minutes watching things to see if we had to leave.

Once it looked like it was okay to stay on the surface, we also instituted another procedure that I thought was very useful, and that is since it had been four or five days since we had gone through the specific training for lifting off from the surface of the moon and thinking about the subsequent rendezvous, that it would be a good idea those first two hours as Mike Collins was coming around the moon again, to act as if we were going to abort and actually lift off at the end of that two hours. So we went through the normal procedure of countdown, and, of course, when we got down to the liftoff, we didn't engage the computer, didn't lift off. We then proceeded to get ready to do the surface.

But I mention this because each crew has their own way of wanting to do things, and for good reasons, we thought that was a very good thing to do. But, you know, each crew doesn't always want to do what the previous crew did, and it concerned me a little bit, but it's their business that later crews decided it wasn't necessary to go through that routine of waiting, preparing for the first opportunity to lift off after two hours.

We adjusted the flight plan because we knew we were not going to be interested in sleeping after we touched down, so we proceeded to leisurely get ready through the procedures to depressurize, get the suits in the right position to be able to open the hatch. So we depressurized the cabin, and then we had our first moment of concern because we couldn't open the hatch. The pressure had to get absolutely zero. If it was just a little bit above and the gauge was still reading zero, you couldn't move the hatch open because the pressure was on the inside. Finally it gave way, and then Neil moved out and collected his contingency sample, and I had the camera in the right window taking pictures at one frame a second while he was doing that.

Then I sent down a camera down the clothesline that was on a pulley that we later used to bring up the rock boxes. When you're down on the surface and you have to get back up again, it's a big jump to that first step, and you don't want to have a rock box under your arm when you're trying to do that. So you have to bring other things back up into the cabin in rather rudimentary simplified methods, and having a pulley and running the box down, or the camera down, and later bringing the rock boxes up was the way we handled that.

I think most everyone knows that we were rather rushed as we moved around taking pictures of the lunar module, setting up the TV camera, taking panorama pictures, deploying several different experiments, a solar wind collector experiment, a Swiss experiment, facing toward the sun to pick up the particles coming from the sun in just

about two hours. There wasn't enough particles, according to the Swiss, that this experiment picked up.

Then we had a laser reflector that Neil deployed that was pointed back toward the Earth so that laser beams from the Earth could bounce off these reflectors back to the Earth again with a changed frequency, indicating a motion between the Earth and the moon. And it's surprising how those measurements eventually over a period of time can be used to ascertain that one continent on the Earth is slowly drifting away from another continent. It's fantastic, the range rate, or the change of frequency, how powerful that is to give you indications. Of course, that same powerful tracking is what enables the Deep Space Network to track another spacecraft many, many miles away. It's not tracking an angle or angle rate or range; it's tracking range rate. This goes into the computer and it's smoothed and everything, and that's what gives us our wonderful accuracy in determining spacecraft as they're going to other planets.

There's another experiment that we deployed, a seismometer that had solar panels so that the sun would rise up, shine on one, and then go over on the other one during the fourteen days of daylight, and it would detect impacts on the moon, any volcanoes. There weren't any volcanoes, but they were able to detect the impact of later spacecraft that were on later missions. But it was so sensitive that they could actually hear us prancing around. One of the things that I wanted to do before the end of the lunar surface EVA in front of the TV camera was to just prance around, turning corners and hopping in different ways to give a good demonstration to people as to how good the mobility really was on the surface.

Then before we realized that we were running out of time and had to get back in again, we got back in the spacecraft and took us a while to get things sorted out, have a quick meal, and we had to depressurize again to throw things overboard, because we had a fairly heavy spacecraft. It was an early LEM-5. It was an early spacecraft, and it wasn't as lightweight as some of the later ones were. So we had to toss everything that was nonessential overboard. So that meant that the cabin was depressurized twice, or re-pressurized again twice, and, of course, that lets high-pressure oxygen go to low pressure and it cools off. So by the time the second pressurization was over, it was pretty chilly in there, and the sun was behind us, and we had a lot of trouble trying to sleep because it was just a little too cold in there.

There weren't any hammocks or beds, so I curled up on the floor and Neil kind of sat back on the ascent engine cover and leaned back. He said later that he was bothered because the telescope that was up here was pointed up and back toward the Earth, and he could see the Earthshine through the telescope, and it was bothering him while he was trying to sleep. But I guess we dozed maybe for a couple hours during the planned six-hour period, and we got up in plenty of time to start getting ready.

