

Sacred Geography: Gaia and her Interpretations

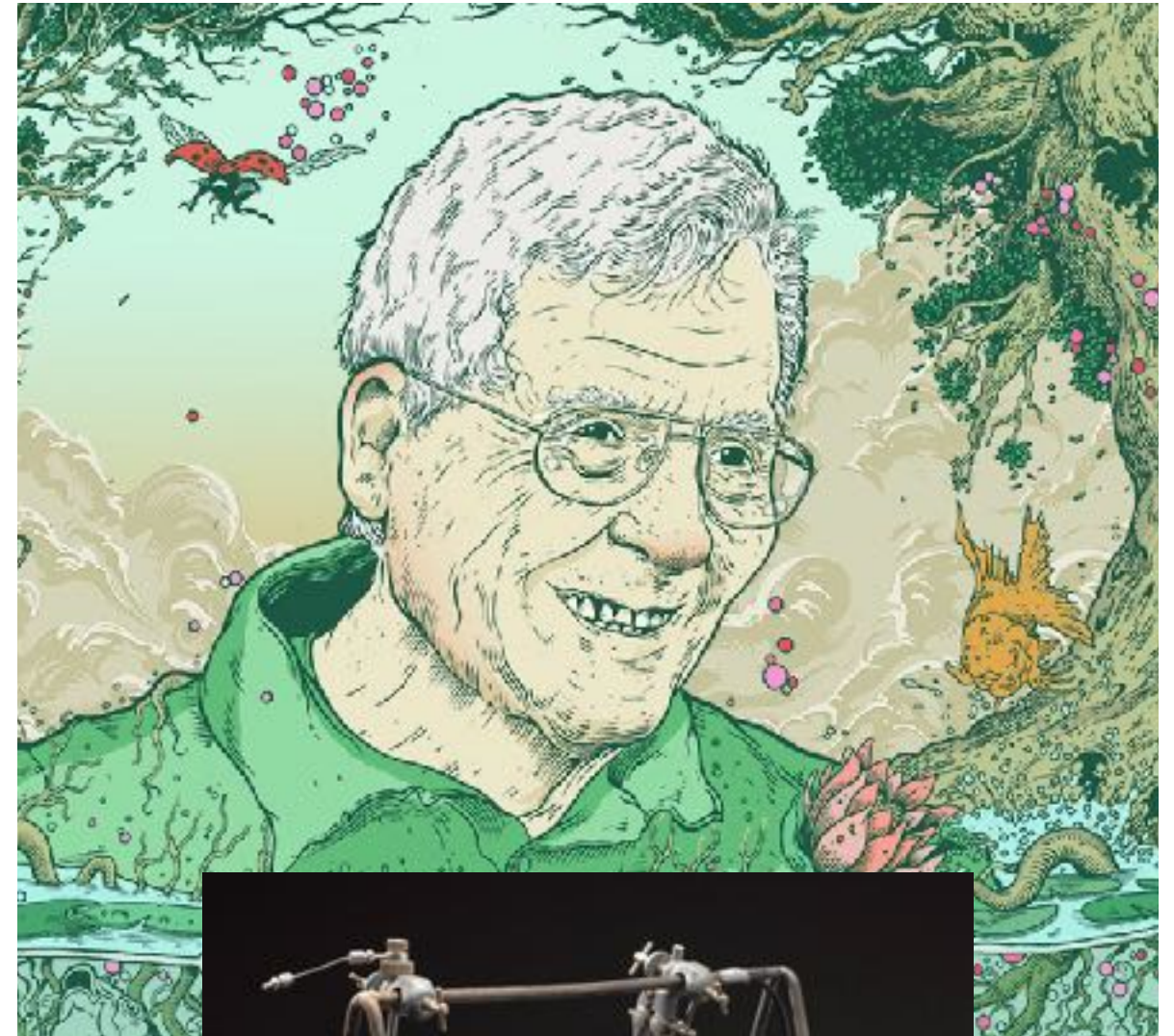


Overview

- James Lovelock
- Lynn Margulis
- Gaia and Self-Regulating Systems
- Controversies - Gaia Hypotheses
- Spiritual and Alternative Interpretations

