many of the millions of meteors that now are burned up would reach the Earth's surface, causing death, destruction, and fires everywhere.

Adaptation to Environment or Creation of Environment for Life?

If evolution works to evolve life to fit the existing environments, why has it not equally conquered all of the various environments here and elsewhere? Earth is far better suited for life than any other planet, yet even here most of the environments are either too hot or too cold, too far underground or too far above ground to support much life. In the many thousands of miles of changing environments from the center of the Earth to the edge of its atmosphere, there are only a few meters of habitable environment for most life forms, and therefore, almost all creatures are forced to live there. Although in our solar system only the Earth was made to be inhabited (Isaiah 45:18), even on the Earth only a thin slice is ideally suited for most life-forms including those we are most familiar with, such as mammals, birds, and reptiles.

This thin section, though, is teeming with life. It is estimated that an acre of typical farm soil, six inches deep, has several tons of living bacteria, almost a ton of fungi, two hundred pounds of one-cell protozoan animals, about one hundred pounds of yeast, and the same amount of algae.

Conclusions

The extremely fine line between an environment where life can and cannot exist is illustrated by the fact that it is estimated a five-degree temperature change in the average worldwide temperature would, in time, seriously affect life on the Earth, and much greater temperature change could be disastrous to life. The tolerances are extremely small, and if there are any other planets in the universe, it is unlikely that any of them could have life due to the extremely rigid conditions required for life to exist.

The chances of a planet being the right size, the proper distance away from the right sized star, and the other conditions noted in this article are extremely minute, even if many stars have planets circling them as some speculate. The mathematical odds that all of these and other essential conditions happened by chance are astronomical--something like billions to one!

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...If you call out for **Insight...** You will understand the fear of the LORD and find the knowledge of God.
Based on Proverbs 2:3-5

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The Earth: Unique in All the Universe (Updated)

by Jerry Bergman, Ph.D.*

The following article was originally published as an Impact article in the June 1985 Acts & Facts. Dr. Bergman provides the following update based on what is currently known about the earth and the universe, as of February 2008. To see the previous article, go to: www.icr.org/article/248

The Scriptures declare that "God ... formed the Earth ... to be inhabited" (Isaiah 45:18). An impartial study of the Earth soon convinces the student that there is a tremendous amount of meaning behind this simple declaration.

The Earth

A brief glance at the Earth compared to all other known planets reveals many contrasts. Even from outer space the Earth stands in stark contrast to the other 7 planets in our solar system. The Earth is a welcoming bright blue and white in color, whereas all of the other planets (and their satellites) are a forbidding red, orange, or dull gray. Furthermore our Earth is the only planet circling our sun on which life as we know it could (and does) exist.

The Earth as a planet consists mostly of oxygen, iron, sulfur, silicon, magnesium, aluminum, calcium, hydrogen, and nickel (total: 98%), with the other two percent consisting of about a hundred other elements. Like no other planet, ours is covered with green vegetation, enormous blue-green oceans containing over a million islands, hundreds of thousands of streams and rivers, huge land masses called continents, mountains, ice caps, and deserts that produce a spectacular variety of color and texture. Except for occasional violent catastrophes, all other known planets are covered with lifeless soil or gas that varies only according to slight movements made by wind or mild air currents. Completely barren, the surface of most planets is totally in contrast to the Earth's lively colors--its bright greens, blues, and whites--whereas the surface of all other known rockey planets are rather dull gray and brown often covered with a thick atmosphere.

Some type of life is found in virtually every ecological niche on the Earth's surface. Even in the extremely cold Antarctica, hardy microscopic beings thrive in ponds, tiny wingless insects live in patches of moss and lichen, and plants that grow and flower yearly. From the apex of the atmosphere to the bottom of the oceans, from the coldest part of the poles to the warmest part of the equator, life

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thrives here. To this day no evidence of life has been found on any other planet.

The Earth is immense in size--8,000 miles in diameter with a mass calculated at roughly 6.6 x 10^{21} tons. The Earth is on average 93 million miles from the sun. If the Earth traveled much faster in its 584-million-mile-long journey around the sun, its orbit would become larger and it would move farther away from the sun. If it moved too far from the narrow habitable zone, all life would cease to exist on Earth. If it traveled slightly slower in its orbit, the Earth would move closer to the sun, and if it moved too close, all life would likewise perish.

The Earth's 365-day-6-hour-49-minute-and-9.54-second-round-trip around the sun (the sidereal year) is consistent to over a thousandth of a second! If the yearly average temperature on Earth's surface changed by only a few degrees or so, much life on it would eventually roast or freeze. This change would upset the water-ice and other critical balances--with disastrous results. If it rotated slower on its axis, all life would die in time, either by freezing at night because of lack of heat from the sun or by burning during the day from too much heat.

