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TOM HARTMAN, BIMAL THEOPHILUS AND ROSS WILLIAMS

Gaia, Science and the New Age

A response to Lawrence Osborn's article.

In general we find that Lawrence Osborn's article echoes much of our own thinking on the subject of Gaia, both the hypothesis and the myth. This response seeks largely to expand or clarify a number of the issues raised and to add some observations of our own.

Lovelock's Gaia

The science of cybernetics (the study of control mechanisms in mechanical, electronic and biological systems) is relevant not only to the maintenance of homoeostasis within a living organism, but also to the way in which a population is regulated. Lovelock's Gaia hypothesis, also known under the less emotive title of geophysiology, considers that the Earth exists in its present condition because of the influence of the biosphere. This view has won him both fame and notoriety, in different circles, but for probably the same reasons.

Lovelock's writing style originally read anthropomorphically and this alienated some of his scientific audience. Some of his prerequisites for Gaia are not up to date with current understanding. For instance, concerns about his requirement for the punctuated equilibrium model of evolution have been answered by its incorporation into neo-darwinism by Dawkins.[1] His strict espousal of science, on the other hand, made his views less attractive to New Age writers (despite the view of Christian writers such as Wright[2] and Begbie,[3] who assume Lovelock's Gaia to lie within the New Age worldview). Where Lovelock has really caught the imagination, however, is in the profusion of literature produced in response to the increased public awareness of Green issues. A large proportion of books aimed at the popular market reference him and his ideas with a casual acceptance and no critical assessment. Books such as *The Gaia Peace Atlas*,[4] *The Gaia Atlas of Planetary Management*[5] and *Top Guns and Toxic Whales (The*

1 Dawkins, R. *The Blind Watchmaker*. London: Longman (1986) (reprinted by Penguin 1988).
2 Wright, R. T. *Biology Through the Eyes of Faith*. Apollos (1991), p. 40.
3 Begbie, J. 'The Trinity and the New Age Movement'. *Third Way* (1991) 14(6), 29–31.
4 Barnaby, F. (ed.) *The Gaia Peace Atlas-Survival into the Third Millenium*. Pan Books (1990).
5 Myers, N. (ed.) *The Gaia Atlas of Planet Management*. Pan Books (1985).

Environment and Global Security)[6] incorporate strands of Lovelock's thinking without comprehending the entirety of his vision. Perhaps Lovelock needs a bulldog, as Darwin had in Thomas Huxley; someone to champion his cause, to tighten up his arguments (especially concerning his views of the Earth as a living organism) and to present his ideas in a strictly neo-Darwinian framework if they are to be respectable to the scientific community.

It is the lack of this scientific precision in Lovelock's writings which has allowed his hypothesis to be subverted into the 'pop-ecology' prevalent in the media, where all living organisms are portrayed in pursuit of a common goal in sustaining one another rather than acting in self interest. It is this view that Dawkins[7] originally derided. He saw Gaia as an extension of the fashionable view of the 'ecological web' which does bear a resemblance, though superficial and ultimately misleading, to the model used by modern biologists. Dawkins' response, however, was to Lovelock's first foray into 'geophysiology' and it would be interesting to see whether his views have been modified by Lovelock's later works on the subject.

The importance of Lovelock's answer to these criticisms, modelled in his Daisyworld simulations, cannot be understated, for it provides the framework by which planetary cybernetics can be married to individual self-interest. This permits Gaian self-regulation to be seen as an emergent property of a system in which the organisms conduct their lives in a purely Dawkinsian manner, ie. selfishly competing for resources at the expense of others and passing on as many of their genes into the next generation as possible. The inter-connections then appear because of the effects of one population on another, as constraints are imposed on the availability of resources, the wastes that are produced etc. Population sizes are controlled by competition within a species (intra-specific) and between species (inter-specific). Both types of competition involve restraints, but not some mysterious consensus. Ultimately, no population can exceed the capacity of its supporting environment as absolute boundaries are set by energy flux, but other factors normally act to keep numbers oscillating around a mean. Again, there is no conscious decision, but limits are dictated by simple physical constraints.

In this way, the forces of Gaian regulation may be likened to plant succession. For example, if a stretch of rock becomes available for colonisation, perhaps by subsidence or volcanic activity, hardy organisms with few requirements, such as lichens, will grow first. In time, they stablize the substrate and accumulate other organic and mineral debris. This paves the way for other slightly more demanding plants to find a niche, growing in the small quantities of soil available. As their generations come and go the available substrate increases and the community shifts

6 Prins, G. & Stamp, R. *Top Guns and Toxic Whales, The Environment and Global Security*. Earthscan Publications Ltd. (1991).

