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**GAIA
or
THE RETURN OF TELEOLOGY**

Abstract

The Gaia hypothesis was formulated for the first time in 1979 by James Lovelock: according to this conception, the Earth should be seen as a macro-organism whose purpose is to keep constant some conditions which are necessary for the presence of life on its surface. However – often with the consent of Lovelock himself – this scientific hypothesis has gone beyond its limits, transforming itself in a sort of anti-humanistic pseudo-religion: the Earth becomes a kind of divinity (Gaia) with a purposive will. This process of “personification” is quite paradoxical: Nature acquires features which are denied, at the same time, to the single man. In fact the human being, in this conceptual framework, is only a part of the Great Whole, the Mother Nature; he cannot be “her” guardian at all, he has to abandon any pretense of ontological superiority and to “believe” in the infinite potential of Gaia, who always finds a way to restore the threatened balance. On the ontological level, there is no difference between the single man and the natural ambient that surrounds him; so, on the moral level, this metaphysical conception ends to justify the indifference of the person to the impact of his own actions on the ecosystem. Not surprisingly, Lovelock has recently been deployed in favor of nuclear power.

It is a widespread idea that the elimination of the teleological explanation for natural phenomena is closely linked to the process of desecralization of nature itself – a process which culminated with the advent of modern science. This argument seems today to be confirmed by the fact that the pleas of some ecologist movements towards a renewed sense of the sacredness of nature go hand in hand with a massive return of teleology in natural science. I refer in particular to the geo-physiology or “Gaia theory”, which has been developed since 1979 by the British biologist James Lovelock: according to him, the Earth must be studied as a macro-organism whose purpose is to maintain optimal conditions for the presence of life on its surface. This means that the interaction among the living beings cannot be only conceived according to the neo-Darwinian model of the struggle of the individual for the preservation of its gene, but also according to a new collaborative model: the *raison d'être* of each living being is also to perform its own task for the maintenance of the energetic balance. In fact, if this diverged, even slightly, from a specific range of values, it wouldn't allow life on the planet anymore. The average temperature, the chemical composition of the atmosphere, the salinity of the oceans and other physico-chemical parameters, which are essential for the presence of life on earth, have quite-constant values even though they are in a state of chemical imbalance, far away from maximum entropy. This is possible, according to Lovelock, thanks to processes of homeostasis and active feedback done unconsciously by the biota, that is, by all the living beings.

Now, the emergent property of the Gaia system, the maintenance of this delicate chemical balance which is necessary for life, is not directly explainable in a pure Darwinian evolutionary framework. In fact, the theory of Lovelock, when it was presented to the scientific community, was harshly criticized by the neo-Darwinians (for example, by Doolittle and Dawkins); Lovelock, then, endeavored to fit the geo-physiological theory within the dominant paradigm of evolution, to make it more acceptable. So he elaborated, in 1983, the mathematical-theoretical model of *Daisyworld*.

Let us assume that:

- 1) there is a hypothetical planet named *Daisyworld*, as big as Earth, but with a wider dry land area.
- 2) on *Daisyworld* there are no clouds during the day: it rains only at night
- 3) *Daisyworld* orbits a star which has mass and luminosity equal to that of the Sun, and which keeps on increasing its heat radiation as time goes by.
- 4) The only variable of the environment is the temperature (therefore the percentage of carbon dioxide is constant).
- 5) the biota is reduced to a single species, the *daisies*: they grow only above 5 ° C, die above 40 ° C and they are in optimal conditions at 20 ° C.

The main value to calculate the average temperature in *Daisyworld* is the albedo, i.e. the capability of a certain body or surface to reflect light (reflected light divided by the light received). The albedo ranges from 0 - total black, no light reflected, all light absorbed, - to 1 - total white, all light reflected, no light absorbed.

The albedo of *Daisyworld's* bare soil is 0.4: this means that it absorbs 40% of the radiation. And the *daisies* have colours ranging from black (albedo 0.2) to white (albedo 0.7).