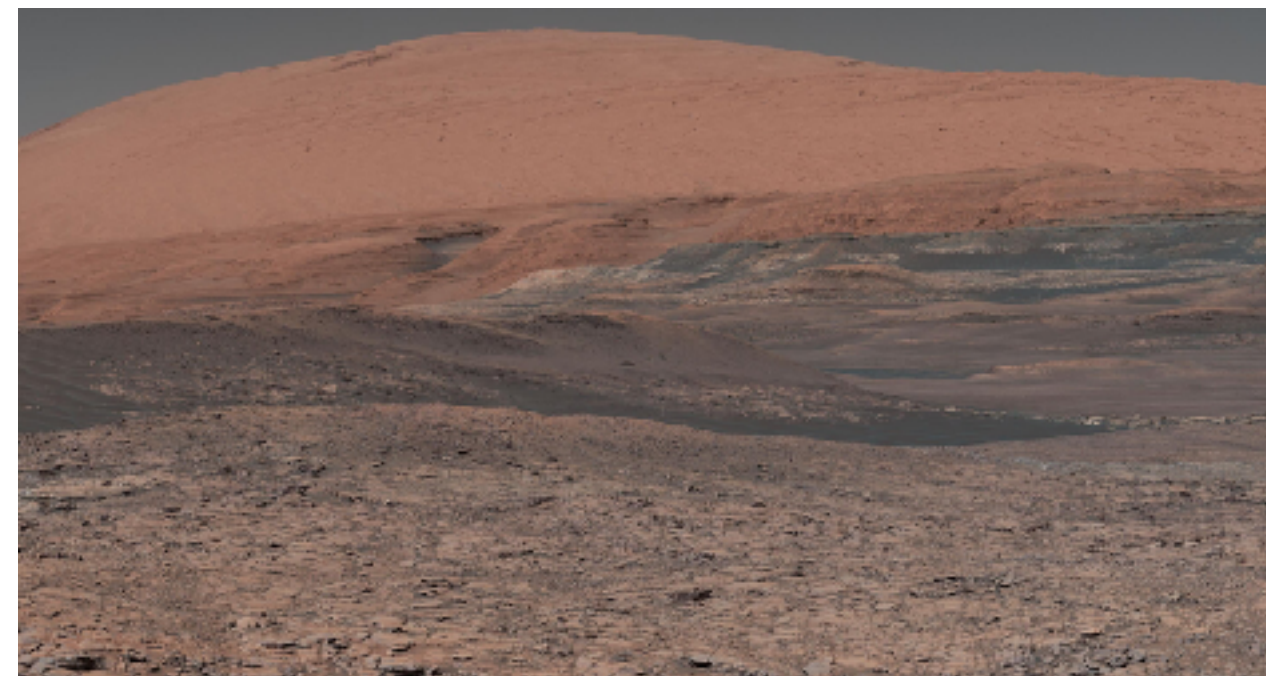
James Lovelock

- Born 1919.
- Independent scientist.
- Invented the Electron Capture Detector (ECD) in the 1950s.
- He used it on independent research voyages to detect the presence of chlorofluorocarbons (CFCs) in the atmosphere.
- Led to discovery of the hole in the Ozone layer and the banning of CFCs in the 1980s.
- Implications of human influence on the wider Earth-system.



Life on Other Worlds

- James Lovelock was tasked by NASA in the 1960s to come up with a method of detecting life on other planets.
- His lab was convinced that the best way to find life on other planets was to send robotic probes to scout for evidence.
- Lovelock came up with a simpler solution – life could be detected remotely (and more cheaply) by long-range analysis of the composition of planetary atmospheres.
- He emphasised an active relationship between the atmosphere and biological life - gases provide a chemical signature of life.



Lynn Margulis

- Lynn Margulis (1938-2011) suggested that symbiosis and was a fundamental organic principle.
- Argued that the organelles within cells were once independent bacteria that have opted to form a symbiotic relationship.
- Was widely rejected in mainstream evolutionary biologists, until later genetic evidence revealed that this was likely the case.
- Gaia Hypothesis stems from the interaction of Lovelock's insights into the relationship between living and non-living systems, and Margulis' emphasis on symbiotic co-evolution.



