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morphed over the years from characterizing the celebration as “New Age apostasy” to embracing it as “innovative liturgical renewal.”

The mainstreaming of the Gaian Mass both at the Cathedral of St. John the Divine and within the Episcopal Church reflects a climate of increased public acceptance of the growing partnership between religious organizations and the environment. Year after year, sold-out performances accomplish the formidable task of actually filling what is, incidentally, the largest gothic cathedral in the world, by packing 3000 to 4000 participants into each celebration. At a time when sociologists of religion cite grim statistics on the decline of mainline Christian congregations in the U.S. that suffer from anemic church attendance, the Gaian Mass’s ecological message and body-active worship seem to have struck a chord with those who resonate with the comfort and beauty of traditional liturgical forms infused with ecospiritual content.

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- See also: Cathedral of St. John the Divine; Christianity (6c4) – Anglicanism; Christianity (7e) – Creation Spirituality; Francis of Assisi; Gaia; Music (various); Winter, Paul.

SP Gaian Pilgrimage

A great pleasure I share with my wife, Sandy, is walking in the countryside enjoying the natural world. We are singularly fortunate to live in the southwest region of England where we can walk on the 630-mile path that winds its fractal way from the seaport town of Poole in Dorset. It goes west along the channel coast to Lands End and travels back east over the rugged cliffs of Cornwall and Devon to end where Exmoor meets the Bristol channel at Minehead in Somerset. This path is more than our long-est trail, it is a contemporary pilgrim’s way.

A pilgrimage implies something more than just a walk through the countryside. It suggests a goal, or a purpose, something spiritual. This trail, whatever the weather or the

season, always has the sea in view with its ever-changing color and motion. Such a view never ceases to uplift and enliven; but more than this, in the course of its undulations the path climbs a total of 91,000 feet, over three times the height of Everest. The effort sets free those natural opiates, the endorphins, which course through the blood and enhance the senses, so that we become aware of our part in the great system of the Earth, and then the trail is the pilgrim’s way to Gaia.

The coast path proceeds uninterrupted for its whole length and it travels over rocks of widely different ages, from the fairly recent at Poole to the 300-million-year-old Devonian, where else but in Devon. To walk the path is to see displayed the fossil history of evolving life on its evolving planet, as in a live museum. At a time not accurately known, but over 600 million years ago, the Earth woke from its long three billion year sleep during which it was a habitat for microorganisms alone. The awakening brought forth the lively world we know of plants and animals, and our journey takes us back through more than half of the history of life forms such as animals and trees. But there is more to the coast path than a display of geology. What makes it so suitable as a pilgrim’s way is that the shore and coastal strip between sea and land is the only remaining natural part of England where the plants and animals are primeval. All other parts of this densely crowded island people use for their own needs, as they do most of the inhabited Earth, so that everywhere it reflects their history, not the Earth’s. Not only this, but the sea is also forever cutting away the land so that on the fresh faces of the cliffs we can see the timeline of the Earth’s history revealed in the rocks and the fossils they bear. There is no better place to get to know our living planet, Gaia, and begin to glimpse our part in it.

The scientific Gaia theory views the Earth as a self-regulating system comprising all life, the air, the ocean and the rocks, that has always kept itself habitable. The theory has been much misunderstood by scientists and some have been unwise enough to condemn it without knowing what it was they condemned. The eminent physicist, Richard Feynman, said “Anyone who claims to understand quantum theory probably does not.” The same is true, although for different reasons, of Gaia theory. Quantum theory is incomprehensible because the universe itself is far stranger than the human mind can contemplate. Gaia theory is difficult to understand because we are not used to thinking about the Earth as a whole system. We often forget that almost all of the science of the nineteenth and twentieth centuries was reductionist. The triumphs of evolutionary and molecular biology that revealed the nature of our genes, the fact that we can almost see the edge of the universe and know the intricate details of inner parts of atoms, all this has come from the patient professional dissection of nature into its component parts. Systems science, which is about the whole not its parts,

has illuminated physiology, the understanding of the way our minds and bodies work, but its successes are lost in the omnipresence of reductionism. Modern science is so steeped in reduction that it is often unaware that there is any other science; the Nobel Laureate biologist, Jacques Monod, even called holists (system scientists) stupid. Gaia theory is a systems science of the Earth, geophysiology, and it requires knowledge of the sciences ranging from astrophysics to zoology and with most other disciplines of science included.

