

**LAWRENCE OSBORN****The Machine and the Mother Goddess:  
The Gaia Hypothesis in Contemporary  
Scientific and Religious Thought**


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*'James Lovelock's Gaia Hypothesis has received widespread publicity as a popular explanation of the development of the global ecosystem. The article examines its credibility as a scientific hypothesis and examines some of the more common criticisms levelled against it. It has come under suspicion because of its apparent affinity with recent mystical approaches to the natural world. The article argues that a clear distinction must be drawn between its use as a scientific hypothesis and the attempts to associate it with such concepts as planetary consciousness and earth goddess. It is suggested that the hypothesis may have a limited role in contemporary Christian theologies of nature provided certain safeguards are maintained.'*

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Few scientific hypotheses of recent generations have generated the degree of controversy common in the scientific debates of our Victorian forefathers. One exception to this generalisation is the Gaia hypothesis promoted by James Lovelock—an engagingly unconventional scientist who has worked for NASA and Hewlett-Packard, has been president of the Marine Biological Association, and currently holds a visiting professorship in cybernetics.

In a recent newspaper article Lovelock is pilloried as a 'catalyst for irrationalism,' 'a scientist of sorts,' and a man who 'knew embarrassingly little ecology and evolution when he wrote his first bestseller on Gaian global ecology.'<sup>1</sup> By contrast, Sir George Trevelyan, that guru of the New Age, proclaims Gaia to be an appropriate myth for our post-industrial society.<sup>2</sup> Such language recalls the mythology of the conflict between Darwinists and the religious establishment.

Why has the Gaia hypothesis generated such strong feelings? The article cited above dismisses it as attractive to 'the ecologically naive' because of 'its religious undertones, bolstered by woolly associations with the art and

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1 J. Horsefall, 'The Hijack of reason' (Guardian, Apr 20, 1990, p. 27). Similar language is used by J. Postgate in *New Scientist*, 7 April 1988, p. 60.

2 G. Trevelyan, *Summons to a High Crusade* (Forres: Findhorn Press, 1986), p. 68. He derived this view from Kit Pedler (see note 26) but his status within the New Age movement gives his use of the phrase additional significance.

culture of the so-called New Age.' This association is also noted by Christian commentators on the New Age movement. For example, Clifford Denton warns against discussion of the Gaia hypothesis on the grounds that Lovelock's approach 'when put alongside other creation centred ideas from scientists and mystics feeds right into New Age thinking.'<sup>3</sup>

## 1 The Gaia Hypothesis

In his first book on the Gaia hypothesis James Lovelock offered the following working definition: 'a complex entity involving the Earth's biosphere, atmosphere, oceans, and soil; the totality constituting a feedback or cybernetic system which seeks an optimal physical and chemical environment for life on this planet'.<sup>4</sup> His colleague, Lynn Margulis adds that

Each species to a greater or lesser degree modifies its environment to optimize its reproduction rate. Gaia follows from this by being the sum total of all these individual modifications and by the fact that all species are connected, for the production of gases, food and waste removal, however circuitously, to all others.<sup>5</sup>

In essence Lovelock and Margulis have proposed that, when considering ecosystems on a global scale, organisms and their abiotic environment are best regarded as mutually interdependent parts of a single system. It is generally agreed that the environment has a profound influence upon organisms and their evolution: species must adapt to their environments, the ones which adapt most successfully are most likely to persist. Lovelock's hypothesis asserts that the converse is also true: on a global scale, organisms profoundly influence their abiotic environment in such a way as to maintain that environment as close to an optimum for the continuance of life as possible. In other words, the evolution of life has resulted in a biosphere which functions on a global scale as an active control system.

But Lovelock has also used less measured terms to describe Gaia. On occasion he has likened this global, environmental control system to an organism, specifically 'the largest living organism'.<sup>6</sup> But his most sweeping statement of the hypothesis must surely be, 'the Gaia hypothesis supposes the Earth to be alive'.<sup>7</sup> It should be added that he has also warned against taking seriously his tendency to speak anthropomorphically about Gaia.<sup>8</sup>

Lovelock's more picturesque expressions of the Gaia hypothesis are a

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3 C. Denton, 'New Age in the Church' (A Christian Response to the New Age Movement, Prophetic Word Ministries Briefing Paper no. 4, Sept 1990), p. 6).

4 J. Lovelock, *Gaia: A new look at life on Earth* (Oxford University Press, 1979), p. 11.

5 cite *ibid.*, p. 128.