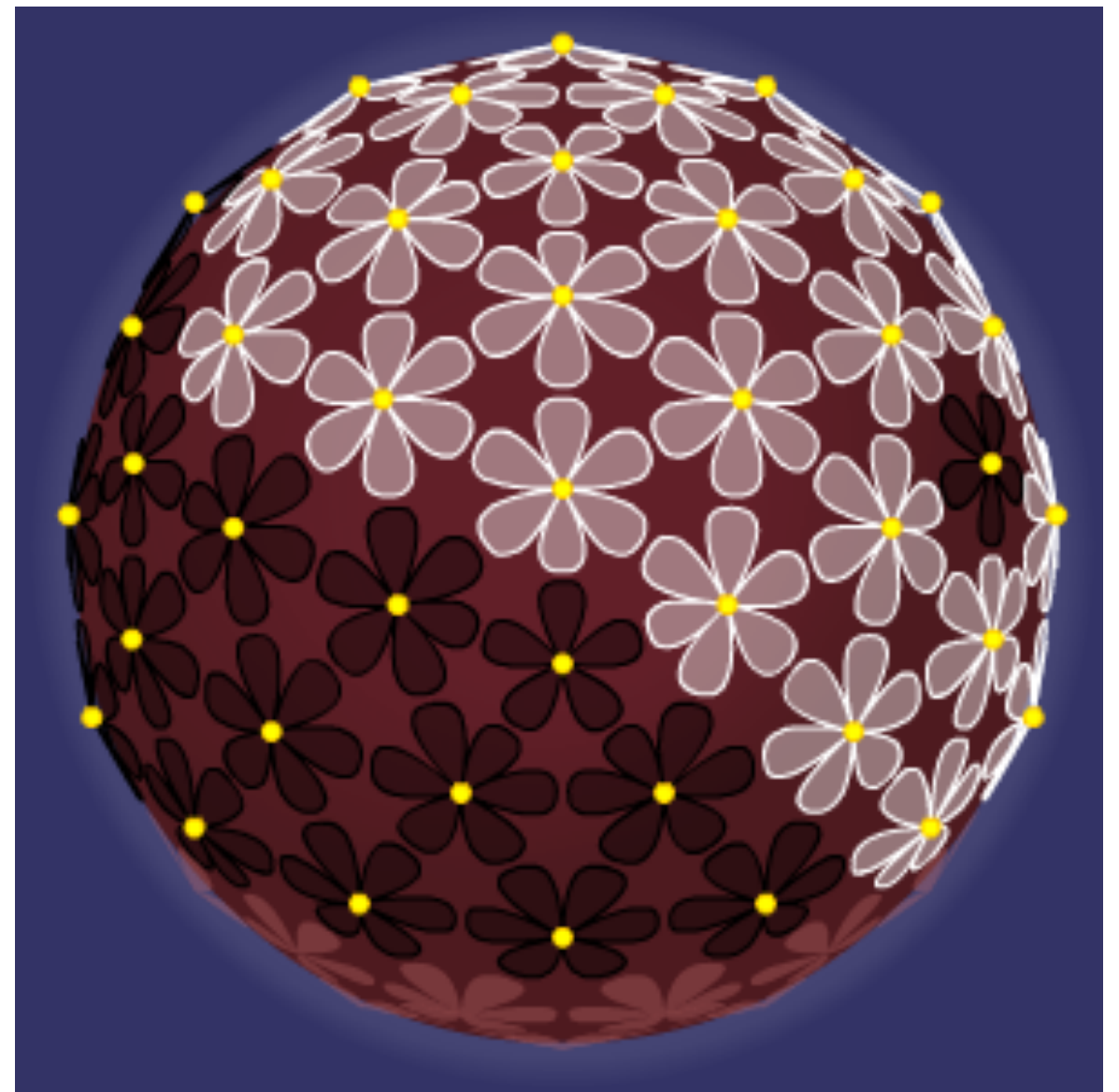
Gaia

- “The notion of the biosphere as an active adaptive control system able to maintain the Earth in homeostasis...” (Lovelock & Margulis, 1974).
- Following the suggestion of his friend and neighbour William Golding, Lovelock called the Earth's self-regulating system ‘Gaia’ - the ancient Greek Earth Goddess.
- “...living things, once they appeared on our planet, took charge of the global environment in a creative way. They became fully fledged partners in the shaping of the Earth, its rocks and water and soil...The goal of life is global homeostasis, and toward this end it transforms the planet into what might be viewed as a single self-regulating organism” (Roszak, 1993, p. 147).
- This idea is not new in the history of science - there have been proponents of homeostatic - e.g. John Hutton (1797) proposed that atmospheric gases were regulated by planetary geological processes (Onori & Visconti, 2012, p. 376).



