

Pushing the Boundaries

Astronaut LtCol Nicole Mann gives a thumbs up from inside the mockup of NASA's Orion spacecraft at Johnson Space Center in Houston, Texas, in July 2019. (Photo by NASA/Bill Ingalls)



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—LTCOL NICOLE "DUKE" MANN

Marine Corps Maj Jasmin Moghbeli is pictured in front of a T-38 trainer aircraft at Ellington Field near NASA's Johnson Space Center shortly after she was named to NASA's 2017 astronaut candidate class.



NASA/ROBERT MARKOWITZ

Boundaries



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Maj Jasmin "Jaws" Moghbeli

NASA/BILL INGALLS

Marine Astronauts Nicole Mann and Jasmin Moghbeli Are at the Forefront of Space Exploration

By Sara W. Bock

When NASA released the names of its 18 Artemis Team members—those eligible for the planned return missions to the Moon—in December 2020, the only two active-duty Marines in the astronaut corps, both of whom happen to be female, made the list.

"One of These Astronauts Will Be the First Woman on the Moon," the headlines read, as the names of the nine women selected to the Artemis Team were plastered across social media platforms and news outlets. And while it would be easy to assume that some degree of rivalry might exist between Lieutenant Colonel Nicole "Duke" Mann and Major Jasmin "Jaws" Moghbeli in that regard, it's nonexistent: They laugh as they say their ideal scenario would be to take that historic step together.

"There's not this sense of competition in the office for any of these missions or these spaceflights because it's so much bigger than us. This is human exploration. It's not just about NASA. It's not about the individual person," said Mann as she sat next to Moghbeli during a June phone call with *Leatherneck* from NASA's Johnson Space Center in Houston, Texas, where they train for future missions. The pair of Marine aviators, both graduates of the United States Naval Test Pilot School, talked at length about their training, how the Marine Corps prepared them for the rigors of spaceflight, and what an exciting time it is to be at NASA. The agency is working with commercial industry on crew transportation to the International Space Station and beyond, has its sights set on human exploration of Mars, and continues to ramp up its Artemis program, which aims not only



PATRICIA SMITH

LtCol Mann, left, and Maj Moghbeli, right, the only two active-duty Marines in NASA's astronaut corps, visit with LtGen Eric Smith, center, Deputy Commandant for Combat Development and Integration, at Marine Corps Barracks Washington, D.C., May 14.



Moghbeli, who became an AH-1W Super Cobra pilot after earning her wings as a naval aviator, flies a CH-46E Sea Knight in Kuwait during a 2010-2011 deployment. As a graduate of Naval Test Pilot School, Moghbeli has piloted approximately 25 different types of aircraft.

to put the first woman and next man on the Moon, but also to set up a sustainable base camp with people living and working there so they can take what they learn there to apply to similar missions to Mars in the future.

Both astronauts talk about being pleasantly surprised upon their arrival at NASA—Mann in 2013 and Moghbeli in 2017—at how the more experienced astronauts would set aside time in their busy schedules to mentor and advise them.

“I was nervous because you have all these people that come from very different backgrounds, and really only about 25 percent military, so a lot of civilians with PhDs and all these crazy experiences,” said Mann. “But then you realize that it’s so incredible to work together on a highly functioning team

This preflight image from Feb. 6, 2019, shows Mann, fellow NASA astronaut Mike Fincke and Boeing astronaut Chris Ferguson during spacewalk preparations and training inside the Space Station Airlock Mockup at NASA’s Johnson Space Center in Houston, Texas, in preparation for the crew flight test of the Boeing Starliner. Ferguson has since been replaced on the crew by NASA astronaut Barry Wilmore. (Photo by NASA/Robert Markowitz)



As an astronaut candidate, Moghbeli, pictured here in April 2018, underwent training in T-38 engine maintenance at Ellington Field in Houston, Texas.

Becoming an astronaut wasn’t a lifelong dream for Mann, a California native, who said the idea didn’t even occur to her until after she was already flying in the Marine Corps and had returned home from her first deployment.

Starliner spacecraft. The Starliner, like the SpaceX Crew Dragon first commanded by retired Marine Colonel Doug Hurley, is another asset that will help enable the return of human space travel from U.S. soil. The Starliner flight test, which was initially scheduled for July 30, was delayed due to a valve issue and at press time had not yet been rescheduled.

