

The Vanishing Face of Gaia - James Lovelock

In 1979 James Lovelock published "Gaia: A New Look at Life on Earth." The Gaia hypothesis proposed that the earth is more than a mere ball of rock and in fact a self-regulating 'superorganism' that automatically maintains optimal conditions for life. At the time of publication the Gaia hypothesis was readily accepted by many environmentalists but it was met with nothing but skepticism from the scientific community. Three decades later the concept of a living Earth is no longer just hypothesis and although not yet fully embraced by the scientific episcopacy, nowadays it is usually referred to as the Gaia Theory and has become an important area of research in biogeochemistry. One day Lovelock's latest book, "The Vanishing Face of Gaia" published in 2009, may be recognized as the most significant publication of the 21st century, of comparable importance to Charles Darwin's "On the Origin of Species."

In the 1960s Lovelock had been working for NASA on a project to determine whether there was life on Mars. It occurred to him that sampling its atmosphere might help to resolve that question. That thought was the start of a long journey.

The atmosphere on earth may seem to us like the most normal and likely cover for a planet but its current composition, a chemically dynamic mixture of 21% oxygen and 78% nitrogen, is actually rather atypical. A few percentage points lower and air-breathing life forms could not survive. A few percentage points higher and terrestrial ecosystems would become overly combustible, prone to ignite into raging firestorms at any time. Without the biosphere as it is now, the earth would probably have an atmosphere similar to the one that was found on Mars, and on Venus, consisting of around 95% carbon dioxide. The nitrogen in the earth's atmosphere is indirectly the result of 4.6 billion years of volcanic activity but it was the evolution of bacteria some 3.3 billion years ago that started changing the early earth atmosphere into the one we know today. Using energy from the Sun for photosynthesis, they started to release oxygen as a byproduct. They also sequestered carbon dioxide in organic molecules.

The Gaia theory proposes that the level of oxygen, the formation of clouds and the saltiness of the oceans are all controlled by interacting physical, chemical and biological processes. Gaia theory suggests it is the result of how myriad intricate ecosystems of living things evolved over billions of years on the surface rocks, in the soil, in the air and in the ocean. The level necessary for life's processes is now maintained by these living organisms themselves.

On page 25 of "the Ages of Gaia", James Lovelock illustrates this, tongue-in-cheek in a rather provocative way: "...As you breathe, you excrete waste products into the air, such as carbon dioxide...At the risk of having my membership card of the friends of the earth withdrawn, I say that only by pollution do we survive...We animals pollute the air with carbon dioxide, and the vegetation pollutes it with oxygen..."

It is certainly not absurd or inappropriate to compare Lovelock with Darwin. Lovelock, now in his nineties, is an independent scientist who works from home, as did Darwin. Living in the English countryside both were astute observers of nature

before they developed their theories. Evolution by natural selection and Gaia were each proposed at a time when the basic ideas were far ahead of the evidence necessary to confirm them. The two theories are plainly related. The best way to understand Gaia is to think about evolution in the widest possible perspective. Researchers have documented multiple examples showing how competition and natural selection within ecosystems ultimately resulted in cooperation between different species. Gaia theory suggests that is exactly what has been taking place on the scale of the biosphere for billions of years. The subtitle of Lovelock's latest book is 'A final warning'. His central message is clear: dark clouds loom on the climate horizon.

"Our gravest dangers are not from climate change itself, but indirectly from starvation, competition for space and resources, and from tribal war." (Page 20)

"What inspired me to write this book was hearing in the autumn of 2007 that the scientists of the Intergovernmental Panel on Climate Change (IPCC) had reached a consensus on future climate....I was shocked to hear that they had reached a consensus on a matter of science; I know that such a word has no place in the lexicon of science; it is a good and useful word but it belongs to the world of politics and the courtroom.....Scientists are concerned with probabilities, never with certainties or consensual agreement." (p. 23)

"We have to stop pretending that there is any possible way back to that lush, comfortable and beautiful Earth we left behind sometime in the twentieth century. The further we go along the path of business as usual the more we are lost." (p.44)

"The assumption that the climate can be stabilized by a reduction in emissions at a carbon dioxide abundance of 550 ppm and a global temperature 2C higher than normal has no secure foundation in science. Instead the Earth system could already be committed to irreversible change, even if we implement 60 percent reduction of emissions'.... Even if we cut emissions by 60 percent to 12 gigatons per year it would not be enough....The exhalations of breath and other gaseous emissions by the nearly 7 billion people on Earth, their pets and their livestock are responsible for 23% of all greenhouse emissions. If you add on the fossil fuel burnt in the total activity of growing, gathering, selling and serving food, all of this adds up to about half of all carbon dioxide emissions" (p. 44)

"Like it or not, we are the problem – and as part of the Earth system, not as something separate from and above it..." (p. 47)

"We cannot continue to assume that because there is no way gently to reduce our numbers it is sufficient merely to improve our carbon footprints. Too many think only of the profit to be made from carbon trading. It is not the carbon footprint alone that harms the Earth; the people's footprint is larger and more deadly." (p.48)