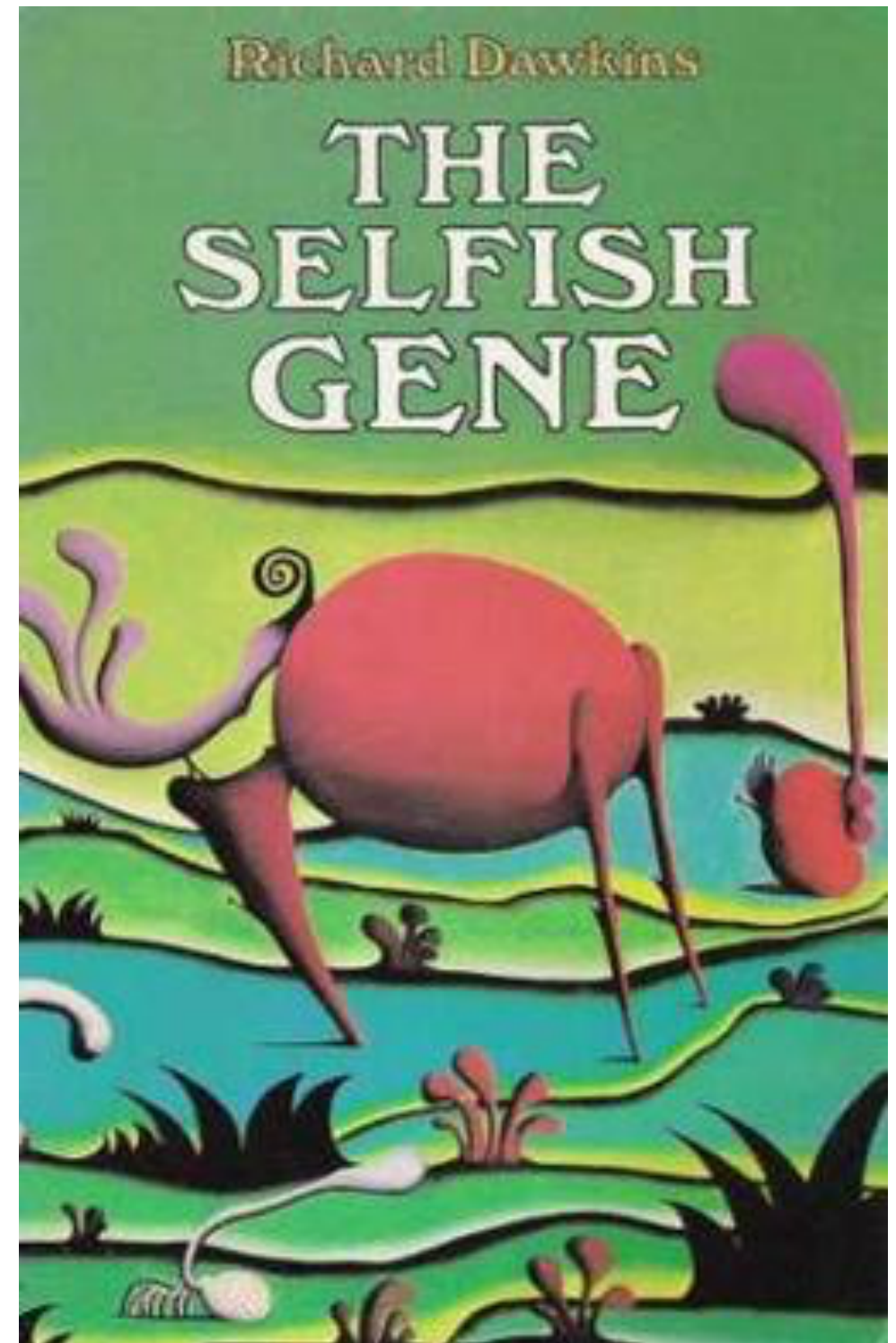
Self-Regulating Systems

- Natural systems run on feedback loops.
- Lovelock has illustrated this with his 'Daisy World' computer simulation.
- A feedback loop is where an action is coupled directly to the consequence, and the consequence to the action.
- This leads to a balancing – referred to as **homeostasis**, or **dynamic equilibrium**.
- The human body is a good example of a homeostatic system.



