# Human Migration into Space is a Biological Imperative

**By Sherry E. Bell, PhD and Colonel M.V. "Coyote" Smith, USAF, PhD, Chief Future Scientist of the Air Force**

*Disclaimer: The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any agency of the U.S. government.*

**Abstract**
This article examines the possibility that humans might be biologically driven to expand their presence to settlements beyond Earth.

> I'm very fond of quoting my friend Larry Niven: "The dinosaurs became extinct because they didn't have a space program. And if we become extinct because we don't have a space program, it'll serve us right!"
>
> - Sir Arthur C. Clarke, 2001[1]

> Now, with our technology, we are beginning to expand our habitat into space. Despite the cost, despite the risks, we are going into space. Perhaps only a handful of humans will live and work in space, at first. But what they accomplish will make life better and safer for all those who remain on Earth. Humans are moving into space. It's in our genes. That's not science fiction, not anymore.
>
> - Ben Bova, 2012[2]

## A Biological Imperative

From the origins of life on Earth up to the present, all biological forms that have survived have done so in part because they shared an inborn ability and a biological imperative to propagate their genes into the future. Those that did this successfully in the face of either sudden or gradual environmental stressors are alive today. Those that failed to do so died out, which includes over ninety-nine percent of all species that ever existed on Earth. Although recent arrivals on the evolutionary timescale, humans have succeeded in a grand fashion and have become the dominant species on the planet. However, like all other life forms, humans must follow the maxim "adapt, leave, or die."

Every species on Earth that has succeeded up to now has done so in part because it expanded its numbers and inhabited every nook and cranny in which it could thrive. By so doing, it increased its odds of long-term survival. Humans, for example, have spread across the globe and now live on much of the habitable area of the planet. However, as

population pressures grow, resources are consumed, and the biosphere becomes increasingly polluted, there will be limits to the degree of adaption to environmental stressors that individuals can tolerate. Indeed, cataclysmic stressors, such as massive asteroid or comet impacts, eruptions of super volcanoes, or other natural disasters could render Earth uninhabitable by humans. It is time for a portion of humankind to exercise the second option—to leave. The long-term survival of our species demands that we move into space.[2]

**Human Migration**

Human migration (derived from the Latin *migratio*) is physical movement by humans from one geographical area to another. Throughout the last few decades we have seen an acceleration of this phenomenon as populations are tending to migrate to the Northern Hemisphere. However, human migration is an old story.

Mitochondrial DNA evidence indicates that 200,000 years ago the earliest known ancestors of modern humans lived in East Africa. The first wave of humans migrated out of Africa, traveled as far as Israel, and then died off. A second group migrated out of Africa around 70,000 years ago. They are the ancestors of all non-African humans living today. Some of them, following the coastlines along southern Asia, reached Australia around 50,000 years ago. It is believed that from this same group, “an inland migration from Asia seeded Europe between 40,000 and 30,000 years ago.”[3] Some of them migrated into Central Asia and Southeast Asia. The descendants of those people eventually reached Japan and Siberia. Although it is not yet known exactly when humans crossed the Bering land bridge into the Americas, genetic evidence places the date at between 20,000 and 15,000 years ago.[3]

Although the state of genetic research has not yet reached the point where the gene or genes responsible for compelling people to be exploratory have been identified, it is likely that people who have this genetic predisposition will be the first to venture into space. Eugene Linden, the author of “The Ragged Edge,” told a New York Times reporter that some of the lust for going to space may come from a primal animal drive to do something no one else can imitate, something, he says, that is “meant to show reproductive robustness on the part of the male.”[4]

Each of the early migrations required adaptation to new environmental stressors. The task was not always easy and failure resulting in death was often the result. Numerous failed settlements dot the East Coast of the Americas, thereby illustrating how difficult the objective was for Europeans during the 17th Century. Ghost towns abound in the American West and demonstrate that adaptation was no easier for many people as late

as the 19th Century. However, enough settlers succeeded that they thrived, expanded, and continue to grow as the human population booms beyond seven billion.

**Why Migrate?**

Although it is not yet possible to determine the reason humans began to migrate from their birthplace in Africa, it is likely they mimic some of the ones currently in practice. Today, people migrate for a variety of reasons, including inadequate food supply, violent conflicts, economic opportunity, family growth and overcrowding, and natural disasters such as floods, droughts, volcanoes, and tsunamis.