6 J. Lovelock, *The Ages of Gaia: A biography of our living Earth* (Oxford University Press, 1988), p. xiv. Cp. Lovelock *op. cit.* (4), p. 1.

7 Lovelock *op. cit.* (6), p. 8.

8 Lovelock *op. cit.*, (4), p. ix.

partial explanation for the heat it has generated. Assertions that the Earth is alive only serve to alienate more conservative scientists.

However, what matters is whether the hypothesis stands up to the usual criteria by which a scientific theory is judged. Is it testable? Is it a fruitful source of fresh insights? How does it relate to other scientific theories?

**(a) *The testability of Gaia***

On the question of testability, Lovelock is quick to point out that the hypothesis has led to a series of specific predictions about the biosphere which are susceptible to testing.

The history of the hypothesis is relevant here. Lovelock claims that it began to take shape while he was working on the problem of detecting extra-terrestrial life. How can you determine from deep space whether or not a planet possesses life? The answer lies in the atmosphere: Earth possesses a highly unstable oxidising atmosphere. This contrasts sharply with the atmospheres of Venus and Mars. Lovelock suggested that a planetary atmosphere would function as a depository for wastes and a source of raw materials for any organisms on the planet's surface. This would have the effect of forcing it away from chemical equilibrium. And on the basis of this suggestion he argued that Mars was most probably lifeless.

One of the main lines of evidence put forward by supporters of the Gaia hypothesis is the chemical composition of the Earth's atmosphere. At 21% Oxygen and 78% Nitrogen it is very different from what you might expect without life. Abiotic models suggest a composition of about 98% Carbon Dioxide and 1.9% Nitrogen (with mean surface atmospheric pressure and temperature approaching those of Venus).<sup>9</sup>

That life has had a profound influence on its environment is not in doubt. The question is whether that influence is of the nature of a negative feedback system. Do the biological factors lend stability to the global environment? Lovelock points to the relative stability of atmospheric chemistry and physics over the past several hundred million years. The mean surface temperature has remained relatively stable during a period in which incident solar radiation has increased by about 15%. The level of free oxygen in the atmosphere has also remained relatively stable for long periods.

The Gaia hypothesis offers biological mechanisms for both examples. Lovelock suggests that global methane production acts as a check on oxygen production. Both are generated by the same source, living organisms. A general increase in biotic activity is likely to increase both production rates with a resultant increase in the rate of oxidation of methane (removing excess free oxygen). The phosphorus cycle and regulation by naturally occurring fires may also have a part to play.

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<sup>9</sup> Figures taken from table in Lovelock *op. cit.* (6), p. 9.

Surface temperature is affected mainly by the presence of carbon dioxide and the planet's albedo. The Gaia hypothesis suggests that atmospheric carbon dioxide levels are under biotic control. As surface temperature rises so the rate at which plants and microorganisms take up carbon dioxide from the atmosphere should rise. This has the effect of reducing carbon dioxide levels and so reducing surface temperature. It has been suggested that increased microorganism activity might increase the rate at which silica bearing rocks are weathered (such weathering is the chief abiotic mechanism for removing carbon dioxide from the atmosphere).<sup>10</sup>

Planetary albedo may also be affected by living organisms. Recently it has been suggested that one of the waste products of oceanic algae, dimethyl sulphide, may be a major source of cloud condensation nuclei. If so, an increase in temperature to encourage the growth of plankton might be expected. This would lead to increased emissions of dimethyl sulphide and a corresponding increase in cloud densities which would have the effect of increasing albedo and reducing surface temperature. Unfortunately for the Gaia hypothesis, recent measurements suggest that, as temperatures increased at the end of the last ice age, dimethyl sulphide generation actually decreased.<sup>11</sup>

Other testable predictions based on the Gaia hypothesis<sup>12</sup> include the suggestion that oceanic organisms play a key role in the transport of essential elements from the oceans to land surfaces. Lovelock points to the discovery of atmospheric dimethyl sulphide and methyl iodide as partial confirmation of this prediction. Yet another prediction is that, during the Archaean period, atmospheric chemistry was dominated by methane.

### ***(b) The fruitfulness of Gaia***

Does the Gaia hypothesis open up new lines of enquiry? Does it offer us a new perspective on global ecology, enabling us to ask new questions and obtain sensible answers?