But before we went down to sleep, there was one thing that I looked down on the floor and there was a lot of dust that we brought back in, but along the side on the right, there was a something that wasn't supposed to be there. It was a broken-off circuit breaker, the

end of a circuit breaker. And, of course, in spacecraft in space, just like airplanes, we disarm a lot of circuit breakers by pulling them out so that the circuit doesn't have power to it so that the switch, if it's thrown inadvertently, won't cause something to happen. So I picked up the broken circuit breaker, wondering which circuit it was, and I looked up to see which was broken, and it was the engine arm circuit breaker, which is the one that has to be in to get power to the engine to lift off to be able to do the rendezvous.

So while we were sleeping, the people back in Houston were learning more than they ever thought they could possibly learn about the different wiring circuits to how to backup the situation the next day when we got up ready to leave, if, when I pushed in the circuit breaker, it wouldn't stay in. I could envision maybe it being like the little Dutch boy, having to hold my finger in the circuit breaker. But it turned out I pushed it in with an instrument that wasn't conducting, and the circuit breaker stayed in. But we put that about two or three hours earlier than the normal time.

So we lifted off when the right time came, and I forgot to turn on the camera until we were on our way up, so we didn't get to see the exact moment of liftoff on the camera, but Neil could see the flag, it was blown over by the liftoff exhaust, and when we discussed this afterward, we decided we didn't need to tell people that the flag had blown over on the first landing that touched down. Some of the film that you can see from later missions that I use in my presentation show on another mission the moment of liftoff, and you see the flag out there, and it just really whips back and forth and then it goes out of sight. So I'm not sure whether that one blew over or not. But clearly, we had to snap the flag into position when we were out there, and then it didn't come out, so we ruffled the flag around, and even though we were in a hurry, from everything I've seen, Apollo 11, clearly, of the six flags on the moon, had the best-looking flag. No one will dispute that.

Kilanowski: I wanted to go back to when Neil and you first stepped onto the moon. When did he decide the words that he was going to say as he took his first step?

Aldrin: That was his task to do. He didn't have any help from NASA. They clearly wanted to avoid putting words in anybody's mouth. It was his task and not mine. So we left that up to him, Mike Collins and I did. We sort of jokingly asked him, or Mike did when we were going to the moon, "Have you thought about what you're going to say?"

And Neil said no, and I thought that was just a bunch of malarkey. Of course he's thought about it. But then now knowing Neil a little bit better, I think maybe he might have been right, that he might have thought those things up at pretty much the last minute after we successfully touched down. For many years I thought that he had perhaps consulted the same person that advised the Apollo 8 crew to read from Genesis. That would have been a logical thing. A lot of people have asked me what would I have done had I been given that task, and my answer would be I would seek advice, because, you know, I'm not that great a speechmaker, and presidents and heads of corporations don't write their own speeches. Other people do that for them. Why would you want something as historic as that to be something that you conjure up at that last minute,

unless you are one of those very talented phrase manufacturers? And I think Neil did a very good job. But to get the exact details, you've got to ask him.

Kilanowski: When you stepped on the ladder, can you describe that to me and what you were feeling, and did you say anything?

Aldrin: Well, it was sort of anticlimactic. Neil had already been out there, he picked up some of the—he helped to guide me out. I do remember being told that when we went outside that we didn't want to leave the hatch door completely open, for some temperature reason. So in response to that, I conjured up what I thought was a little light moment by saying I'm going to reach back and partially close that hatch, being careful not to lock it on my way out. I've given that a lot of thought since then, because if we did have a leak and it caused that hatch to slam shut, the problems that we had earlier would have really been bad if we'd had a leak in pressure holding that hatch shut, and here the two of us are out there on the surface at the top of the ladder trying to knock a hole in the door to get in again. That would have been very, very embarrassing.

Backing down the ladder was not particularly difficult. The bottom rung was a good ways from the footpad, a testimony to a very smooth landing, because if it was a hard landing, it would have compressed the strut and it would have been closer to the ground. So it was our procedure to jump back up again to find out how difficult that was, and it took a pretty big jump. So if you look at pictures that I have on the moon, you see that there are a little dust on part of my leg where I didn't make that first step when I did the practice one, but then I did it again and with a much higher jump force and was able to get on up there.

Kilanowski: I just read in *The L.A. Times* the other day—go ahead.