Mark Hopkins, the leader of the National Space Society, which is the premier Space Settlement organization on the planet said,

> The vast majority of the resources of the solar system in terms of materials and energy lie in space rather than on the Earth. For example, the sun produces one to ten trillion times the amount of energy currently consumed by the human race. It is only a matter of time before these resources are used for the dramatic betterment of humanity.[5]

Adventures and explorers—high stakes risk takers—will likely be among the first to venture off world. This form of migration pressure cannot be easily measured. “Humans have an innate desire to explore and colonize new territories. Even when not driven by hunger, politics or economics, humans migrate.”[6]

It is clear that migration and/or leaving can be a viable alternative to adapting to environmental stressors—and is certainly preferable to death or living in misery. Human migration can be as large-scale as refugees fleeing a war zone or as small-scale as an adult child leaving home when living under his or her parents’ rules becomes unbearable. It can also involve seeking greater opportunities, such as the motivation for the migration of humans during the Gold Rushes in American history.

**Where to next?**

Where is the next place humans will migrate? Dennis Wingo, the author of *Moonrush*[7] and Robert Zubrin, founder of the Mars Society,[8] have suggested the next place will be the Moon or Mars, or some other place in space. Perhaps they will live on space stations or on space faring vehicles, as Gerard O’Neill suggested over two decades ago.[9]

Gary Barnhard, one of the leading minds on the planet and a former Executive Director of the National Space Society, said,

> Opening the frontier of space for our civilization is the real overarching choice before us. There is no greater enterprise. It is the ultimate game changer. It is the difference between life as we know it rising to the challenges the universe puts before us, or abject resignation as a species to being an inconsequential aberration whose time will soon pass. Let us find a way past the hyperbole and get on with building the interplanetary railroad to the stars. It is up to us to not wait for the future, but to make it![10]

In space there is ample room for people to live. As the population on Earth increases, this issue is becoming ever more important. Violent conflicts continue to be a problem. Some form of a natural disaster will someday engulf the planet, although when remains a mystery.

**How will we get there?**

Until recently, only governments had the resources to take humans into space. However, beginning in the 1990s, spending from the commercial sector began to outpace government investment in space. Now, in the early part of the 21st Century, private entrepreneurs are becoming involved. A number of private companies are building spacecraft that are capable of taking humans off of the Earth.

In 2002, Elon Musk founded the Space Exploration Technologies Corporation. The overarching goal of the company is to “revolutionize space transportation and ultimately make it possible for people to live on other planets.”[11] In June, 2012, Mars One, a private company led by Bas Lansdorp, announced its objective to establish a permanent human colony on Mars by 2023. The plan involves using existing technologies and readily available materials.[12] Robert Zubrin and the fellow members of the Mars Society have a plan for a humans-to-Mars mission. The plan calls for the use of existing launch technology and using in-situ resources to sustain the mission.[13]

Already interest in space tourism is gaining in popularity. Entrepreneurs such as Eric Anderson of Space Adventures and Sir Richard Branson of Virgin Galactic are offering space tourism adventures. Space Adventures has already sent seven tourists into space. One of the clients, Charles Simonyi, went on two different occasions.[14] Virgin Galactic has sold over 500 tickets to tourists and is steadily booking more.[15] On September 07, 2012, the New York Times ran an article titled, “Space Tourism Is Here! Wealthy Adventurers Wanted.”[4]

Art Dula's company, Excalibur Almaz is currently in the process of offering trips to the Moon. Dula points out that his venture is not about space tourism. He says, "The people are not tourists. This is much more about private expedition members—conducting expeditions that will go further into space than anyone has before."[16] Taken together it appears human settlement of space is inevitable, and is in fact in the early stages of being developed.

**Summary and Conclusion**

For millennia humans have migrated. The reasons for venturing forth are myriad and range from seeking food to seeking adventure. Because migration stems from the biological imperative to survive, it is certain that humans will exhibit the same pattern of behavior in the future as they have in the past.

The prospect of a mass extinction event is ever present. Wars are being fought. Over-population is a problem we will soon face.

Humans now have the means and opportunity to travel to space. Several private citizens have already experienced this adventure.

Companies are offering short forays into space and already over 500 intrepid souls have signed up to take one of the trips. One company is offering an adventure for explorers. Their objective is to take people around the Moon and back.

Plans to colonize the Moon and Mars are in place and will soon be implemented. It is only a matter of time before humans establish colonies in space.

To "adapt, leave, or die" are the choices all species on Earth are faced with. For millennia humans have survived by leaving. It is a biological imperative for humans to migrate into space. The very survival of the species depends upon it.

**Notes**

[1] Arthur C. Clarke, "Meeting of the Minds: Buzz Aldrin Visits Arthur C. Clarke" (Interview by Andrew Chaikin, February 27, 2001), www.clarkefoundation.org/sample-page/sir-arthurs-quotations/ (accessed September 30, 2012).

[2] Ben Bova, "70th World Science Fiction Convention," *Naples News*, September 23, 2012, www.naplesnews.com/news/2012/sep/23/ben-bova-70th-world-science-fiction-convention/ (accessed September 29, 2012).