The Sun

Of all the energy the sun gives off, only 0.45 billionth of its daily output strikes the Earth. The sun provides the eEarth with energy estimated at over 239 trillion horsepower, about 35,000 horsepower for each current resident. Even though there likely exists several hundred billion galaxies in the universe, each with a 100 billion stars, there is only one atom for every 88 gallons of space, which means the vast majority of the universe is empty space!

If the Moon was much larger or nearer to Earth, the huge tides that would result would overflow onto the lowlands and erode the mountains. If the continents were leveled, it is estimated that water would cover the entire surface to the depth of over a mile! If the Earth was not tilted 23° on its axis, but rather was on a 90° angle in reference to the sun, we would not have four seasons. Without seasons, life would soon not be able to exist on Earth--the poles would lie in eternal twilight, and water vapor from the oceans would be carried by the wind towards both the north and south, freezing when it moved close enough to the poles. In time, huge continents of snow and ice would pile up in the polar regions, leaving most of the Earth a dry desert. The oceans would eventually disappear, and rainfall would cease. The accumulated weight of ice at the poles would cause the equator to bulge, and, as a result, the earth's rotation would drastically change.

The Miracle of Water

Another example that illustrates the rigidity of environmental variations necessary for life to exist is that of water. The Earth is the only known planet with huge bodies of water--70% of its surface area consists of oceans, lakes, and seas surrounding huge bodies of land. The few planets that have water contain only moisture floating as vapor on their surface or small amounts of ice or liquid water on the planet itself, not large bodies of liquid water as on Earth.

Water is unique in that it can absorb enormous amounts of heat without a large alteration in its temperature. Its heat absorption level is about ten times as great as steel. During the day, the Earth's bodies of water rapidly soak up enormous amounts of heat; thus, the Earth stays fairly cool. At night, they release the vast amounts of heat that they

absorbed during the day, which, combined with atmospheric effects, keeps most of the surface from freezing solid at night. If it were not for the tremendous amount of water on the Earth, far greater day and night temperature variations would exist. Many parts of the surface would be hot enough to boil water during the day, and the same parts would be cold enough to freeze water at night. Because water is an excellent temperature stabilizer, the large oceans on Earth are vital for life to exist on Earth.

The large amount of water on the Earth can create problems, though. Most all materials expand when heated and contract when cooled. Thus, given two objects of the same size and material, if one is cooler, it will be denser. This may not seem like a problem, but it would be a serious problem in the case of water if it were not for a rare anomaly.

Water, as almost all other substances, contracts when cooled, but, in contrast to virtually all other materials (the rare exceptions include rubber and antimony), it contracts when cooled only until it reaches 4° Celsius; then it--amazingly--expands until it freezes. If water continued to contract when cooled, as do most all other substances, it would become denser and, as a result, would sink to the ocean bottom. Furthermore, when water turned to ice, it would likewise sink to the bottom of the ocean. In time, more and more of the ocean bottom would become ice as more surface water froze, sank, and accumulated at the bottom.

Thus, because of this anomaly, the ice that forms in seas, oceans, and lakes stays near the surface where the sun heats it during the day and the warm water below melts it in the summer. This and the Coriolis effect that produces ocean currents insure that most of the ocean stays in a liquid form, allowing the myriads of water creatures to live and demonstrating that "The Lord by wisdom hath founded the Earth; by understanding hath He established the heavens" (Proverbs 3:19).

The Miracle of Air

On the land, the opposite occurs. The air close to the Earth's surface is heated by light energy from the sun, and after the air is warmed it becomes less dense and rises upward. The result is that the air near the Earth's surface maintains a temperature in which life can exist. If air contracted when heated and became denser, the temperature on the Earth's surface would become unbearable--and most life could not survive for very long. The temperature a few hundred feet above the surface, on the other hand, would be extremely cold, and most life could also not exist there for very long. The only habitable region would be a thin slice of air, but even here life could not exist for long because plants and trees necessary to support life in the atmosphere could not survive, as they would be in the cold zone. Thus birds would have no resting place or food, water, or oxygen. But because air on the Earth's surface rises when heated, life can exist on the Earth.

The movement of warm air from the surface rising upward creates air currents (wind), which are an important part of the Earth's ecological system. They carry away carbon dioxide from areas that overproduce, such as cities, and move oxygen to areas in need of it, such as the large urban population centers.

The mixture of gases usually found in the atmosphere not contaminated by human pollution is perfect for life. If it were much different (say 17% instead of 21% oxygen, too little carbon dioxide, etc., or the atmospheric pressure was much higher or lower), life would cease to exist on Earth. If our atmosphere were much thinner,