



## Forging Into the Unknown

In less than 15 years, scientists predict that human beings will have the technology and resources to successfully **inhabit the Moon**.

*“NASA’s Constellation Program is planning a year-long test run of a potential lunar habitat at a site in Antarctica. The program, whose goal is to send humans back to the Moon by 2020, judges the Antarctic’s extreme climate to be the closest ecosystem that Earth has to lunar conditions” (Outlook 2009, p.7).*

But living on the Moon is only the tip of the intergalactic iceberg. Many organizations, including 4Frontiers out of Florida, have their brightest minds and biggest budgets set on colonizing the **Red Planet**.

*“The global space industry is expanding in directions unanticipated only a decade ago. Entrepreneurial space companies are changing the entire focus of commercial space. An industry once limited to satellite telecommunications is now seeing huge private sector investments in space transportation, personal (tourism) spaceflight, Earth-orbit logistics, and resource recovery” (4Frontiers.com).*

While many argue that **interplanetary settlement** could be impossible for a variety of reasons, including uninhabitable atmospheric conditions, astronomical costs, and icy landscapes, there are researchers who believe we may be closer to overcoming those hurdles than previously believed. What’s more, the **motivation** for humans to emigrate to Mars may be reminiscent of the same driving forces that led the first American settlers to seek opportunity in a new land.

*“We have seen that despite the fact that Mars may lack any resource directly exportable to Earth, Mars’ orbital elements and other physical parameters gives a unique positional advantage that will allow it to act as a keystone supporting extractive activities in the asteroid belt and elsewhere in the solar system. We have examined the potential of relatively near-term types of interplanetary transportation systems, and shown that with very modest advances on a historical scale, systems can be put in place that will allow individuals and families to emigrate to Mars at their own discretion.*

### WATCH: Living on Mars



From **MarsSociety.org**: This PowerPoint presentation outlines the differences between Earth and Mars and explores why we would want to inhabit the Red Planet, what the challenges of living on Mars might be, and the resources we will need to sustain life on another planet.

### TWO TO WATCH



The **Mars Homestead Project**, the primary focus of the Mars Foundation, aims to build a growing, **permanent settlement beyond Earth**.



**4Frontiers** is an emerging space commerce company focused on the **settlement of Mars**. It recognizes the economic potential resulting from the convergence of four current and upcoming space frontiers – Earth orbit, the Moon, Mars, and Asteroids.



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*Their motives for doing so will parallel in many ways the historical motives for Europeans and others to come to America, including higher pay rates in a labor-short economy, escape from tradition and oppression, as well as freedom to exercise their drive to create in an untamed and undefined world” (Zubrin, p.16).*

Can we learn from the **mistakes** we’ve made on Earth in pursuing life on another planet? Are we **capable** of living any **differently** than we already do?

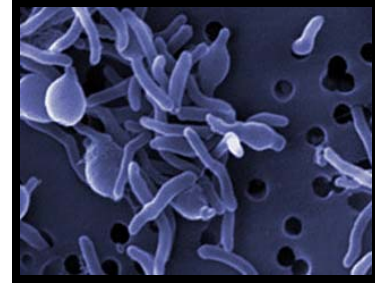
The prospect of living on another planet inevitably provokes the debate about the possibility of **extraterrestrial life** existing beyond Earth.

When we typically think about extraterrestrial life forms, we often conjure up images of space aliens, the stuff of science fiction movies. We picture tiny space creatures that vaguely resemble humans, flying around in silvery saucers and beaming up unsuspecting humans to probe them for information about our species. But what is perhaps more likely is that extraterrestrial life exists on a **microscopic** scale and in closer proximity than we think.

*“The Earth may have been home to a second creation of organisms that make up an unremarked realm of ‘life as we don’t know it’ ... Such ‘weird life’ would never have been identified by scientists because the techniques they use for studying microbes are based on the familiar biological processes that drive the living things we understand ... The identification of such life on Earth could aid efforts to find life on Mars or elsewhere in the solar system. A second terrestrial creation would also indicate that life arises easily when the conditions are right, suggesting that it is common throughout the Universe” (Henderson).*

In 2003, scientists discovered **methane on Mars**, which points to signs of life as methane is a byproduct of biological processes such as digestion. While it is unsure whether it indicates current or past activity, localized methane “burps” may signal evidence of biological or geological activity on Mars.

*“Assuming that the methane is produced by internal processes on Mars ... the source could be ‘geology, in which case it’s the reaction between water and rock, or biology, in which case the microbes are producing the methane.’*



**RECENT NEWS: Aliens** may be living among us, but we do not know it because they are **microbes** that do not have the standard biochemistry of Earth-dwelling organisms. Read the full story [here](#).

### Top 5 Bets for **Extraterrestrial Life** in the Solar System

- 1. Enceladus:** The sixth-largest moon of Saturn has been called the most promising bet for life thanks to its welcoming temperature and the likely presence of water and simple organic molecules.
- 2. Europa:** Jupiter’s moon Europa also seems a possible stomping ground for E.T. due to its potential water and volcanic activity.
- 3. Mars:** The red planet is the most Earth-like of solar system planets, with a comparatively similar size and temperature range as our own planet.
- 4. Titan:** Saturn’s largest moon looks suspiciously like it might have hosted life, because its thick atmosphere is rich in compounds that often mark the presence of living organisms.
- 5. Io:** Jupiter’s moon Io is one of the few solar system moons to support an atmosphere, and it contains complex chemicals promising for life.

Read more about these moons and planets [here](#).