[3] "Human Journey," *National Geographic*, March 2006 [Map supplement], ngm.nationalgeographic.com/ngm/0603/feature2/map.html (accessed September 30, 2012)

[4] Jesse McKinley, "Space Tourism Is Here! Wealthy Adventurers Wanted," *New York Times*, September 7, 2012, travel.nytimes.com/2012/09/09/travel/space-tourism-is-here-wealthy-adventurers-wanted.html?pagewanted=all (accessed September 29, 2012).

[5] Mark Hopkins, Personal communication, October 1, 2012.

[6] E. Grabianowski, "How Human Migration Works," *How Stuff Works*, December 27, 2007), science.howstuffworks.com/environmental/life/evolution/human-migration.htm (accessed September 29, 2012).

[7] Dennis Wingo, *Moonrush: Improving Life on Earth with the Moon's Resources* (Burlington, ON: Apogee Space Press, 2004).

[8] Robert Zubrin, *The Case for Mars: The Plan to Settle the Red Planet and Why We Must* (New York: Free Press, 2011).

[9] Gerard O'Neill, *The High Frontier* (New York: Bantam Books, 1977).

[10] Gary Barnhard, Personal communication, October 1, 2012.

[11] Space Exploration Technologies Corp. "Company Overview," www.spacex.com/company.php (accessed September 29, 2012).

[12] Mars One, "Mission and Vision," mars-one.com/en/mission/mission-and-vision (accessed September 29, 2012).

[13] The Mars Society, "Mars Direct (Summary)," www.marssociety.org/home/about/mars-direct (accessed September 29, 2012).

[14] Space Adventures, "Vision," www.spaceadventures.com/index.cfm?fuseaction=Our_Vision.welcome (accessed September 29, 2012).

[15] Virgin Galactic, “Welcome,” www.virgingalactic.com (accessed September 29, 2012).

[16] B. Rooney, “Fly Me to the Moon,” *Wall Street Journal*, June 20, 2012, blogs.wsj.com/tech-europe/2012/06/20/fly-me-to-the-moon/ (accessed September 30, 2012).



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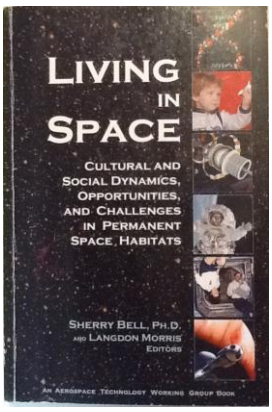
**About The Authors**

**Dr. Sherry E. Bell** received her Master of Science degree (2002) and her PhD (2005) from Capella University. She is an Industrial/Organizational Psychologist. Dr. Bell is the Dean of Psychology at Kepler Space Institute. Currently she is the Assistant Secretary of the National Space Society, www.nss.org, and plays an active role in other space-related organizations.

Dr. Bell has written numerous articles and chapters, edited a book, *Living in Space*, and frequently presents at space conferences. She is an avid researcher and has been awarded two research grants. She is a lifetime member of both the Golden Key National Honor Society and Psi Chi (the National Honor Society of Psychology).

Her current interests include Consulting, Evolutionary Psychology, Extrasolar Planets, Genetics, Humans Living in Space, and reading and writing both Science and Science Fiction. She can be reached at DrSherryBell@aol.com.



**Colonel Dr. M. V. "Coyote" Smith, PhD,** is the Director of the Center for Strategy and Technology at Maxwell Air Force Base where he leads faculty and research fellows conducting the Chief of Staff's Blue Horizons project–a multi-year research project that investigates trends in technology–and advises senior defense and political leaders how those trends will possibly impact America over the next twenty-five to fifty years. He also serves as Professor of Strategic Studies at the School of Advanced Air and Space Studies. Prior to his Doctoral work at the University of Reading, UK, he served as the Chief of "Dream Works," which was the Future Concepts division in the Pentagon's National Security Space Office where he directed the Space-Based Solar Power Study and served as a Visiting Military Fellow at National Defense University.

He is a noted spacepower theorist, having published several articles and books, including *Ten Propositions Regarding Spacepower* and the forthcoming *Natural Cosmopolitics*.

**Editor's Notes:** Dr. Sherry Bell has been a dedicated Kepler Team Member since the first discussions occurred to form the Kepler Space Institute and University in 2006. Her edited book, *Living in Space, 2009,* has placed her in the professional Space scholar category. Kepler Space Institute was honored to have Dr.(Colonel) Coyote Smith be a presenter at our First Convention at Hilton Head Island in March of 2012, and to be a contributor to the Journal of Space Philosophy. *Bob Krone, PhD.*

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