Becoming an astronaut wasn’t a lifelong dream for Mann, a California native, who said the idea didn’t even occur to her until after she was already flying in the Marine Corps and had returned home from her first deployment. “I didn’t have it all figured out, but fortunately the opportunities presented themselves and I was able to take hold of them,” she said.

Conversely, Moghbeli’s dream of being an astronaut began while growing up in Baldwin, N.Y., when she selected Russian cosmonaut Valentina Tereshkova, the first woman in space, as her topic for a sixth-grade report. When she presented her report in character, wearing a costume, it was the first time she remembers saying she wanted to be an astronaut—and her interest only grew from there.

“I remember begging my parents to send me to Space Camp,” said Moghbeli of NASA’s youth program in Huntsville, Ala. “It took a couple years for me to wear them down and they eventually sent me. As I learned more and more, it just kind of reaffirmed what I wanted to do.”

Selected by NASA in 2017, Moghbeli earned her undergraduate degree in aerospace engineering at Massachusetts Institute of Technology and was commissioned as a second lieutenant in the Marine Corps in 2005. She flew more than 150 combat missions in Afghanistan as an AH-1W Super Cobra pilot, earned her master’s degree in aerospace engineering from the Naval Postgraduate School and was a test pilot assigned to Marine Operational Test and Evaluation Squadron (VMX) 1 at Marine Corps Air Station Yuma, Ariz., at the time of her selection as an astronaut candidate.

The first-ever Iranian-American astronaut in NASA history, Moghbeli, who was born in Germany, is an immigrant who became an American citizen as an elementary school student



Mann, far left, stands with fellow NASA astronauts after a United Launch Alliance Atlas V rocket with the Boeing Starliner onboard was rolled out to the launch pad at Cape Canaveral Air Force Station in Florida, Dec. 18, 2019. Two days later, the Starliner’s first uncrewed orbital flight test departed for the International Space Station as an end-to-end test of the system’s capabilities.

and cites her parents and older brother as her role models. She was inspired to join the Marine Corps not solely in pursuit of her dream to become an astronaut but also because of her family’s history serving in the Iranian military and the stories she grew up hearing her grandfather tell about his service.

Not yet assigned to a specific mission, Moghbeli spends her days—none of which are ever the same—training in a wide array of skills and capabilities from flying the T-38 supersonic trainer to operating robotic arms and preparing for spacewalks and extra-vehicular activities in the neutral buoyancy lab.

“There is no typical day,” said Moghbeli, who emphasized that at NASA, training is continuous. “I think that’s one thing that a lot of us love about this job if you can call it a job. There isn’t a typical day as an astronaut because you’re going to be in space with a fairly small crew of people, and you have to be the maintainer, you have to be the doctor, you have to be the scientist. You have to be a little bit of everything, and so because we’re preparing for that, no day really looks the same.”

Though Mann is currently focusing her efforts on preparing



Moghbeli undergoes water survival training at NASA Johnson Space Center's Neutral Buoyancy Laboratory in Houston, Texas, in 2017. (Photos by NASA/James Blair)

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— MAJ JASMIN “JAWS” MOGHBELI



for the Starliner crew flight test, she continues to train broadly so she's prepared for other future missions. She describes a recent week during which she flew in the T-38, and the next day did some manual flying of the Starliner in the morning and flew the robotic arm in the afternoon—all of which require very different flying techniques.

“I remember it used to stress me out in the beginning because you had so many different things you were going to do, and so many different skillsets to jump between. I wanted to be 110 percent prepared for everything that I needed to do,” said Mann. “But some of what NASA teaches you is that you need to be able to figure out this training evolution without being 100 percent prepared. Space is going to throw problems at you and challenges that you just need to be able to adapt and deal with.”

It's this exact ability to adapt and overcome that both Mann and Moghbeli credit the Marine Corps with instilling in them, as well as with preparing them for the physical and mental demands of astronaut training and eventual space travel.