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*(Even the former explanation could be intriguing, as Mars is not thought to be very geologically active.) In either case, the discovery of individual methane plumes points to the existence of localized aquifers (water-bearing rock layers) under the surface” (Matson).*

Should we be **threatened** by the possibility of extraterrestrial life? What does the existence of other life forms yet undiscovered mean for the **future** of the human species? Can we **co-exist**, or is a species conflict inevitable?

As we continue to look to the sky to explore our expansive universe, marine biologists and oceanic researchers look below to study the possibilities of energy, resources, and undiscovered life **undersea**.

**Seafloor Massive Sulphide (SMS) deposits** are home to high-grade reserves of copper, zinc, gold, and silver. Nautilus Minerals, one of the leading undersea exploration companies, has been working diligently to locate and mine these highly sought-after minerals off the shores of Papua New Guinea, Fiji, Tonga, the Solomon Islands, and New Zealand along the western Pacific Ocean’s Rim of Fire.

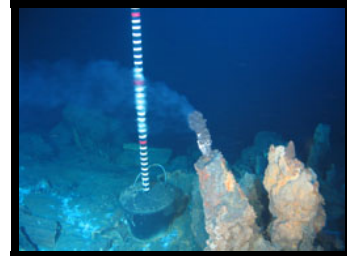
Experts estimate that two of the world’s first SMS mines will be operating as early as 2010, and while this is an exciting discovery for the future of mineral mining, many have raised questions about the potential impact SMS mining could have on the **ocean environment**.

*“There are concerns about disturbance of the sea bottom. Very little is known about it. This is a new frontier that has yet to be explored with a fragile, marine ecosystem. There’s no significant independent work that has been done on the impact of mining” (Bowcott).*

Do the **benefits** of undersea mineral mining outweigh the potential impact on the surrounding marine environment?

**Ocean currents** may provide massive renewable energy potential; researchers estimate that by capturing just 1/1,000<sup>th</sup> of the available energy from the currents off the coast of Florida, which have 21,000 times more energy than Niagara Falls, they could supply Florida with 35 percent of its electrical needs.

### Learning about **Seafloor Massive Sulphide Deposits**



#### How are SMS deposits **formed**?

“Rising up from the floors of the world’s oceans like miniature mountains, hot springs (called ‘black smokers’) emit heated brines which cool to become rich deposits of zinc, copper, silver, and gold, so-called seafloor massive sulphides.”

#### How are SMS deposits **mined**?

“Nautilus’ proposed mining system will consist of an excavator, a support ship, and a riser and lifting system to pump metal sulphide debris to the surface.”

### Underwater **Adventure**



#### **Jules' Undersea Lodge** in Key Largo, Florida

Vacationers can spend the night with the marine life of the Emerald Lagoon in the **world’s only underwater hotel**. “Marine life is actually enhanced by the presence of an underwater structure,” explains Ian Koblick, owner and co-developer of the Lodge. “Jules’ Undersea Lodge serves as an artificial reef, providing shelter and substrate for marine animals.”



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To harness this energy, scientists have developed technology that involves **submerging turbines** to utilize the ocean currents' hydrodynamic lift or drag. While no commercial turbines are currently connected to a distribution grid, many technologies are being tested for future applications.

Deep sea exploration also introduces the possibility of **underwater habitats**. Currently the only operating undersea research laboratory, Aquarius Reef Base in Key Largo, Florida can house six scientists for up to 10 days as they live and work on the base. Researchers use Aquarius to study not only marine life, but also the effects oceanic living has on the human body.

While these new frontiers may seem the stuff of science fiction, it wasn't terribly long ago that **ancient explorers** and philosophers faced the same seemingly impassable obstacles when seeking out new lands beyond what they could see and new ideas beyond what they could comprehend. These forward-thinkers were met with public ridicule and harsh criticisms, yet pushed on into the realm of the unimaginable to discover the world as we have come to know it today.

**How will you venture into the unknown? How will you learn from the past to shape your future?**

### Sources:

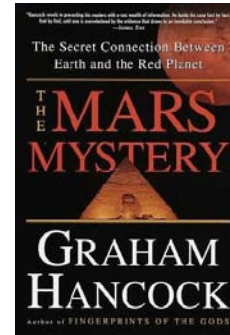
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Matson, John. "Methane on Mars: Is Something Organic Brewing on the Red Planet?" Scientific American 15 Jan. 2009. 19 Feb. 2009 <<http://www.sciam.com/article.cfm?id=methane-on-mars-is-something>>.

### FOOD FOR YOUR BRAIN: Suggested Reading



From [Amazon.com](http://Amazon.com): "As we continue to explore the red planet, geological evidence mounts that long ago water flowed freely across its surface, begging the question: If there was water, was there life? Graham Hancock thinks so. In fact, Hancock ... believes that certain formations on the Martian surface are the remnants of an ancient civilization – one strikingly similar to ancient Egypt – that was destroyed by a cataclysmic deep impact. Further, Hancock claims that NASA's reluctance to give credence to 'The Face,' 'The Pyramids,' and other things people see in images of the Martian surface is evidence that the U.S. space agency is motivated by cold war paranoia and mistrust ... Hancock raises many intriguing questions in this synthesis of unorthodox Mars theory, but those looking for applications of Ockham's razor had best search elsewhere – Hancock's theories require a leap of faith as surely as NASA's do."

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## **Forging Into the Unknown**

Outlook 2009: Recent Forecasts from World Future Society for 2009 and Beyond. Rep. 1-10.

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