

Planetary and Personal Health: Global Health and Agriculture

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Learning from the Past to Create a Healthy Future

As an evolution biologist, I am a deep Pastist, and I am that in order to be a reasonably well informed Futurist, because only by knowing the past trajectory through which we have come can we even try to gauge what is possible and probable as our future. For example, it is by knowing that Earth, long before humans, has been through Hot Ages as well as Ice Ages that we can understand and predict that the one coming on now will be temporary, if extremely long from a human perspective, and that its predictable changes in sea level, temperatures, water distribution, etc, are survivable if we work with nature rather than trying to outsmart or control it. And by knowing that we humans have survived through at least a dozen Ice Ages, we can predict our future resilience at this other climatic extreme that is new to us as a species. Earth has her fevers and her chills, but we must acknowledge her amazing resilience and overall health, at least until we came along.

We can also see that, in the context of climate and other crises, Earth's living creatures were sorely tested, up to 95% of them going extinct in the worst crises, yet with so flexible an entirely interchangeable DNA pool and such strong innovative drive that the crises were responded to with the evolution of simultaneous batches of new species after even the most desperate situations. Evolution happens when DNA reorganizes in response to stress. Every crisis is thus an opportunity for new evolution. Nature, we now see, functions intelligently, being extremely conservative when things are going well and radically creative when they are not. It is our human foolishness that we ask each other to choose between these strategies as though either could be adequate in itself, rather than teaching ourselves to use both as appropriate the way Nature shows us.

A Cycle of Maturation

Our still youthful human species' intelligence and creativity follows in the footsteps of countless other species in their own immature phases, when feisty competitive behavior coupled with creative invention helped them establish themselves in their niches and permitted their expansion. But many a species eventually learned the energy efficiency and security advantages of sharing territory and feeding their enemies rather than killing them off, thus evolving into mature cooperative species, such as are found in the great interwoven diversity of rainforests, coral reefs and prairies. This maturation cycle of species, only the first half of which Darwinian theory covers, plays itself out anew for each species. This is evident in the transition from Type I "pioneer" ecosystems to Type III "climax" ecosystems—from youthful hostile, if creative, competition to mature collaboration and the interdependency of true community.

The same maturation cycle we observe for species is clearly reflected in human individual and cultural maturation. We do not consider a human psychologically healthy if they do not mature from feisty adolescent combativeness to socially contributing cooperation.

Seeing this maturation parallel in human individuals and in our—and all—species, brings us to another important concept, that of Holarchy.

Holons in Holarchy

Everything in nature is organized as holons (entities) making up holarchies. Holarchy was philosopher/novelist Arthur Koestler's name for the embeddedness of everything in nature. Examples of holarchy are cells, organs, organisms, species, ecosystems, planets, etc. or individuals, families, communities, ecosystems, nations, world. We can think of Earth as one holon made up of innumerable smaller holons. In this way we begin to comprehend the idea of all life as Oneness.

Seen from a Big Picture perspective, the first half of Earth's evolution as a living planet—roughly two billion years—was devoted to competitive and diversifying bacterial evolution. Nucleated cells—the next level of holarchy—evolved as bacterial cooperatives once bacteria matured enough to take advantage of communal security. They are on average a thousand times as big as bacteria and contain the once free-living bacteria as 'organelles'. The diversification of nucleated cells took another billion years of competition before cooperative multi-cellular life—the next level of holarchy—began in the last billion years to the present—the part of evolution we usually learn about in school.

The nucleated cells of our own bodies are as complex as large human cities, with vast numbers of interactive processes keeping their economies healthy. Just as one example, there are some 30,000 'recycling centers' inside each cell of our bodies just to keep their proteins healthy! And every cell has two meters of DNA packed into its invisibly tiny nucleus together with proteins and water. Joining these two-meter pieces end to end, your personal DNA string would stretch so far into space that a jet pilot flying 500 km per hour would have to fly day and night for 23,000 years just to reach its end. It is difficult for us to grok the vastness and complexity of our universe, but perhaps even more difficult to grok the tinyness and complexity of our own awesome cells.