Controversies

- “A network of relationships there may be, but it is made up of small, self interested components. Entities that pay the costs of furthering the well being of the ecosystem as a whole will tend to reproduce themselves less successfully than rivals that exploit their public-spirited colleagues, and contribute nothing to the general welfare...” (Dawkins, 1982, p. 237).
- “Neither Lynn Margulis nor I have ever proposed a teleological hypothesis. Nowhere in our writings do we express the idea that planetary self-regulation is purposeful, or involves foresight or planning by the biota. It is true that our early statements about Gaia were imprecise and open to misinterpretation, but this does not justify the persistent almost dogmatic, criticism that our hypothesis is teleological...” (Lovelock, 1990).



Strong and Weak Gaia

- James Kirchner makes a distinction between ‘strong’ and ‘weak’ forms of Gaia.
- He argues that there are in-fact several ‘Gaia Hypotheses.’
- He develops a taxonomy of Gaia hypotheses:



Taxonomy of Gaia Hypotheses

- “*Influential Gaia*. The weakest of the hypotheses...asserts that the biota has a substantial influence over certain aspects of the abiotic world, such as the temperature and composition of the atmosphere...
- *Coevolutionary Gaia*...asserts that the biota influences the abiotic environment, and that the environment in turn influence the evolution of the biota...
- *Homeostatic Gaia*....asserts that the biota influences the abiotic world, and does so in a way that is stabilising...feedback loops...
- *Teleological Gaia*...holds that the atmosphere is left in homeostasis ,not just by the biosphere, but by and for (in some sense) the biosphere...
- *Optimizing Gaia*....holds that the biota manipulates its physical environment for the purpose of creating biologically favourable, or even optimal, conditions for itself...” (p. 38).



Taxonomy of Gaia Hypotheses

- “So if I were asked whether I believed in the Gaia Hypothesis, referring to *that* [weak] Gaia hypothesis, I would say that I do. But does that mean that I believe that the biota is part of a global cybernetic control system, the purpose of which is to create biologically optimal conditions - that is another matter entirely” (Kircher, 1991, p. 39).
- “The common perception is that Gaia means that “the earth is alive”... Because many people do not understand the risks of treating poetic statements as scientific propositions, the public at large thinks that scientists are busy trying to figure out whether the earth *really is* “alive.” I don’t think that perception helps any of us...” (Kirchner, 1991, p. 46).



What to Call the Global Ecosystem?

- Huggett (1999) highlights the competition between the terms 'biosphere,' 'ecosphere' and 'Gaia' in ecological science.
- Referring to the earth system as Gaia "... is possibly an imprudent practice because Gaia is an emotive word with a gamut of confusing undertones and overtones. Gaian terminology can be unscientific...A purely mechanistic world is characterless compared with the world of gods and goddesses, and of superorganisms with superphysiologies and (presumably) superanatomies..." (p. 425).
- "... 'ecosphere' is the most appropriate term for all situations where living things and their supporting environment are taken as a whole..." (p. 430).



Cultural Interpretations

- Mycorrhizal fungi are the classic example of symbiotic life, and their influence on popular culture is strong - e.g. Paul Stamets, Merlin Sheldrake, Terence McKenna and others.
- “I see mycelium as the living network that manifests the natural intelligence imagined by Gaia theorists. The mycelium is an exposed sentient membrane, aware and responsive to changes in its environment. As hikers, deer, or insects walk across these sensitive filamentous nets, they leave impressions, and mycelia sense and respond to these movements. A complex and resourceful structure for sharing information, mycelium can adapt and evolve through the ever-changing forces of nature...” (Stamets, 2005, p. 4-6).
- What are the wider social and cultural implications of our interpretations of ecological processes?