As I have already indicated, advocates of the Gaia hypothesis argue that it explains a number of outstanding problems in the history of the biosphere. In addition to the above examples, it has led to the suggestion that the low salinity of the oceans may have a biological explanation through the mechanism of reef formation. Still more speculative is the suggestion that the presence of life may be responsible for plate tectonics through the destabilization of the earth's crust as a result of limestone deposition at the continental margins.<sup>13</sup>

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10 D. W. Schwartzman & T. Volk, *Nature*, 340 (1989), 457-59.

11 A. Watson, 'Inside Science No. 48: Gaia', *New Scientist*, 6 July 1991.

12 Lovelock, 'Hands up for the Gaia hypothesis', *Nature*, 344 (1990), 100-02 (p. 102).

13 D. L. Anderson, 'The Earth as a Planet: paradigms and paradoxes', *Science*, 223 (1984), 347-55.

The existence of such speculation does suggest that, for some parts of the scientific community, the Gaia hypothesis has offered a helpful new perspective on old problems. At the very least it has made scientists in fields such as geophysics, climatology, and atmospheric chemistry take the possible role of life more seriously.

Sometimes Lovelock's new perspective produces unexpected results. The most striking of these is his Gaian perspective on environmentalism. Readers who are familiar with Gaia mainly from environmentalist literature may not be aware of what an uneasy bedfellow it is for ecocentric environmentalists.<sup>14</sup> Lovelock stresses the robustness of the global ecosystem. It is not the fragile flower depicted by so much environmentalist literature but a tough control mechanism which has most probably maintained life on this planet through major global catastrophes. He accuses environmentalists of being overly anthropocentric in their concerns. He denies that industrial pollution or nuclear waste are major threats to the global ecosystem. Indeed he has gone on record to the effect that a major nuclear war, while catastrophic for the human race, would not be ultimately disastrous for Gaia.<sup>15</sup>

Taking a Gaian perspective he perceives the real threat to Gaia as coming from bad farming practices which replace complex ecosystems with simple ones. Allied with this is widespread atmospheric pollution resulting from slash-and-burn clearance of land for agricultural use. He argues that the latter has already had a significant impact on the atmospheric transport mechanisms which are an integral part of Gaia's climate regulation. It is perhaps indicative of the extent of Lovelock's influence amongst environmentalists that there has been a significant shift in emphasis towards these concerns since the publication of his first book.

### ***(c) The Gaia hypothesis in relation to existing theories***

Gaia may be testable and fruitful, but is it coherent with related sciences? The very fact of its apparent fruitfulness in terms of generating further speculation suggests that the hypothesis is intelligible to at least some scientists. However, Lovelock has created a number of difficulties for anyone seeking to relate the hypothesis to certain important aspects of contemporary biological thought.

The first is his very loose understanding of the term 'life'. He dismisses whatever biologists might have to say about the subject as 'manifestly inadequate' on the strength of the term's omission from one textbook and a couple of popular dictionary definitions.<sup>16</sup> His own approach is informed

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14 Environmentalism is now frequently classified into two main approaches: technocentrism (which regards environmental problems as susceptible to technological solutions) and ecocentrism (which sees the environmental crisis as symptomatic of a faulty understanding of the relationship between humankind and nature).

15 Lovelock *op. cit.* (4), p. 41.

16 Lovelock *op. cit.* (6), p. 18.

by systems theory and by the unorthodox views of Lynn Margulis. The two features which he highlights as particularly important for defining life are its social character and its use of homeostatic control mechanisms. This rapidly leads to confusion over what entities might be called living creatures

We have no trouble with the idea that noble entities such as people are made up from an intricate interconnected set of cell communities. We don't find it too difficult to consider a nation or a tribe as an entity made up of its people and the territory they occupy. But what of large entities, like ecosystems and Gaia? It took the view of Earth from space . . . to give us the personal sense of a real live planet on which the living things, the air, the oceans, and the rocks all combine in one as Gaia.<sup>17</sup>

Contrary to Lovelock, I think most people would have difficulty in regarding human societies as living creatures in their own right. Lovelock's criteria for life may be necessary, but they are not sufficient, with the result that the term is used in a much broader sense than would be acceptable to most biologists.

Another difficulty is Lovelock's insistence that the Gaia hypothesis entails a punctuated equilibria approach to evolution.<sup>18</sup> This has alienated many of the most outspoken advocates of neo-Darwinism.

To make matters worse Lovelock's response to his critics has been every bit as aggressive and pejorative as the article cited in the introduction. Criticisms from the biological establishment result in sweeping judgments. For example, 'Biology has seemed to be imprisoned in a narrow, almost puritan, reductionism' and 'Most biologists and many geochemists are ignorant of the details of control theory'.<sup>19</sup>

#### ***(d) Criticisms of the Gaia hypothesis***

Setting aside the invective, what substantial arguments have been brought to bear by critics of his hypothesis? Lovelock himself divides the criticisms into two main categories.