“Something the Marine Corps has gotten us used to is mentally to stay in the game when you’re being pushed to your limit physically,” said Moghbeli, who, along with Mann, referenced

the neutral buoyancy lab—a huge training pool used to simulate microgravity—as one of the most mentally challenging training exercises required of them thus far.

“During that training evolution, which is usually about six hours long, you’re working against the pressure of the suit,” said Mann. “It’s like a marathon for your arms and hands.”

“I had been warned beforehand, ‘Hey, it’s going to be like a marathon, that’s how draining it is physically,’” Moghbeli echoed, describing her first experience in the lab. “And sure enough, I got in there for the first time, and they were absolutely right. But because I had that background from my Marine Corps training, mentally I was able to kind of stick with it the entire time and push through.”

When asked what skills and traits they learned in the Marine Corps that they rely on today, the duo mentioned public speaking, teamwork and a focus on mission accomplishment. They also emphasized that their shared experience as Marine Corps test pilots has proven vital, particularly at this moment in NASA's history.

“This is the most new spacecraft we’ve had coming on the line ever in the history of human spaceflight, and so having that

Mann flies the WB-57 aircraft during a spaceflight readiness training class. (Photo courtesy of NASA)

test pilot background to be able to look at these different spacecraft and evaluate them, determine the human-vehicle interface, whether that works well or not, how all these things carry over” is vital, said Moghbeli.

Mann said that the ability to compartmentalize in high-stress scenarios is something that she's carried over from her time in the fleet.

“You’re going to learn something new, and you might not be good at it when you first learn it, but it’s incredibly important that you master that skill—whether that be on the rifle range or flying a jet in combat or landing on an aircraft carrier. Whatever it is, it’s so important that you master that skill because other people are relying on you to execute so that we can accomplish the mission,” said Mann. “Sometimes you’re going to screw something up ... and hopefully you learn these lessons in training, but when that happens, how do you respond? Because the war is going to continue, or the mission in space is going to continue. You need to be able to compartmentalize that struggle that maybe you had, and now focus on the next piece of the mission and still be able to execute.”

Mann also credited much of her success to her mentors in the Marine Corps who led by example and her commanding officers who supported her in pursuing a career as an astronaut even if it meant making decisions that took her away from the “expected” career path that many pilots strive to follow.

“It was so important that those leaders in my life had those discussions with me, and especially at a young age, that ‘Hey, it’s OK. You don’t need to fit this perfect mold. You’re going to be more of an asset to the Marine Corps if you’re personally satisfied and engaged in following your dreams and your home life is making you happy.’ So I look back on that and appreciate that,” said Mann, who is married to a retired Navy F/A-18 pilot she met in flight school in Pensacola, Fla. The couple, who spent years as dual active-duty pilots, have a 9-year-old son.

Moghbeli and her husband, an aerospace engineer she met shortly after she moved to Houston, recently started a family when they welcomed twin girls less than a year ago. Both her parents and her husband’s parents recently relocated to the Houston area, which she says has been a huge help, and she emphasizes how supportive her husband is of her career.

As they navigate challenging careers and the demands of

Mann spent three days in the wilderness participating in land survival training in Maine in 2013, during the first phase of the extensive training program that turns astronaut candidates into full-fledged astronauts.



Above: Standing in front of an Orion mock-up in the Johnson Space Center's Space Vehicle Mock-up Facility, Mann speaks to a special media-day crowd in August 2013 after her selection to the 2013 class of NASA astronaut candidates. (Photo courtesy of NASA)



Above: Aboard USS Enterprise (CVN-65), Mann, an F/A-18 pilot, prepares for a combat mission in Afghanistan in 2007.



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Moghbeli, center, is pictured with her fellow 2017 astronaut class members in August 2019. (Photo courtesy of NASA)

As they look to the future, both Mann and Moghbeli reflect on the elite group of Marine astronauts whose legacy they strive to uphold.

family life, both Mann and Moghbeli stress that they've come to terms with the fact that there's no such thing as finding a "perfect balance" because certain things need to be prioritized at different times. "It's that kind of continual balance, and just tweaking of that based on what's happening in your life and what your priorities are at the time that you need to just modify as you go through," said Mann.

Both Moghbeli and Mann come across as very humble about their accomplishments; but given how competitive the application process is—and that they're among only 25 Marines ever to be selected as astronauts—it goes without saying that their accolades are numerous and their potential is endless.