Soon after the start of the trail in the county of Dorset we walk over chalk cliffs, a layer of white rock, more than 1000 feet thick, and made entirely of the shells of algae that lived in the ocean during a period before 65 million years ago. From the cliff-top vantage point we can look out to sea where the similar microscopic algae are now living in its surface, and wonder about their remote ancestors, whose shells sedimented onto the sea floor only to be uplifted and dried by the Earth's tectonic forces so as to become these cliffs. The path we tread is not dead ground; we tread on the living Earth. The chalk cliff represents the sequestering of about thirty atmospheres of carbon dioxide gas. Were most of the carbon dioxide in the atmosphere instead of in those fossil shells we would be on a dead planet half as hot as Venus. These algae did their part over tens of millions of years and so made sure that the carbon dioxide of the air was kept at a level conducive to a favorable climate and yet still sufficient for the needs of plants. Their skeletons, on which we stand, are the record of their contribution. Like the algae, all life, including us, evolves in a world that is made from the breath, the blood and the bones of our ancestors.

All living things are recondite and they are difficult to understand because we are not used to the circular logic of systems where cause and effect are inextricably tangled. Consider the complexity of the connection between blooms of algae living in the ocean, these chalk cliffs, and the climate. We could start by researching the way the different species of organisms in the ocean surface live with one another, but we would soon find that we needed to know the chemistry and physics of the ocean surface and the way the algae use the carbon dioxide to make their shells, and the way that CO₂ in the air keeps the Earth warm. But this would be less than half the story that the algae could tell. Through the inspiration of Gaia we discovered that algae could powerfully affect the climate in another way. Their response to the saltiness of the ocean causes them to synthesize the precursor of a gas, dimethyl sulphide, which plays a vital part in the cycle of the essential element sulphur between land and sea, but this gas is also part of Gaia's climate-control mechanism. Dimethyl sulphide oxidizes in the air to become tiny droplets of sulphuric acid, and without these, clouds would be fewer and less dense and the Earth a much hotter place. So we also need to know the chemical reactions in the air,

the physics of cloud formation, the way that clouds affect the Earth's radiation balance and the way all these related processes affect climate. More than this we still have to understand how climate feeds back on the growth of algal blooms, and this is just a small part of Gaia. No wonder the denizens of separated scientific disciplines are uncomfortable with this four-letter word, Gaia, which requires the understanding of a dozen or more apparently unconnected sciences.

As we walk on and leave the chalk cliffs behind we travel further back in time to the Jurassic period, made so familiar by Michael Crichton's novel *Jurassic Park*. We come first to the Purbeck limestone brimming with the man-sized spirals of fossil ammonites, and then on to the dark and somber cliffs of Kimmeridge shale. I recall the thrill of excitement felt when walking on a beach in this region and seeing, as if drawn in chalk, the white skeleton of an ichthyosaur on a flat black slab of shale. Walking on westward we come to Devon with its red sandstone cliffs dating back close to the time when the multicellular life of our world began. After Devon the westward trail takes us on to Cornwall and to Lands End. The cliffs now are of basalt and granite, there are no fossils in these rocks. They are the slag of past volcanoes and tectonic events. These dead rocks were once orange hot and molten but they are still part of our living planet. According to Gaia theory, plate tectonics and the persistence of water are the unique properties of a planet with abundant life. Further on, the trail turns east along North Cornwall's rugged coast until we reach the Cambrian rocks of Devon again where the uplands of Exmoor reach the sea. The trail ends in rocks of the Jurassic period at the Somerset town of Minehead, and from here we return home to the present and to think about our own relationship with Gaia.

Our planet is a unique member of the solar system. It is special not just because it bears life. The moon did not become a living system when the astronauts walked on it, nor would the discovery of an oasis of bacteria on Mars or Europa make them living planets. What makes the Earth special is not just the abundance and diversity of life but that our planet has always kept its material conditions habitable for them. On Earth the evolution of the living organisms and the evolution of their material environment have, since life began, gone forward tightly coupled together, and from this single evolution has emerged the self-regulation of the climate and chemistry, so that always the Earth was habitable. A consequence is that now and in the past the air, the ocean, and the rocks that go to make up the Earth's surface are utterly and impossibly different from those of a dead planet like Mars. They are as different as we ourselves are from a stone statue.