The first type of criticism accepts Lovelock's contention that life has a profound influence on its environment, but questions his efforts to explain the geochemical and atmospheric evolution of the planet entirely in biological terms. This group of critics argue that the kind of regulation provided by Gaia is only partial; that abiotic control mechanisms also exist.<sup>20</sup> Lovelock takes these criticisms as a reluctant admission that he is right. However, it remains to be seen which set of mechanisms is dominant. If abiotic mechanisms constitute the more important part of the

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17 *ibid.* p. 18f.

18 *ibid.*, p. 13, 55-56.

19 Lovelock *op. cit.* [12], p. 102.

20 e.g., S. Schneider & R. Londer, *The Coevolution of Climate and Life* (San Francisco: Sierra Club Books, 1984).

control system, then the Gaia hypothesis will have to be modified beyond recognition.

Some scientists, led by Richard Dawkins, have opted for a second line of attack.<sup>21</sup> They argue that the Gaia hypothesis is teleological and, therefore, falls outside the bounds of what is acceptable as a scientific hypothesis. Assuming that evolution proceeds by a process of local natural selection, there is no reason to expect the evolution of global altruism. The argument is analogous to the one used by neo-Malthusians to demonstrate the impossibility of long-term environmental protection by human goodwill alone. It is always to the immediate advantage of the individual to pursue his or her own interests at the expense of the longer term interests of the group as a whole. Some form of overarching central control is necessary to force the individual to exercise restraint. Dawkins, and those who follow his approach, perceive in the Gaia hypothesis just such a central agency; hence the accusation of teleology.

Lovelock denies this second accusation with vigour, asserting that he has never 'express[ed] the idea that planetary self-regulation is purposeful, or involves foresight or planning by the biota'.<sup>22</sup> In his defence he has devised a computer model called *Daisyworld*. In this model a planet is maintained at constant temperature in the face of increasing incident solar radiation by means of a population of dark- and light-coloured daisies. The evolution of the daisies is tightly coupled to the planet's climate and this in turn is affected by changes in the planet's albedo brought about by changes in the relative populations of daisies. This model has been considerably extended by the inclusion of many more species (e.g., herbivores and predators).

The results of *Daisyworld* are striking. It displays long-term ecosystem stability in the face of ever-increasing solar radiation. It also demonstrates the system's capacity to repair the major planet-wide damage to the biosphere that might be caused by an asteroid impact. Most important, it illustrates very graphically Lovelock's contention that an active global homeostatic system need not be teleological. On the other hand, it does not actually demonstrate that this is the case for the earth's environment.

It is perhaps worth noting at this point an underlying assumption of the Gaian approach to the environment. Gaia, understood as the sum total of all interactions of the biota and the abiotic environment, is assumed to be self-regulatory. This is uncannily similar to the underlying assumption of *laissez-faire* economics: no conscious regulation of individual selfish behaviour is required because the system as a whole is self-regulatory. Behind this lies the Enlightenment's secularization of providence into the concept of harmony.<sup>23</sup>

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21 e.g., R. Dawkins, *The Extended Phenotype* (Oxford University Press, 1982).

22 Lovelock *op. cit.* (12), p. 100.

23 P. Tillich, *Perspectives on 19th and 20th Century Protestant Theology* (London: SCM, 1967), pp. 36-43.

**(e) Is Gaia alive?**

Biological life is normally distinguished from non-living matter by a list of specific characteristics. These include emergence by evolutionary mechanisms, internal homeostasis, the ability to grow, reproduction and death. It is apparent that Gaia fails to meet these widely accepted criteria for a biologically living organism. The property of homeostasis is shared by computers and motor cars, so is clearly not sufficient on its own to establish a system as living, however complex that system may be.