7 Dawkins, R. *The Extended Phenotype*. Oxford: Oxford University Press (1982).

away from these species to ones better able to exploit the enriched environment. This positive feedback loop ultimately leads to the development of the climax community (normally woodland) at which point the situation stabilizes.

This scenario does not legitimise the view that the original lichens are acting in the interests of other species; far from it, for the lichen's 'purpose' is to produce more lichens. But inherent in their growth pattern is their ability to trap other particles of matter and alter their own environment, opening a niche for competitors. They sow the seeds of their own demise, but have served their self-interest by breeding and dispersing their spores to other disturbed environments. Lovelock claims that this pattern can be interpreted as life changing the environment so that it maintains life, but this is a dynamic and non-harmonious reflex, a by-product of the system.

Despite the controversy, however, the Gaia hypothesis has generated some useful investigations. It is noteworthy that, with present data, no discontinuity has occurred in the history of life on Earth. That either attests to the persistence of favourable conditions or the effectiveness of the Gaian homoeostatic mechanisms. The holistic approach and labyrinthine interconnectedness of the theory make testing difficult, but Lovelock[8] notes several predictions based on Gaian principles that validate his claims.

(1) Predictions made about the lifeless state of Mars, based on atmospheric data, made in 1968, were strongly confirmed by the Viking mission of 1977. Recent speculation about the terraforming of Mars[9] makes use of Lovelock's contributions.

(2) Climate regulation by CO_2 control through biological weathering of rock stated in 1981 was shown in 1989. Watson[10] notes that the carbon dioxide pump maintained by living systems is far more effective than inorganic methods.

(3) The reason for the level of oxygen being maintained near to 21% for the past 200 million years could be due to regulation by fire and phosphorous cycling, for which biological input is important.

(4) That chemical elements essential for life on land were transferred by algae was predicted in 1971 and shown in 1973. This, in particular, confirmed the usefulness of Gaia for highlighting ecosystems with increased sensitivity to interference.

(5) The link between cloud density and algal sulphur emissions was considered in 1987 and reported in 1991. The feedback mechanism is perhaps the strongest advocate for the veracity of Gaia.

From the viewpoint of Gaia, humans are not integral to the feedback

8 Lovelock, J. E. 'Hands up for the Gaia hypothesis', *Nature* (1990) 334, 100–102.
9 McKay, C. P., Toon, O. B. & Kasting J. F. 'Making Mars habitable'. *Nature* (1991) 352, 489–496.
10 Watson, A. 'Gaia'. Inside Science No. 48 *New Scientist* (6 July 1991).

mechanisms by which geophysiology is achieved. Human industry, agriculture and attempts to cope with pest organisms, however, can have destabilising influences that may cause Gaia to react. Loss of rainforest, for instance, can have serious hydrological consequences as well as removing a sink for atmospheric carbon. The burning of fossil fuels may also serve to tip the balance and oil spills may block sunlight from reaching the marine algae. It is not that Gaian systems cannot cope with the changes, but that in maintaining the equilibrium the Earth may change into a less comfortable habitat for many extant life forms, including humans.

The Gaia hypothesis allows for speculation on a grand scale. It may be of use in the remote detection of life in other parts of the universe and highlights the urgent need to conserve diversity on the Earth. It may also have consequences in defining limits for human agricultural endeavour and pollution, but Gaia's demands on human behaviour and attitudes are equivalent to those made by a house or a garden, namely care and stewardship that embodies responsibility, wisdom and reasoned forethought. Lovelock[11] also notes a therapeutic value whereby consideration of such an ornate mechanism reduces one's feeling of alienation from it. Thus Gaia may also act as a catalyst, opening our minds to the magnificence of creation and hence, as the writer of Psalm 19 perceived, to the hand behind it.

Awareness in Gaia

Despite claims to the contrary, Lovelock has often treated Gaia almost as a personality rather than a hypothesis. His use of this particular epithet, with all its pagan earth goddess connotations, has led to the hypothesis being attached to a largely unrelated mythology and, in this form, being absorbed by some into the New Age movement. The presence of two Gaias, myth and hypothesis, which Osborn describes, has been noted by us also, as has the dearth of reference to Lovelock's Gaia within New Age writing of the metaphysical and religious type (as opposed to the environmentalist type). For instance, Christine Albanese[12] sees Lovelock's Gaia as merely a backing 'of sorts' for the revival of the goddess myth with its deification of the earth. Meanwhile, in Green literature Gaia is common; it has a homeliness, a warm, cosy feeling of oneness with nature. Although this is not directly allied to the pagan worship of a goddess, it is closer to that than to a cold hard-nosed scientific geophysiology.