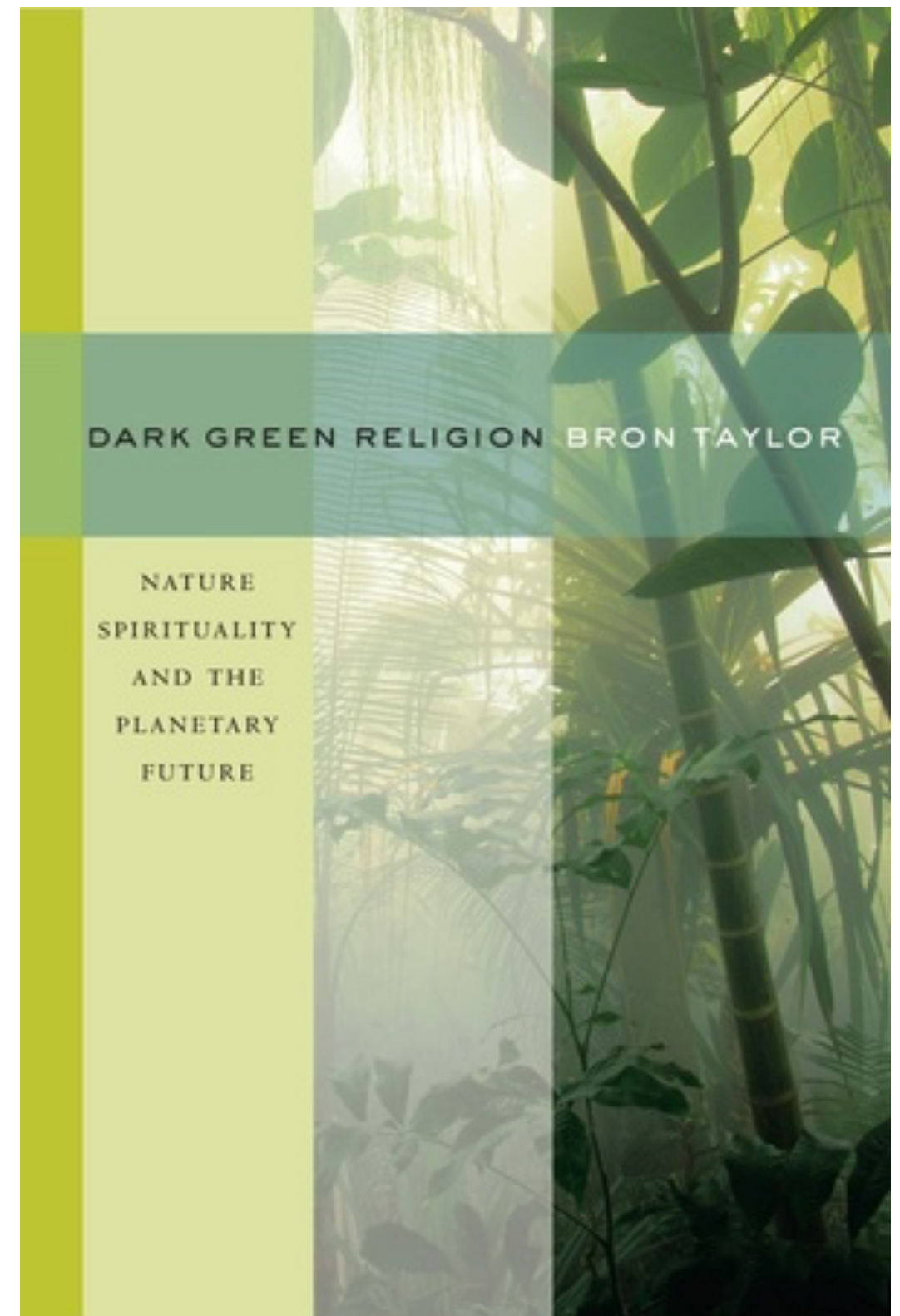
Gaian Spirituality

- Bron Taylor distinguishes between four dominant frameworks adopted by Dark Green Religionists:

	Animism	Gaian Earth Religion
Supernaturalism	Spiritual Animism.	Gaian Spirituality.
Naturalism	Naturalistic Animism.	Gaian Naturalism.