Let's imagine the distant past of *Daisyworld*: its sunlight was dim, and the temperature low; 5°C were found only at the equator, so that the daisies would only grow there. In this first phase, we have *daisies* of every colour, but those most favoured by natural selection are the dark ones, because they absorb more heat. The dark daisies started spreading more and more, covering a wider surface and absorbing a great deal of heat, thereby increasing the temperature of soil and air throughout the region (positive feedback: the solar radiation increases, the temperature of the planet increases too). But when the increase of the temperature exceeds 20°C (the *optimum* for daisies), white daisies begin to spread more and more, starting from the equator: they are favoured by natural selection because they keep cooler in a hot climate (because they absorb less heat). The white daisies compete with the dark ones for survival, but in the meantime both daisies cooperate in regulating the global climate: the negative feedback of the white daisies (which cool down the soil and the air), compensates the positive feedback of the dark ones.

As the sun grows old, it radiates more light, and on the planet white daisies are increasingly favoured. When 40°C are exceeded, even the white daisies cannot survive, so the system collapses and *Daisyworld* goes back to being barren.

Models have been elaborated with daisies of different colours, up to twenty subspecies, and also models with other species (for example with rabbits that eat daisies, and foxes that eat rabbits). There has even been hypothesized a situation where a sudden illness reduced drastically the number of daisies. The result is always the same: the average temperature is stable, thanks to the adjustments of the biota in accordance with the changes in sunlight.

Lovelock comments the *Daisyworld* model with these words: «the Gaian world evolves through Darwinian natural selection, *its goal being* the maintenance of conditions favourable for life in all circumstances» (Lovelock, *Gaia: a new look of life on Earth* (1979), Oxford University Press, 2000, p. 119).

The addition of «*its goal being*» seems in my opinion to be significant. Natural selection has no goal! In fact, natural selection, despite Lovelock's attempts, is not sufficient to explain the Gaia system; there must be something else, another law, which regulates the mutations of the living organisms and of the environment, in order to keep the necessary conditions.

In Darwinism mutations occur *randomly*, and only *after* they have occurred natural selection intervenes in favour of some of them. This point was made clear in 1998 by Robertson and Robinson, in an article entitled *Darwinian Daisyworld*, where a fundamental critique against the *Daisyworld* model is made.

In particular, the hypothesis n. 5 of Lovelock's *Daisyworld* would not be in line with Darwinism. In fact, for *Daisyworld* to work, we have to assume that the daisies' growth is limited and strictly established: the daisies grow *only* above 5°C, die above 40°C, and are in optimal conditions at 20°C.

But what if the daisies, instead of dying, adapted to survive at different temperatures?

If "survival of the fittest" means "survival of the fittest to the ever changing environmental conditions", then the limit values and the optimal temperature of the daisies should not be established as constants, but as variables. If dark daisies genetically capable of withstanding well above 20°C bloomed *by accident*, then at that temperature natural selection would *not* favour the growth of white ones! Consequently, the daisies wouldn't regulate the climate anymore: instead, the positive feedback of dark daisies would be enhanced, the heating would increase and the whole system would quickly collapse.

In this case, Lovelock goes straight to the point and argues in favour of a vision of nature as *limited*. In fact, his whole theory is based on the assumption that there are very *strict conditions* regulating life on Earth (salinity, average temperature, oxygen level...) and that all living beings cooperate with the environment to keep them constant.

«The scientific basis for the theory of Robertson and Robinson - Lovelock writes - depends on their assumptions about the natural constraints of the development, and on the significance of adaptation. In their model, the daisies are adapted to grow at higher or lower temperatures, free from constraints. [...] I do not accept that their kind of adaptation has place in nature. In *Daisyworld*, the crucial function is the one that determines the boundary of the constraint» (Lovelock, *Homage to Gaia*, 2000, p. 304).