It seems to me that it would be perfectly possible to think of Gaia as a global environmental control system without having to suggest that it is, in any sense, a living creature in its own right. Lovelock's colleague Margulis has similar reservations about this aspect of the thesis:

I reject Jim's statement 'The Earth is alive'; this metaphor, stated this way alienates precisely those scientists who should be working in a Gaian context. I do not agree with the formulation that says 'Gaia is an organism'. First of all in this context no-one has defined 'organism'. Furthermore I do not think that Gaia is a singularity. Rather Gaia is an extremely complex system with identifiable regulatory properties which are very specific to the lower atmosphere.<sup>24</sup>

## **2 Beyond Mechanism**

Some advocates of Gaia are impatient with the caution inherent in models such as *Daisyworld*. They see in Gaia a system of such complexity that entirely new properties might be expected to emerge within the system—properties which a computer model cannot be expected to duplicate. Specifically they draw an analogy between the complexity of a mammalian central nervous system and that of Gaia. For them Gaia is quite clearly alive and probably conscious. For example, Elisabet Sahtouris insists that 'the earth meets the biological definition of a living organism . . . only limited aspects of its function—never its essential self-organization—may be usefully modeled by cybernetic systems'.<sup>25</sup>

This constitutes a tacit acceptance of the observation that Gaia is teleological. Like Dawkins, they can only envisage planet-wide environmental control if it is the result of conscious planning.

One of the first advocates of Gaian consciousness was the science journalist Kit Pedler. He accuses the more cautious advocates of Gaia (and, by implication, Lovelock himself) of reductionism. Descriptions of Gaia which remain content with accounts of its control mechanisms

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24 cited by R. Sheldrake, *The Rebirth of Nature: The Greening of Science and of God* (London: Century, 1990), p. 129.

25 E. Sahtouris, *Gaia: The Human Journey from Chaos to Cosmos* (New York: Pocket Books, 1989), p. 66. It is worth noting that her definition of life, drawn from Varela and Maturana's theory of autopoiesis, is so broad as to embrace star clusters and galaxies!



are no more complete than a neurophysiological view of the human brain. For Pedler, the assertion that Gaia is this network of negative feedback loops is as reductionistic as saying that human love and creativity can be explained entirely in terms of neurones and synapses.

Pedler would have us believe that, if it is taken seriously, the Gaia hypothesis entails a radically holistic approach to all our thinking: an approach which will, at the least, relativise the old emphasis on reductionism. But does this insistence on holistic thinking arise from his acceptance of Gaia or from other sources? Embedded within his account of the Gaia hypothesis is ample evidence that he is looking at Gaia from the perspective of a particular world-view.

What is Pedler's understanding of reality? This is summed up most succinctly in his approving citation of Eddington's famous dictum, 'The universe looks less and less like a great machine and more like a great thought'.<sup>26</sup> Not only is his approach to reality idealistic but he also tends to monism (the view that all observed phenomena are merely temporary manifestations of a single ultimate reality). For example, he regards individuality as 'a temporary separation from the fabric of the universal life process'.<sup>27</sup> Just to complete the picture of his 'holistic science' we should note that, since reality is ultimately thought we, as thinkers, have a hand in creating it. Thus he criticises the objectivity of traditional science and calls for greater stress on subjectivity.

It should be noted that very little of this 'holistic' perspective could have been gleaned from Lovelock's version of the Gaia hypothesis. By comparison with Pedler, Lovelock's approach is reassuringly reductionist and objective. Gaia is the symbol upon which Pedler has chosen to hang his philosophy rather than the source of that philosophy. Indeed, at one point he describes Gaia as 'a myth for a post-industrial age'.<sup>28</sup>

Another writer who has taken Gaia far beyond its mechanistic roots is Peter Russell. Russell is a management consultant and author who has been active in the popularisation of transcendental meditation. His account of Gaia is far more elaborate than Pedler's.<sup>29</sup> After a relatively brief journalistic introduction to systems theory, Gaia and evolution, he works Gaia into an evolutionary cosmology informed mainly by Teilhard de Chardin and Sri Aurobindo. This becomes the launch pad for what is, in effect, an introduction to New Age thought.

In one important respect, however, Russell is more cautious than Pedler. While Pedler boldly asserts that Gaia is 'one single life-form with senses, intelligence and the power to act',<sup>30</sup> Russell believes that

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26 K. Pedler, *The Quest for Gaia: A Book of Changes* (London: Souvenir Press, 1979), p. 38.

27 *ibid.*, p. 39.

28 *ibid.*, p. 46.