When recruiting for its 2017 astronaut class, NASA received a record-breaking 18,000 applications. Moghbeli described the rigorous selection process, which includes multi-day visits to NASA where applicants go through a physical and medical screening and a series of interviews to assess technical background and ability to work with others.

"It's a very lengthy process," Mann added. "I was surprised at how many different things that we did during that interview process. There's a formal interview, there's some teambuilding, technical activities that you'll do, there's some social events—and really because they're trying to get a glimpse of this 'whole person' concept during that time. I was a little surprised by how much emphasis they put on your ability to work well with others, especially those that aren't the same Marines that you're usually training alongside."

"And there's a lot of waiting in between interviews hoping that you'll get another call," Moghbeli chimed in with a laugh.

"I think they drag it out a little bit on purpose!" Mann said.

While they're in a unique position in that they are technically active-duty Marines whose work at NASA will keep them in Houston long-term, both Mann and Moghbeli are proud to be part of the Marine Corps family and strive to maintain a strong relationship with their service branch.

"We have had great support from the Marine Corps from an



Mann is seated at the capsule communicator (CAPCOM) console in Houston's Mission Control Center during the release of the SpaceX Dragon cargo vehicle from the International Space Station, July 3, 2017. (Photo courtesy of NASA)



Moghbeli is helped into a spacesuit prior to underwater spacewalk training at NASA's Johnson Space Center Neutral Buoyancy Laboratory in April 2018. The training event, which both Moghbeli and Mann describe as physically draining, requires a level of mental strength that they said they learned in the Marine Corps. (Photo courtesy of NASA)



Mann is lowered into the Neutral Buoyancy Laboratory (above) during a spacewalk training session in May 2014. Prior to her selection as an astronaut, Mann served as a developmental test pilot (right) with Air Test and Evaluation Squadron 23 at Naval Air Station Patuxent River, Md. (Above photo courtesy of NASA)

administrative perspective as well as from aviation, and we really enjoy doing any type of outreach events that we can in making sure that we continue to involve the Marine Corps in human exploration so that Marines are aware of what we're doing," said Mann. "It'll be interesting to see as this space domain expands and more people in the world are involved in it, what specifically the Marine Corps' role will be in the space domain."

Do either Moghbeli or Mann have their sights set on returning to the fleet and jumping back into the cockpit as Marine aviators? For now, they both say they're focused on doing the work of preparing for spaceflight but it's an idea that neither of them is willing to rule it out.

"The Marine Corps is a very important part of both of our lives, and for me I can say very strongly that the Marine Corps is kind of what led me here and prepared me to do this job," said Moghbeli.

As they look to the future, both Mann and Moghbeli reflect on the elite group of Marine astronauts whose legacy they strive to uphold.

"There haven't been a ton of Marines in the astronaut corps, but you've seen them at the forefront of human exploration and really leading the way," said Mann, referencing John Glenn, the first Marine astronaut and first American to orbit Earth; as well as Doug Hurley, who commanded the first Crew Dragon flight to the International Space Station. Soon, Mann will take her own turn in pioneering when she takes part in the first Boeing Starliner crew flight test. She finds herself particularly inspired by the myriad ways that space travel has improved the human race and will continue to do so in the future.

"What we learn about ourselves and about our home planet,



and things we can do to take care of Planet Earth, and some of the technologies that we develop for spaceflight—how they benefit humans back on earth," said Mann. "Of course, there's this inspirational part of it too—inspiring young kids to dream, to work hard in school, to study math and science and to be involved ... I think as you see us moving forward with Artemis to the moon and eventually to Mars, I think you'll see a uniting of the world that we have not seen in a long time," she added.

For Moghbeli, there's no limit to what can be learned in space, and she's excited to be a part of it as she awaits her first mission assignment.

"You don't know what you're going to learn when you explore, but we can look back and say every time humankind has pushed the boundaries further and explored, we've always gained from it, and we've seen that in our human exploration of space so far as well," said Moghbeli. "I think that's bound to continue happening as we go further."

Editor's note: To read more Leatherneck stories about the Marine Corps' pioneers in space exploration, go to mca-marines.org/article-collections.