Aldrin: You asked about—it wasn't my task to say anything particularly notable, but after a few minutes on the surface, it just occurred to me to put together some words that were going through my mind, and that's when I said, "Magnificent desolation," contrasting the magnificent of the achievement that the two of us had just accomplished by being there, but just the utter desolation of this void surface with the horizon curved away. You could see rocks and just small little craters, absolutely no life, still as could be, the black velvet sky. The sun was out, so we couldn't see anything stars. It was just the most totally lifeless place that you could ever imagine.

Kilanowski: When you looked up at the Earth, that was certainly a contrast.

Aldrin: Well, we had seen the Earth from orbit, and from the surface it's not going to look any different except it's going to be at one fixed place and it's going to be pretty close to straight up, because we were only about 24 degrees off of vertical. So it took a pretty good leaning back to be able to look up and see the Earth, and being that high, objects always appear kind of smaller than when they're close to the horizon. And even though the Earth seen from the moon is four times bigger in diameter than the moon is from the Earth, it still looks very small, a long ways away, and you can't really see too

much, except the wispy clouds covering up some brown spots. If the Earth's in a certain position, you can begin to identify a continent, but it's a total journalistic faux pas, error, to ever say that you could see the Great Wall of China from the moon. Absolutely not. Maybe from 160 miles in orbit, if you have excellent eyes like Gordon Cooper did, maybe you could see the Great Wall of China, but it's a meandering, it's an irregular line. That's one of those journalistic mistakes that get propagated.

Kilanowski: Everyone mentions the blackness of space. It's blackest black. What did you think?

Aldrin: Well, I had seen many night passes of about forty-five minutes apiece during the Gemini Program, and whether it's daylight or darkness, during the daylight, the sky is bright to your eyes because of the intensity of the sun shining on the Earth below you and parts of the spacecraft and even on your suit. So the pupils of your eyes are going to close down because of all this brightness, so you won't be able to see little specks of stars' light at all, but instead you begin to see a velvety sheen to the sky. It's not dark black the way it is at night.

Now, in a night pass, on the night side of the Earth, the sky and the stars are not that much different from a clear, very clear night down here. There is a certain amount of interference in the visor that we have that cuts down on some of the transmitted light, but I wouldn't say that any of the moonless night passes were any more brilliant, filled with stars than nights I've seen here on Earth. Maybe that's just the relative situation.

Kilanowski: Reflecting upon Apollo 11, what do you think the greatest moment of that flight was for you?

Aldrin: The greatest moment was what had never been done before in all of history, and that is to get in a spacecraft and take that spacecraft and actually rest it on another object in space. So clearly the touchdown was the moment of greatest anticipation and the moment of greatest satisfaction and relief, and for two non-too-talkative guys, I looked over and patted Neil on the shoulder, we looked at each other, smiled, and then went about what we were doing. But if there's any moment that I would want to try and remember that was not photographed, it's that second or two after touchdown and we shut the switches off and we looked at each other and smiled, and without saying anything, we acknowledged so much of an achievement that we were sharing in.

When we came back and saw the television of the reaction of the Earth to the successful landing, and the cheering, I felt compelled to say to Neil and Mike, "Look, we missed the whole thing," because the joy, the exuberance of success was shared by people back on Earth and we were not able to really relax and unwind and share in that moment along with other people around us. Everybody else had the joy of the cheering and, for some, the cigar-smoking and whatever, but we missed that opportunity.

Kilanowski: I'd like to ask you how that flight changed your life.

Aldrin: When a person is propelled into a situation where a large number of people know what that people has done, he becomes sort of a celebrity, and sometimes it's because of doing something unusual. When that something is of a growing historical significance, it affects people who then approach you. Then that's a challenge of response from me to those people, and that impact, which is lifelong, has a much greater impact that anything that might have been observed in the going to the moon, doing things and coming back. As magnificent as those achievements are, they're captured by film and people can imagine similar situations of the achievement of accomplishing the mission, but then it's the lifelong realization that you're a special person because you've done something that other people haven't done before. You were given that great good fortune to come along at the right time with the right credentials, do the right thing, say the right stuff, then get put on the real important mission. How fortunate can a human being be to come along at that time and to share the wonder?

Kilanowski: I'd like to ask you to reflect, as we're celebrating the century of flight, from where we've been at Kitty Hawk and the magnificent accomplishments that we've made in this century in aviation and space. What are your thoughts as we celebrate this event?