29 Peter Russell, *The Awakening Earth: Our Next Evolutionary Leap* (London: Routledge & Kegan Paul, 1982).

30 Pedler *op. cit.* (26), p. 11.

Gaia is only just on the threshold of consciousness. This is directly related to the New Age expectation of a global transformation. We stand at a critical moment in the history of evolution. Russell suggests that there is an analogy between the human population explosion of recent decades and the rapid multiplication of neurones in the brain of a human embryo. There will soon be as many human beings as there are neurones in the average human brain. In human development, the rapid multiplication of neurones gives way to the rapid multiplication of synaptic connections between them and the awakening of consciousness. So it is with the Earth—it is possible that the explosion of information technology will result in a planetary brain with humans as the individual neurones. But that evolution depends critically upon the choices we make in the next few decades:

We appear to be at a historical cusp, wavering between two mutually exclusive directions: breaking through to become a global social super-organism; or breaking down into chaos and possible extinction.<sup>31</sup>

Why has Lovelock's Gaia hypothesis received this kind of attention? Part of the answer lies in his systems perspective. In a limited sense, it is a holistic hypothesis—it asserts the interconnectedness of all terrestrial organisms together with their physical environment. Provided you are prepared to overlook the fallacy involved in generalizing from a biological theory to a metaphysical principle, this might be used as an argument in favour of the metaphysical principle of interconnectedness, namely, that *all* spiritual and material realities are mutually interdependent. Because this principle pervades New Age thought, the Gaia hypothesis might thus be read as scientific legitimization of an important aspect of the New Age.

However, there are deeper reasons for its attraction. Lovelock quotes a semiotician<sup>32</sup> to the effect that 'Gaia is an empty sign with near infinite capacity for signification' to which he adds 'I watch it filling fast, and mostly with rubbish, like an empty skip left on a London street'.<sup>33</sup>

But is it true that Gaia is an empty sign? On the contrary, it is replete with connotations for anyone with a classical education or an interest in paganism or feminist spirituality.

The 2nd century Roman author Apuleius puts the following self-description in the mouth of Gaia, the Earth Mother:

I am Nature, the universal Mother, mistress of all elements, primordial child of time, sovereign of all things spiritual, queen of the dead, queen also of the immortals, the single manifestation of all gods and goddesses that are. My nod governs the shining heights of Heaven, the wholesome sea breezes, the lamentable silences of the world below. Though I am

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31 Russell *op. cit.*, (29), p. 95.

32 Semiotics is a branch of linguistics specializing in signs and symbols and their relation to meaning.

33 Lovelock *op. cit.* (12), p. 102.

worshipped in many aspects, known by countless names, and propitiated with all manner of different rites, yet the whole round earth venerates me.<sup>34</sup>

These connotations would certainly not have been lost on William Golding, whom Lovelock credits with suggesting the name. Nor are they lost on those who have extended the hypothesis beyond the bounds of natural science. Kit Pedler, for example, clearly trades on its metaphorical force, and Theodore Roszak, a perceptive commentator on the New Age movement, recognises that 'the image of Earth as a living personality has sounded strong existential chords'.<sup>35</sup>

### **3 Gaia and the New Pagans**

The metaphysical use of the Gaia hypothesis described in the preceding section consciously stops short of deifying Mother Earth. More than once Pedler denies that this is his intention: he has no desire to revive goddess worship or to reinstate pantheism.<sup>36</sup> Nonetheless there is a very fine line between the metaphysics of interconnectedness and conscious pantheism. The fineness of the dividing line can be seen both in Russell and Pedler, e.g., 'She is spirit, she is life'.<sup>37</sup>

This might lead one to expect the widespread celebration of Gaia by those whose goal is to restore worship of the goddess. The revival of witchcraft is one facet of the contemporary revulsion with the fruits of the Enlightenment. For many people science with its ideal of objective analysis has killed the mystery and enchantment of life while our technocentric industrial society has come to be seen as a juggernaut going nowhere. Their reaction has been a compulsive search for something to restore the enchantment and to give their lives a renewed sense of direction. For some that search has led them back to Christianity but many more see the Christian faith as part of the problem. They have turned instead to those spiritual traditions which have been suppressed or at least opposed by the dominant western culture in the hope of finding a more promising alternative.

There are a number of New Agers who enthusiastically subscribe to a metaphysical or mystical reading of the Gaia hypothesis. I have already cited Kit Pedler, Peter Russell, and Elisabet Sahtouris. Another advocate is the unorthodox biologist, Rupert Sheldrake. In his most recent book he has accommodated the Gaia hypothesis to his own theory of morphogenetic fields, arguing that the purposive organising principle behind Gaia is just

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34 cited by M. Stone, *When God was a Woman* (New York: Harcourt Brace Jovanovich, 1978), p. 22.

