

There's No Place Like Home

With everything God touches He leaves something of His glory behind.

Outer space is not a very inviting place to visit. There is no air or air pressure, no oxygen, no liquid water, no food, extremely high and low temperatures, and harmful radiation, to name a few features that don't match the basic requirements for life as we know it. We do visit space, but this requires intelligently engineered equipment to allow us to take our environment along with us. We must have oxygen-containing air at the correct pressure, otherwise blood would "boil" in the no-pressure vacuum of space. Food and water are essential, too, as is the right temperature for the biochemistry of life to run smoothly. And our DNA must be protected from damage by cosmic radiation. All of these conditions are already provided for us on earth. The physical conditions on earth exactly match the requirements to sustain human life with little or no effort on our part. Whereas it is with great effort that we take these conditions with us into space.

Earth-like gravity is also difficult to take with us into space. The microgravity environment of space looks like fun, but microgravity is actually harmful to humans. In the short term, with no gravity pulling blood down into the legs, blood redistributes into the head causing facial swelling. The inner ear, which normally controls our equilibrium on earth, is confused by the lack of gravity and many astronauts experience nausea and vomiting as a result. But more than anything else, the lack of normal "1g" gravity in space may limit human exploration of space because the under-use of muscles causes them to become weak and the progressive loss of calcium weakens bones also.¹

Data from long-duration microgravity exposure during Skylab missions in the 1970s indicated an average bone loss of 1% per month.² To counter this decline, NASA

required astronauts to perform regular exercise in orbit and dedicated space shuttle missions to the evaluation of vacuum gravity suits and treadmills. While helpful, exercise has not prevented bone-loss during space flight.³ In a sense, bones need gravity because they are designed to resist gravity and mechanical forces on earth. There is within bone a mechanism to sense where mechanical stress is placed on the bone and to call in bone-building cells to reinforce or "remodel" the bone. Since these design features are not needed in microgravity, the body switches from using dietary calcium to build bone, to leaching calcium from bone—thus reducing bone strength.⁴

These concerns are not insurmountable. It may be that Arthur C. Clarke's vision of a circular, rotating spaceship, from the book and movie, *2001: A Space Odyssey*, will need to be realized in order to create an artificial earth-like gravity field which we bring with us into space. In the end, these considera-

tions should remind us that our earth environment and the needs of our human physiology are intelligently designed and constructed to be precisely matched and, while we may visit space, there is still no place like home.

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