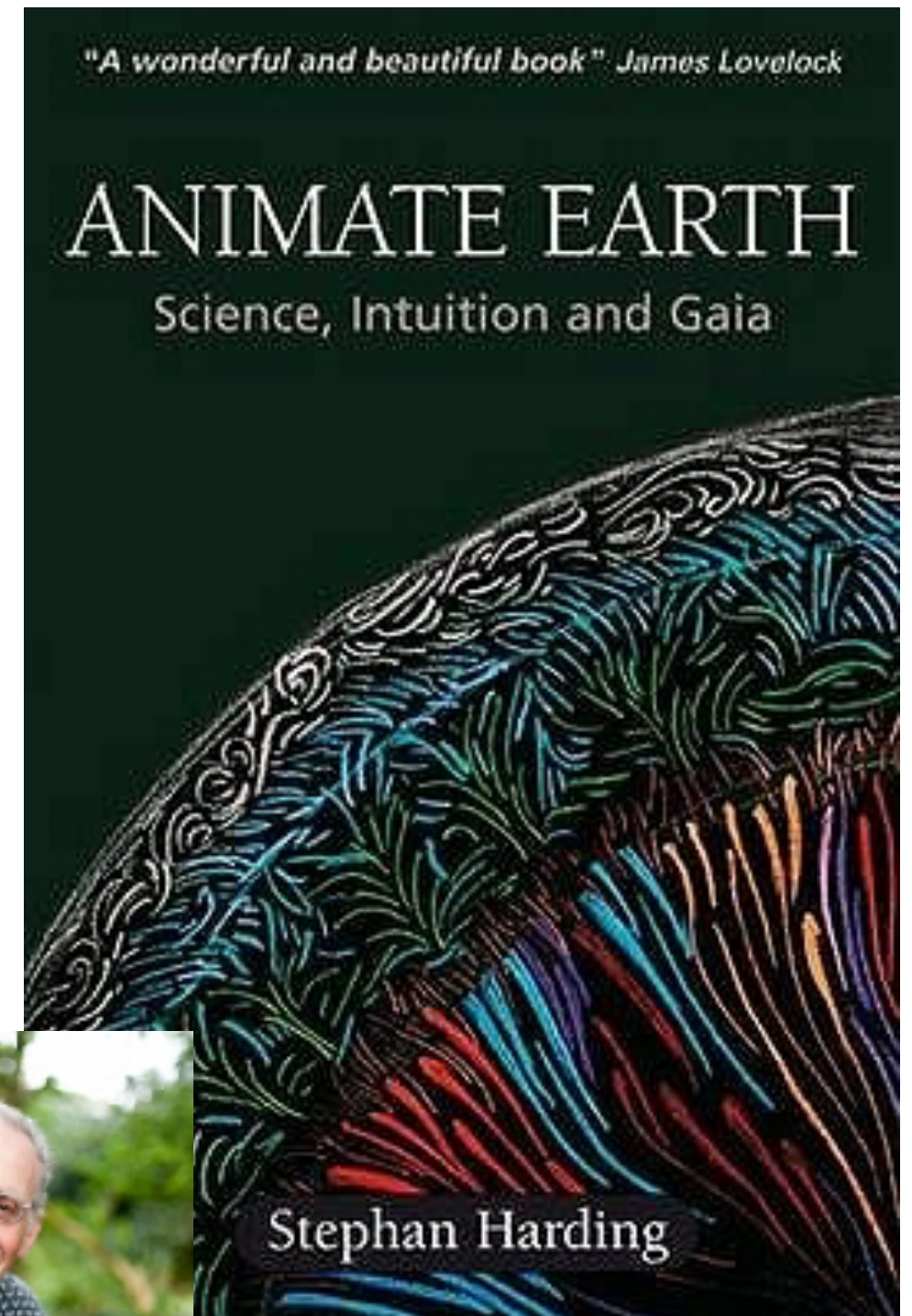
(TAYLOR, 2010, P. 15)

- Gaia understood here as a perception of ‘the biosphere (universe or cosmos) [as] alive or conscious, or at least by metaphor and analogy [resembling] organisms with their many interdependent parts’ (2010, p. 16).
- Gaia can be popularly understood either **supernaturally** (as a teleological Gaian consciousness), or **naturalistically** (as global homeostasis through material systems).



Animate Earth

- Stephan Harding's formulation of the Gaia Hypothesis takes a particularly animistic perspective.
- *Animate Earth* (2016): "...explores how Gaian science can help us develop a sense of connectedness with the 'more-than-human' world. His work is based on the integration of rational scientific analysis with our intuition, sensing and feeling... replaces the cold, objectifying language of science with a way of speaking of our planet as a sentient, living being. The book is a contemporary attempt to rediscover *anima Mundi* (the soul of the world)..."