Now, in the Darwinian model it is *casuality* that potentially generates "genetically modified" daisies. Basically, the para-law of random mutation, fundamental in Darwinism, cannot be integrated with the Gaia theory. Here, a law of teleological nature must work side by side with natural selection to govern the energetic exchanges between the living beings and between them and the environment.

My idea is that with the Gaia theory we are in the presence of a new scientific paradigm, which explains the same events in a way different from (easier than?) Darwinism.

Let's take an example from a volume of Slavoj Žižek:

«May 17th, 2007: researchers at the Albert Einstein College of Medicine have found evidence that certain fungi have the capacity to use radioactivity as an energy source for making food and spurring their growth. Robot sent into the still-highly-radioactive Chernobyl reactor had returned with samples of black, melanin-rich fungi that were growing on the ruined reactor's walls. The researchers then set about performing a variety of tests [...] and found that radiation interacts with melanin to alter its electron structure — an essential step for capturing radiation and converting it into a different form of energy to make food. Ideas already circulate for the radiation-munching fungi to be on the menu for future space missions. Since ionizing radiation is prevalent in outer

space, astronauts might be able to rely on fungi as an inexhaustible food source on long missions or for colonizing other planets» (Žižek, Milbank, *Paul's New Moment*, 2010, p. 193)

How does Žižek interpret this phenomenon? In a Darwinian way:

«Instead of succumbing to terror at this prospect, it is in such cases that one should remain open to new possibilities, bearing in mind that “nature” is a contingent multifaceted mechanism in which catastrophes can lead to unexpected positive results»

How would Lovelock interpret the same case?

He'd probably say that Gaia has finally found a way to balance the disproportionate increase of nuclear radiations, (in order) to maintain suitable conditions for life!

(He maybe hasn't heard of this discovery, otherwise he would reinforce his pro-nuclearist position: men are free to use nuclear power, nature will think about disposing of it!)

This is a really crucial point in Lovelock's theory, one that introduces us to the religious problem: Lovelock “believes” in Gaia, and therefore believes in the ability of Mother Earth to restore the constantly threatened balance using her “children”: the living beings that proliferate on her surface. Hence the term “Gaia”, which refers to the pre-Greeks cults of deification of the Earth. We cannot dwell, in this conference, upon Lovelock's links between respiration, metabolism, photosynthesis, and climate regulation. Let us assume as valid the result of his studies: it is the necessity to hinder entropy, which regulates the individual beings' natural mechanisms of survival. The “whole” is worth more than the parts. Lovelock is so fascinated by this conception of life as a *cosmos* which opposes the thermodynamic laws of death and disorder, that he doesn't really explain why a creature following the law of thermodynamics could not proliferate. He simply says that such a creature cannot exist: Gaia follows the law of anti-entropy, and, like a mother, bears children who have in themselves this fundamental law, this “genetic code”, this information, this *purpose* (which is) to be unconsciously followed.

And yet, in Lovelock's pages we sometimes find the idea that an illegitimate child, a degenerate and rebellious son of Gaia, can actually exist: the *human being* is some sort of *virus* in the system, a virus to be expelled in order to recover.

We human beings are nothing «more than the most destructive event in our planet's biological history», Lovelock writes in an avowedly anti-humanistic way. When further reading, it results obvious that men are not *only* this, they are also something that *can't be there*, that shouldn't have happened. Their positive feedback has now reached dangerous levels to the overall balance of the system. «Humans behave like a pathogen micro-organism, or like the cells of a tumor» (Lovelock, *Gaia: the practical science of planetary medicine*, 1991, pp. 17, 153-154). This polluting action didn't begin during the last century (which is, for Gaia, an infinitesimal of her time), but in the dawn of humanity: «When we decide to work the land, we break our bonds with Gaia»: when replacing natural forests with crops or livestock, in fact, we considerably reduce the capacity of the Earth's surface to control its own climate and its own chemical processes (Lovelock 1991, p. 171). But how can men, which are living beings, act *against* nature? This cannot be. We are diverting nature from its end! We are using nature as a means to our ends, which no longer respond to its limits.