35 T. Roszak, *Person/Planet: The Creative Disintegration of Industrial Society* (London: Granada, 1981), p. 65.

36 Pedler *op. cit.* (26), pp. 11, 46.

37 *ibid.*, p. 13.

such a field.<sup>38</sup> Within Neo-Paganism, Gaian views are most strongly associated with Tim Zell, one of the founders of the Church of All Worlds. In 1970 he proposed a mystical form of the Gaia hypothesis.<sup>39</sup>

However, the use of Gaia by New Agers and Neo-Pagans is surprisingly patchy. Probably the best known contemporary witch is Starhawk. She describes the Goddess in the following terms:

She is the reality behind many metaphors. She is reality, the manifest deity, omnipresent in all of life, in each of us. The Goddess is not separate from the world—She is the world, and all things in it: moon, sun, earth, star, stone, seed, flowing river, wind, wave, leaf and branch, bud and blossom, fang and claw, woman and man.<sup>40</sup>

The Goddess is the reality behind many metaphors and Starhawk is free in her use of metaphors to articulate her faith. But one metaphor she does not use is Gaia! The Gaia hypothesis receives no more than a footnote in her writings. Similar comments might be made about a leading British witch, Caitlin Matthews.

Turning to mainline New Age publications, the journal *Kindred Spirit* has never run an article on Gaia.<sup>41</sup> During the course of my research on the New Age movement I have built up a large database of New Age publications: out of nearly 1200 volumes only 7 make any substantial reference to Gaia.

Even advocates of green spirituality are less than unanimous in their use of Gaia. Jonathon Porritt certainly mentions Gaia in passing but deep ecologists Bill Devall and George Sessions ignore the hypothesis completely. Even more striking is the fact that the ecofeminist Charlene Spretnak uses the Hellenistic Gaia myth but ignores its twentieth century ecological namesake.<sup>42</sup>

Another spokesman of the New Age who might have been expected to make use of Gaia is Matthew Fox. Fox, the Dominican priest who founded the creation-centred spirituality movement, has written at great length

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38 R. Sheldrake, *op. cit.* (24) pp. 126–36.

39 M. Adler, *Drawing Down the Moon: Witches, Druids, Goddess-Worshippers, and Other Pagans in America Today* (Boston: Beacon Press, 1986), p. 303; J. G. Melton, *New Age Encyclopedia* (Detroit: Gale Research, 1990), p. 183.

40 Starhawk, *The Spiral Dance: A Rebirth of the Ancient Religion of the Great Goddess* (San Francisco: Harper & Row, 1979), p. 8.

41 This was true as of December 1990. Another British New Age journal, *Resurgence*, has recently (October 1990) published such an article—but it was merely a reprint of Lovelock *op. cit.* (12).

42 J. Porritt & D. Winner, *The Coming of the Greens* (London: Collins, 1988); W. Devall & G. Sessions, *Deep Ecology: Living as if nature mattered* (Salt Lake City: Gibbs M. Smith, 1985); C. Spretnak, *The Spiritual Dimension of Green Politics* (Santa Fe: Bear & Co, 1986)—since Spretnak is an associate of Fritjof Capra, who has made limited use of the Gaia hypothesis, it seems unlikely that she is unaware of Lovelock's work.

about Mother Earth.<sup>43</sup> However, in spite of the potential utility of the Gaia myth (as distinct from the hypothesis), he makes no use of it.

Why has Gaia not made a greater impact upon the minds and hearts of New Agers? Part of the answer may lie in the New Age suspicion of science with its emphasis on rational analysis and disciplined empirical testing of speculation. While New Agers will often affirm the value of linear analytical rational thought (usually associated with the brain's left hemisphere) they see it as less important than intuition. For example, 'the holistic vision of the right hemisphere is considered to be more in touch with underlying reality than the linear vision of the left hemisphere'.<sup>44</sup> Thus the creative products of their own imaginations have greater validity for them than any images or symbols which originate elsewhere (particularly those with strong scientific associations).

It is important to distinguish between Gaia as a myth and Gaia as a scientific hypothesis. The relationship between the two is largely dependent on their common name. Under various names, the Gaia myth emerged amongst New Agers quite independently of Lovelock's work. The spiritual writings of Sri Aurobindo and Teilhard de Chardin, and the science fiction of Olaf Stapledon probably exercised a greater influence on the development of this aspect of New Age thought than the Gaia hypothesis.

Having said that, the Gaia hypothesis can be pressed into service by New Agers in two ways. They may point to it as evidence that at least some aspects of modern science support their world-view. Alternatively, some New Agers with a vested interest in science may use it to justify science to their suspicious co-religionists.<sup>45</sup>

#### **4 Gaia, God and Creation**

There remains the question of what use, if any, may be made of the Gaia hypothesis in Christian theology.