The coast path is a fine place to sense the presence of Gaia but a full understanding is probably beyond the most capable minds alive today. Gaia theory is not contrary to Darwin's great vision; but I suspect that it will be some

time before biologists and geologists collaborate closely enough for us to see the emergence of a truly unified Earth System science. The Oxford biologist, William Hamilton, in a television interview, referred to the Gaian view of evolution as Copernican, but added, we await a Newton to explain how it works.

Science is often said to be ethically neutral and the good or bad consequences of its application are attributed to those who apply it. The philosopher, Mary Midgley, reminded us that Gaia has influence well beyond science. She said,

The reason why the notion of this enclosing whole concerns us is that it corrects a large and disastrous blind spot in our contemporary world view. It reminds us that we are not separate, independent autonomous entities. Since the Enlightenment, the deepest moral efforts of our culture have gone to establishing our freedom as individuals. The campaign has produced great results but like all moral campaigns it is one sided and has serious costs when the wider context is forgotten (2000).

One of these costs is our alienation from the physical world. She went on to say:

We have carefully excluded everything non-human from our value system and reduced that system to terms of individual self interest. We are mystified – as surely no other set of people would be – about how to recognise the claims of the larger whole that surrounds us – the material world of which we are a part. Our moral and physical vocabulary, carefully tailored to the social contract, leaves no language in which to recognise the environmental crisis (2000).

President Havel of the Czech Republic expressed similar thoughts when he was awarded the Freedom Medal of the United States, and he took as the title for his acceptance speech, “We are not here for ourselves alone.” He reminded us that science had replaced religion as the authoritative source of knowledge about life and the cosmos but that modern reductionist science offers no moral guidance. He went on to say that recent holistic science did offer something to fill this moral void. He offered Gaia as something to which we could be accountable. If we could revere our planet with the same respect and love that we gave in the past to God, it would benefit us as well as the Earth. Perhaps those who have faith might see this as God’s will also.

Four billion years of evolution have given us a planet unsurpassed in beauty. We are a part of it and through our eyes Gaia has for the first time seen how beautiful she is. We have justified our ancient feeling for the Earth as an organism and should revere it again, and what better way

to do it than by a pilgrimage. Gaia has been the guardian of life for all of its existence; we reject her care at our peril. We can use technology to buy us time while we reform but we remain accountable for the damage we do. The longer we take the larger the bill. If you put trust in Gaia, it can be a commitment as strong and as joyful as that of a good marriage, one where the partners put their trust in one another and since they are, as Gaia is, mortal, their trust is made even more precious.

James Lovelock

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- See also: Epic of Evolution; Gaia; Gaia Foundation and Earth Community Network; Gaian Mass; Science.

Gandhi, Mohandas (1869–1948)

It is tempting to think that Gandhi may have been an “early environmentalist” and yet there seem to be insuperable problems in embracing this view. He was remarkably reticent on the relationship of humans to nature, and it is striking that he never explicitly initiated an environmental movement, nor does the word “ecology” appear in his writings. Though he was greatly animated by the subject of cow protection, the 50,000 pages of Gandhi’s published writings have otherwise little to convey about trees, animals, vegetation, and landscapes.

It is also doubtful that Gandhi would have contemplated with equanimity the setting aside of tracts of land, forests, and woods as “wilderness areas.” The enterprise of retreating into the forest was familiar to him from Indian traditions, but Gandhi spent an entire lifetime endeavoring to remain other-worldly while wholly enmeshed in the ugly affairs of the world. The problems posed, for example, by the man-eating tigers of Kumaon, made famous by Jim Corbett, would have left less of a moral impression upon him than those problems which are the handiwork of humans who let the brute within them triumph. It is reported that when the English historian Edward Thompson once remarked to Gandhi that wildlife was rapidly disappearing in India, Gandhi replied: “wildlife is decreasing in the jungles, but it is increasing in the towns.”