Aldrin: My thoughts throughout this centennial-of-flight year have been focused on the challenge that I have assumed myself by being very close to the Space Program, to see what the challenges are, to improve where we are, what we're doing, and the relatively stymied Space Program of Space Station, of Shuttle, not knowing what's going to happen, venturing into Shuttle replacement several times and not succeeding. I've devised trajectories between Earth and Mars, and I'd like to see those things happen, but I think a lot of us are very frustrated. But I've formed a team of people who, in our networking together, feel that we've come up with a far superior approach to what NASA should be doing than what it is they're planning on doing, and we have to make that clearly known within the next couple of months or it'll be locked in. And most people that I've talked to are not very happy with the directions that have been chosen for the so-called orbital space flight. They're very limiting in what the opportunities can be in the next ten or twenty years.

So the centennial of flight and the next century of flight, where I'm proposing to have a conference the day after the anniversary of the Wright brothers, which is December 17th, I'm helping to organize a conference to be held to look at the space imperatives for the next century, and I hope to present these ideas. But I really can't wait till then. That's why I'm going to be visiting senators and congressmen and trying to open up the creativity of ideas from just the ones that are of great benefit to the major companies, to the Air Force that want to use their rockets. It gets into details, but I see that the politics and the corporate pressures are very strong, and I'm not too happy with the way that they're directing us.

So the centennial brings to me a very great challenge for individual marketing of ideas, of convincing, that in some ways it gives me an opportunity to make an even greater contribution, maybe, by redirecting things than the contribution that I was given by being in the right place at the right time on Apollo 11. That's the challenge as I see it, and

those are the consequences, and it can bring about great satisfaction or just a frustrated disappointment.

Kilanowski: Well, it's really sad that we left the moon in 1969, it's been thirty years, and we have not progressed.

Aldrin: Mm-hmm. Well, there are a lot of reasons why we are where we are, and we can take steps to recover and proceed in a way that I think will excite the public by seeing progress coming that they've been expecting, and the public being satisfied that the Space Program is moving in a satisfying way will inspire the Congress to be more supportive, and the administration. It takes the leader of the nation to decide what it is we're going to do, and the leader in these days has very, very many pressures worldwide, world conditions, the economic conditions. It's very difficult decisions that especially because of the second Space Shuttle tragedy, the *Columbia* accident have now focused attention a good bit more on what it is we need to do to finish the Space Station and have an appropriate new vision for the future.

A gateway to the moon and Mars is what I think we should be doing, a gateway that's close to the moon, sort of a port facility that will enable us to get out of low Earth orbit and support the missions eventually to commit back to the moon and Mars. But we need to take those first steps that are affordable and that are so necessary to inspire people in this aerospace business and the public at large to be more supportive of what we're doing.

Kilanowski: I have one other question, because I don't want to keep you too long. Someone had mentioned to me that when we built the Space Station, that a lot of the Apollo engineers had retired and the rendezvous specialists, and they had lost some of the technology of knowing how to do rendezvous. Is that true?

Aldrin: No, I don't think so. I think the proximity operations became more sophisticated. They became more precise because you have a much larger vehicle that you're moving very deliberately, rather than the fighter-plane aspect of the Gemini spacecraft that you could kind of move around with a lot of freedom. That was more constrained with Apollo, but with the Shuttle, everything you do is so determined ahead of time as far as the maneuvers.

We've chosen not to do automatic docking the way the Russians have demonstrated. That's been a weakness on our part to not have developed those techniques to demonstrate them so far, and I guess part of that is because the vehicle is so big that somebody wants to be on top of it at all times, whereas the Soyuz, when it docks at smaller space stations, they can afford to maybe have it observed but do an automatic docking. There are many things that we do need to catch up and learn from other people, and I think we'll certainly be doing those within the next five or ten years.

Kilanowski: I hope so. Well, thank you so much. Is there anything else that you would like to say or reflect upon?

Aldrin: I came along into the aviation business as a fighter pilot, following some in the footsteps of my father, and I saw the opportunity following being in combat to be as good a fighter pilot as I could but then enhance my education, and then to have open up, because of that, the fraternity of test pilots. I became a part of that because I flew in space, and then I was given the opportunity to command the Test Pilot School, very challenging. So I sort of worked in the back door of this wonderful community, the Society of Experimental Test Pilots, where there is such a cream of the crop of the sacrifices, the dedication, and the just plain bare talent that has been exhibited by so many people who have preceded all the rest of us and paving the way by developing the aircraft and improving the performance in ways that people really couldn't anticipate. But it's those people who have risked their lives as a part of the advancing of the performance of airplanes and spacecraft, and I feel so happy to have come into that community also, even if it was through the academic route initially.

Kilanowski: Well, I think they feel pleased and honored that you're part of them.

[End of interview]