For some Christians the very suggestion evokes fears of a sell-out to New Age thought. Tony Higon, while admitting that Lovelock himself sees Gaia as no more than a scientific hypothesis, attempts to present its wider use as a revival of pantheism and closely associated with spiritualism.<sup>46</sup> Elliot Miller, a generally reliable Christian critic of the New Age, takes a similar view. He identifies Gaia with Teilhard's Omega Point and the Earth Mother of Neo-Paganism.<sup>47</sup> These authors have ignored the

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43 See particularly M. Fox, *The Coming of the Cosmic Christ* (San Francisco: Harper & Row, 1988).

44 Starhawk *op. cit.* (40), p. 21.

45 Contrary to popular opinion, this seems to have been the motivation behind Capra's *The Tao of Physics*. Rupert Sheldrake's use of Gaia as a tool for the re-enchantment of nature suggests a similar motive (see Sheldrake *op. cit.* (24), p. 130).

46 T. Higon, 'The Environment as Religion' in *What is the New Age?* by M. Cole, J. Graham, T. Higon, & D. Lewis (London: Hodder & Stoughton, 1990), 78-95 (pp. 87-91).

47 E. Miller, *A Crash Course on the New Age Movement* (Eastbourne: Monarch, 1990), pp. 70-73.

distinction between scientific hypothesis and religious myth. Thus the Gaia hypothesis comes to be seen as the first step on a slippery slope leading inexorably to earth mysticism.

Clearly Gaia as a myth is not reconcilable with orthodox Christian belief. It posits a quasi-divine earth soul and encourages the revival of nature worship. Christianity has always denied that the natural world is to be worshipped (while, in its more biblical forms, maintaining that it is worthy of respect as God's good creation). Because of the increasing tendency to associate the name 'Gaia' with the New Age mythology rather than the scientific hypothesis, the term may already be unuseable for orthodox Christian theology.

One theologian who would disagree with this is Hugh Montefiore. He is a friend of Lovelock's and a vocal advocate of his hypothesis. In some of his recent books he has presented a Gaian view of the biosphere as part of God's plan for the creation of life. In doing this he does not fall into earth mysticism. On the contrary, Montefiore is more cautious in his statements about Gaia than Lovelock, admitting only that 'the biosphere has some of the characteristics of a living creature'.<sup>48</sup> Elsewhere he makes it clear that his interest in Gaia was prompted by the possibility of extending the anthropic principle to the field of biology. Thus the Gaia hypothesis is, for Montefiore, a potential ally in the development of an anthropic design argument for the existence of God.<sup>49</sup>

Another theologian who has made use of this idea is Jürgen Moltmann. He does not use the term 'Gaia' perhaps because of its associations with the myth of the Earth Mother. But he does develop an ecological theology of creation based on the assumption that 'all higher forms of life on earth develop in multi-layered system-environments'.<sup>50</sup> Fundamental to his recent theology is the same kind of systems thinking which underlies Lovelock's approach.

In my comments on Dawkins' critique of the Gaia hypothesis I suggested that Lovelock's line of thinking is one more manifestation of the Enlightenment's secularization of providence. If this is the case a contemporary environmentally sensitive treatment of providence may well make use of Lovelock's ideas if not his terminology. Thus the emergence of a complex regulatory mechanism for the environment may be seen as part of God's providential care for His creation.

Might such a theology regard the earth as a living creature? There are at least two stumbling blocks in the way of such a move. Richard Hooykaas has argued that biblical Christianity favoured the emergence of a mechanistic

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48 H. Montefiore, *Reclaiming the High Ground: A Christian Response to Secularism* (London: Macmillan, 1990), p. 55.

49 H. Montefiore, *The Probability of God* (London: SCM, 1985), pp. 44-58.

50 J. Moltmann, *God in Creation: An ecological doctrine of creation* (London: SCM, 1985), p. 300.

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## The Machine and the Mother Goddess

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view of nature because of the association of classical organicism with pantheism.<sup>51</sup> Can a modern doctrine of a living earth purge itself of such an association and maintain a clear distinction between creature and Creator? Given the current strength of New Age thought, I doubt it. The other stumbling block is the definition of life and the relationship of such a concept to modern science. I fear that insistence on treating the earth as a living creature will only drive an unnecessary wedge between theology and science.

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51 R. Hooykaas, *Religion and the Rise of Modern Science* (Edinburgh: Scottish Academic Press, 1973), pp. 1–28.

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