An aspect of Gaia worth further emphasis is the way in which different individuals have extended the hypothesis into areas of their own choosing. In particular, consciousness, purpose and ultimately, spirituality are attributed to Gaia in varying degrees. Lovelock himself says that the Earth is alive, but only in a mechanistic way in that,

11 Lovelock, J. E. 'Stand up for Gaia'. *Biologist* (1989) 36, 241–247.
12 Albanese, C. L. Nature Religion in America: From The Algonkin Indians to The New Age Chicago: University of Chicago Press (1990).

> '. . . the term alive also includes the concept of a system switched on and working, . . . Gaia is alive in this sense but in no way has foresight or purpose'[13]

so disagreeing with Rupert Sheldrake's view. Nevertheless, consciousness is implied when he says Gaia is 'awake and aware of herself'.[14] Even if she claims it is not alive, Lynn Margulis' Gaia has greater consciousness,

> 'On earth the environment has been made and *monitored* by life as much as life has been made and influenced by the environment . . . the biota itself, which includes *Homo sapiens* is autopoietic. It *recognizes*, *regulates*, and *creates* conditions necessary for its own continuing survival'[15] (emphasis ours).

New Age writers attribute far more to Gaia. Fritjof Capra holds that the 'new paradigm . . . is ultimately spiritual'[16] just another aspect of the change of attitude of the 'rising culture'. Peter Russell regards it as the first step on a long staircase leading to the enlightenment of the universe as a single sentient entity.[17]

Biblical perspective

Whether Gaia is approached from a reductionist or more holistic viewpoint may depend on the extent to which the nature of complex interacting systems is held to be capable of self-regulation, without conscious control. This point is further complicated by subjective and varying definitions of the terms 'living' and 'conscious'. As Osborn points out, Pedler's holistic view of the observed interconnectedness tends to monism; hence its attraction to New Age thinking. Biblical references to the Earth, on the other hand, do not endow it with personality or emotion, but see it as unconscious creation (Gen. 1:1), the conscious aspect being God, the creator and sustainer, followed by mankind made in His image. While creation displays His glory (Isa. 6:3), God has total possession and power to do with it as He pleases (1 Cor. 10:26; Ps. 46:6). Thus, there is no tendency to give creation either a maternal nature, nor the capacity for indefinite self-regulation as if it were a single being and in some sense alive. It exists, fulfilling God's plans and purposes, not its own (Ps, 33:11) and all of it, including ourselves, is constantly maintained and preserved by him (Heb, 1:3; Acts, 17:28). Moreover, the end of the created order in its present form comes as an act of the divine will (Rom. 8:20–23) rather than as a breakdown in Gaia.

13 Lovelock, J. E. *Nature* (1990) 348, 685.
14 Lovelock, J. E. *Gaia: A New Look At Life One Earth* Oxford: Oxford University Press (1979).
15 Margulis, L. & Sagan, D, *Microcosmos: For Billion years of microbial Evolution* Allen & Unwin (1987).
16 Capra, F. *The Turning Point: Science, Society and The Rising Culture* Wildwood House (1982) pp. 308–309.
17 Russell, P. *The Awakening Earth: The Global Brain* J. P. Tarcher (1983); Ark (1984).

We can conclude that there is no Biblical basis for the concept of 'Mother Earth'. Attempts to attribute this to the biosphere by using Gaian terminology (Gaia being female, and the first deity) have added little to our understanding of interconnected ecological systems that could not have been gained by a purely scientific, if holistic approach. The Biblical portrayal of nature is one of beauty and interconnectedness, but there is little if any Biblical support for Lovelock and Margulis' proposal of mutually interdependent parts of a single entity.

At best, the use of Gaian terminology has encouraged realization of the value of a holistic approach, reminded man of his responsibilities of stewardship (by demanding an appropriate response), and questioned the correctness of an anthropocentric viewpoint, since man is not central to the function of Gaia. The latter, it should be noted, may be at odds with a Biblical view, which does not advocate the exclusive importance of human beings, but does teach that they are of greater worth than the rest of creation (Matt 10:29–31), being the only ones made in the image of their creator. The rehabilitation of Gaia as 'geophysiology', coupled with wonder at God's providence in maintaining life 'in His image' on this planet, might salvage much of value from a useful, if unorthodox hypothesis, hijacked because of its name. This could also go some way towards retrieving a valid Christian environmental concern.

Tom Hartman and Ross Williams are Research Fellows in the School of Biological Sciences, University of Birmingham. Bimal Theophilus is a researcher in the Wolfson Laboratories at the Queen Elizabeth Medical Centre, Birmingham.