«We have declared war on Gaia», writes Lovelock again, we have «usurped Gaia's authority», thinking only about our own welfare. (Lovelock, *The revenge of Gaia*, 2006, pp. 47, 50).

Men have sinned against Gaia, they have abandoned nature's harmonic law because of the freedom that can make them conscious of that same law: we have here, once more, the powerful idea of original sin! After the biblical original sin, in fact, the earth no longer gives its fruits to man, and men become farmers. Ever since men have known good and evil – or, translated in the Gaian language, ever since they have become aware of nature's purposes and limits – they have distanced themselves from nature, becoming able to use it as a means for their own free, unlimited goals.

Hence, Lovelock's radical anti-humanism: his positive approach to nuclear power goes hand in hand with his radical renunciation to any kind of ecological ethics. Man must cease to be man, and go back to being benignly unconscious, like all other animals: we should «learn to live with the Earth as part of it; by humbly taking and giving the gifts that sustain us [...] Some of you may regard my proposal as irresponsible [...]but] I believe that even asking ourselves such a question, or being persuaded that our task is to rule the Earth, is excessively arrogant. [...] No fate could be worse than the obligation to be forever responsible of the proper management of climate, of the composition of the oceans, air and soil, of what was once Gaia's free gift, until we started to destroy the creation» (Lovelock 1991, pp. 174, 78, 184-85).

Men – Lovelock seems to say – needn't worry about the consequences of their actions on the environment's health, they must return to acting “according to nature” as the other animals do; Gaia, as an almighty God, will restore the situation if necessary.

But isn't this the end of every kind of ecology, as proclaimed by one of its greatest *guru*? And above all, isn't this apparent egalitarian anti-specism nothing but a new version of the never-ending myth of the “noble savage” and of the recovery of our lost innocence? Can men really return to behaving “according to nature”? I don't think so. Men's fundamental experience is that of a transcendence of nature, which founded the very idea of nature. Nature is men's experience of something that doesn't depend uniquely on their own will, the experience of a “cannot-not” (and freedom is therefore the experience of a “can-not follow” the obligations of nature).

Romano Guardini says that «Man's nature consists in not having it» (*Etica*, Morcelliana 2011, p. 18). I think, on the contrary, that men's nature consists precisely in *having nature*, and in feeling this *having-nature-at-their-own-disposal* as an obligation and a responsibility.

Men cannot-not reflect morally (rationally) on their actions, even when those consist in simply satisfying a natural need: the argumentation “in the absence of more important reasons, it is right to follow your own natural instincts”, is already a moral (rational) argument!

This is why, all in all, I consider ecologically dangerous the moral imperatives about “going back to being part of nature”: when this imperative is formulated, accepted and voluntarily practiced, it isn't natural anymore. The problem is that we cannot go back to *only* being part of nature. If men *only* seeked their own interest and the satisfaction of their own instincts, their own well-being and “well-feeling”, their own self-preservation and pure hedonism, like every other animal, it would result in an ecological disaster. Men would take advantage of nature *beyond measure*, because they have no natural limit, no Gaian law to comply with. They would exercise their possession of nature at hypertrophic levels, treating it *only* as a means to their purposes.

This is exactly what happened with the technological society, which led to the ecological crisis: violent technocracy should be interpreted as an attempt to return to animality, not as an example of anti-naturalism. As men maximize the profit, they maximize the domain.

Theologian Robert Spaemann claims: «When men consider themselves as pure natural beings, they can overcome any measure», because they can transcend their limits. Consequently, «only when they are something different from nature, then they can understand nature as measure», and morally accept some limits to their action (Spaemann, Löw, *Natürliche Ziele*, 2005, it. tr. 2013, pp. 340-346).

Only upon a humanist ontological foundation can we build an ecological ethics, even in a new Gaian biological framework. Otherwise, we would have the strange case of a new religion without ethics, without humanity.