

Excerpt From  
The Feasibility of a Testable Gaia Hypothesis  
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**STRONG AND WEAK GAIA**

Of Coevolutionary Gaia, Kirchner argues that Lovelock simply restates the obvious and well-documented fact that life influences the environment. Kirchner cites numerous examples, dating as far back as 1844 that illustrate the premise that biological processes alter the physical environment. Kirchner states “An observation that is so widely recognized lacks the tentative character of a true hypothesis” (227).

In criticizing Homeostatic Gaia, Kirchner divides the hypothesis into two separate forms: weak and strong.

**WEAK GAIA:** The weak form of Homeostatic Gaia states that “the dominant interactions between the biotic and abiotic worlds are stabilizing” (227).

**STRONG GAIA:** The strong form states that “these dominant interactions make the Earth’s physical environment significantly more stable than it would have been without life” (227).

Kirchner states that climatic homeostasis alone is not evidence for Gaia because it is impossible to determine whether the climate is stable as a result of those biological processes or regardless of them. He criticizes the proposed feedback mechanisms of Gaia because it unclear whether these mechanisms are stabilizing or destabilizing. Without the ability to determine which mechanisms are destabilizing, or tend to weaken homeostasis, Kirchner argues it is impossible to understand an organism’s homeostatic regulatory function.

Kirchner criticizes that Homeostatic Gaia is unfalsifiable. To support this claim, he points to Lovelock’s explanation of the oxygen crisis, the switch from oxidizing to reducing conditions in the Precambrian atmosphere. Lovelock cites the fact that terrestrial life survived the oxygen crises as evidence for Gaia’s ability to adapt to changing conditions. In response, Kirchner states:

*If the most destabilizing biotic event in Earth’s history can be construed as evidence for Gaia, and the relative stability since then can also be cited as evidence for Gaia, one wonders what conceivable events could not be interpreted as supporting the Gaia hypothesis. If there are none, Gaia cannot be tested against the geologic record...If Gaia stabilizes and Gaia destabilizes...is there any possible behavior which is not Gaian? (228).*

Concerning Geophysiological Gaia, Kirchner states that the use of Gaia as an “Earth-as-organism” (231) metaphor and applying the same terminology to both Gaia and recognized biological organisms is both unwise and potentially misleading. He states that although some may find it useful to view the Earth as if it were an organism, viewing the Earth as an organism itself “is neither scientifically meaningful nor scientifically answerable”(231). Kirchner argues that falsification of such a hypothesis is futile, and thus devoid of meaning.

Kirchner regards Optimizing Gaia as the most speculative version of Gaia, stating that it is both ill defined and unfalsifiable. He states that unless there exists a definition of what constitutes optimal conditions, any given function can be argued as optimal for at least some sets of conditions. Kirchner also asks the question “What could possibly be optimal for the whole biosphere?” (232).

With these criticisms, Kirchner dismisses Gaia (both as a whole and as four distinct hypotheses) as unscientific, untestable, and potentially misleading. In his conclusions, Kirchner remarks:

- ☞ “Attempts to test this metaphor (Gaia) as a scientific proposition will be, in my opinion, ultimately futile” (233).
- ☞ “Gaia is crippled by its great generality” (233).
- ☞ “Gaia may be a grand vision, but it is not the kind of vision that can be scientifically validated” (234).