One day, humans may colonize the Red Planet. What will it take to survive there?

On July 20, 1969, astronauts Neil Armstrong and Buzz Aldrin became the first people to set foot on the moon. The occasion marked the beginning of human space exploration. More than 40 years later, scientists have their sights set on another first: human colonization of Mars.

But before adventurers blast off, scientists are doing as much intelligence gathering as possible to ensure success.

CLOSER TO HOME
Since Mars is millions of miles away, scientists who are interested in learning how to colonize the Red Planet often conduct experiments...
here on Earth. It’s a lot simpler and less costly. Pascal Lee, an astrogeologist for NASA, set up a research station on an isolated island in the Canadian Arctic in 1997. He chose the location because of its similarities to Mars. More than a decade later, it is still a major hub for experiments designed to prepare for future manned Mars missions.

Devon Island lies 1,600 kilometers (1,000 miles) from the North Pole. The surfaces of both Mars and Devon Island are pitted with meteorite-impact craters. Both lack plant and animal life. And while Devon Island’s weather isn’t nearly as extreme as Mars’ frigid climate, its cold and unpredictable conditions make the island as close as you can get to Mars on Earth. “We were blown away by the similarities that exist between this island as close as you can get to Mars on Earth. “We were blown away by the similarities that exist between this island and Mars,” says Lee.

The island’s remote location, terrain, and extreme conditions make it useful for testing technology—like spacesuits, rovers, and greenhouses—that could someday help astronauts living on Mars.

**SUITING UP**

In order to survive on the Red Planet, explorers would need a lightweight, flexible suit that protects them from the hazards of outer space.

On Mars, the atmosphere is only 0.7 percent that of Earth’s and contains mainly carbon dioxide (see Earth vs. Mars, right). A spacesuit’s life-support system has to mimic Earth’s atmosphere, simulating, for instance, its air pressure (air molecules in the atmosphere pushing down). Without this pressure, the human body’s systems would malfunction, resulting in death.

Spacesuits also must protect explorers from the hazards of outer space. These high-energy waves and particles come from the sun and space, which can damage or kill living cells.

Today’s heavy spacesuits are fine for current tasks like floating outside the International Space Station to make repairs. But they are far from being compatible with the Martian environment. Explorers on Mars will need, for instance, to be able to bend down and pick up rock samples without toppling over. They’ll need to be able to suit up quickly and have the flexibility necessary to drive a rover over the rough Martian terrain. On Devon Island, scientists are testing out NASAs latest concept suits to see if they make the grade.

**ROBOTIC EXPLORERS**

Since the Martian environment is so inhospitable, it will sometimes be easier to let robots do the exploring. NASA already has sent numerous robotic spacecraft to the Red Planet. One robot, Phoenix, landed on Mars in 2008 and was the first mission to return data from Mars’ poles. It confirmed water ice on the planet.

Most likely, robots will continue to scout Mars’ surface when the first explorers are ready to set up a colony. “Robots can go places that are very difficult for people to go. They become a remote extension of people as we explore the universe,” says Matthew Dears, who leads the Haughton robotics team.

Mars explorers will rely on technology similar to that being tested by Dear’s team. The team has developed a robot called K10 which operates using artificial intelligence. K10 is programmed to solve problems on its own without any outside instructions.

**FAR-OUT FARMING**

Luckily, as Phoenix confirmed, Mars has a supply of frozen water, which could sustain colonists. But with current technology, the journey to Mars would take two years, making it impossible to resupply a Martian base with food from Earth. The ability to grow food would be an important step in setting up a permanent base.

Anna-Lisa Paul, a horticultural scientist from the University of Florida, is investigating the effects of a Marslike environment on plants. Paul grows crops in a greenhouse on Devon Island. She uses the local loose, rocky soil that is similar to the regolith on Mars. So far, the experiment has yielded some self-sustaining crops like lettuce.

**ARE WE THERE YET?**

Research related to colonizing the Red Planet is ongoing. But an actual mission to Mars is still years away. In 2004, the United States announced plans for a resurgence of human space exploration, including a trip to Mars. But those plans have since changed. As a result, programs such as a proposed return trip to the moon in 2012—a first step in further exploring our solar system—were revised.

“The new direction at NASA is to develop technologies that can lead to breakthroughs in space travel,” says Lee. Meanwhile, scientists are busy making sure that when the U.S. does decide to send humans to Mars, we’ll be ready.

—Tyrus Cukavac

[VIDEO EXTRA] Watch a video about Mars exploration at: www.scholastic.com/scienceworld