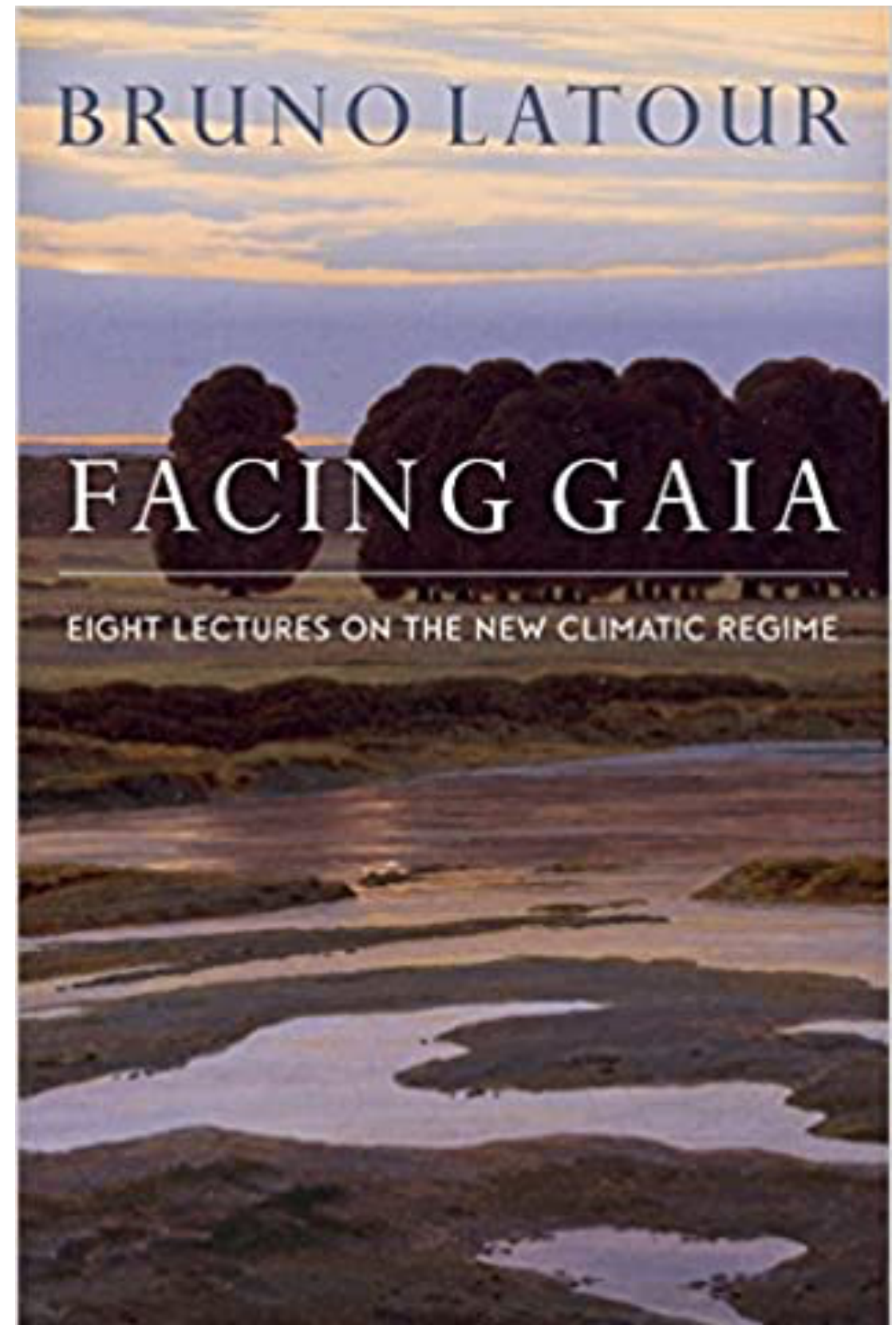


Gaia 2.0

- Lenton & Latour (2018) - ‘Gaia 2.0: Could humans add some level of self-awareness to Earth’s self-regulation?’:

“As a result, deliberate self-regulation—from personal action to global geoengineering schemes—is either happening or imminently possible. Making such conscious choices to operate within Gaia constitutes a fundamental new state of Gaia, which we term Gaia 2.0....”

- “By emphasizing the agency of lifeforms and their ability to set goals, Gaia 2.0 may be an effective framework for fostering global sustainability.” (p. 1066).
- Sidestepping the debate over the teleological nature of Gaia - saying that we are the teleological component.



Conclusions

- There are scientific ‘facts’ about the functioning of ecological systems and processes.
- These are interpreted by human beings in many different ways.
- Some approaches emphasise the apparent teleological nature of these processes, and others emphasise a mechanistic or random perspective.
- Wider culture interprets these ideas in different ways - incorporating ideas from science into spirituality.
- Others draw on traditional and indigenous models (e.g. animism) to make sense of the scientific data.
- Gaia 2.0 - as a model for focussing human activity in favour of the biosphere.

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