Our nervous system acts as a service government—a central guidance system collecting information, monitoring the state of affairs everywhere in the body, working closely with endocrine and blood systems to make sure supplies are appropriately distributed, coordinating the tensegrity (integrity through tension) movements of bone and muscle, the perceptions from eyes, ears, nose, mouth and skin, regulating body temperature and emotions. Its jobs are far too numerous and complex to mention or track them all. What we *can* say is that as long as the body is healthy, there is no conflict between its ecology and its economy. It coordinates a win/win economy/ecology in which all parts contribute what they have to offer and all parts benefit equally from the collective economy while every one of our cells have considerable autonomy in running their own local economies. Note well that no part of a healthy body gains its health at the expense of other parts; there are no such things as rich and poor organs. We would do well to emulate our bodies' economies.

Just as all parts of our body holons need to be healthy for the body as a whole to be in good health, so the ecosystems of the Earth holon need to be healthy for Earth to be in

good health. In the well-evolved systems of our physical bodies, we can see their ecology as their organization into interrelated systems—skeleto-muscular, circulatory, digestive, brain/nervous, perceptual, and so on. The principles by which they manage their economies of food intake, of cellular maintenance, of endocrine, plasma, etc. production, of materials and product distribution, of consumption or recycling and elimination of wastes, are the same principles by which the larger holons of our communities, nations and Earth itself must run *their* economies.

Here is a list of 15 such principles:

15 Features or Principles of Healthy Living Systems:

1. Self-creation (autopoiesis)
2. Complexity (diversity of parts)
3. Embeddedness in larger holons and dependence on them (holarchy)
4. Self reflexivity (autognosis, self-knowledge)
5. Self regulation/maintenance (autonomics)
6. Response-ability to internal and external stress or change
7. Input/output of matter, energy and information with other holons
8. Transformation of matter, energy and information; no non-recyclable waste
9. Communications among all parts
10. Empowerment, full employment of all component parts
11. Coordination of parts and functions
12. Balance of interests negotiated among parts, whole and embedding holarchy
13. Reciprocity of parts in mutual contribution and assistance
14. Conservation of what works well
15. Innovation, creative change of what does not work well

Globalisation as Humanity's Maturation

To understand globalisation, we can look once again to the past to predict our future—to amazing biological stories of how ancient bacterial cells harnessed solar energy, built nuclear piles, invented electric motors and the first WorldWide Web of universal DNA exchange in their prolonged and mutually exploitative immature phase, only to discover the advantages of sharing the DNA pool and working in the collaborative communities that became the greatest innovation in all evolution: the evolution of the nucleated cell as described above. Recall how this same maturation process repeated itself when these comparatively huge nucleated cells ended their own youthful hostilities to form the collaboratives we know as multi-celled creatures, including, eventually, ourselves.^{i, ii} Note also that if a single human body has up to a hundred trillion cells, each as complex as a large human city, and all working together in an awesomely complex collaborative economy, it should not be so difficult to weave only six billion people together in a healthy global economy!

Elsewhere I have pointed out in detail how our current process of Globalisation repeats Nature's maturation curve.ⁱⁱⁱ Globalisation began with the globalising of our juvenile win/lose system of financial interests controlling inequitable global markets. Now this

unsustainable system is collapsing and the process is gradually morphing into the greening of local economies with healthy food production, the inventions of clean energies and equitable mutual credit systems permitting local economies to thrive and trade according to win/win principles. As Paul Hawken has pointed out, there are already well over a million NGOs around the planet working in a myriad ways to make life better for people and restore their ecosystems.^{iv}

From understanding past evolutionary events we can thus predict something of the collaborative future of Globalisation, *if* we humans follow the natural evolutionary trajectory that is our positive heritage and leads to a healthy humanity within a healthy planet, rather than killing ourselves off in our dominant culture's adolescence. We must recognize that focus on selfish consumer cultures that concentrate wealth must give way to sharing and the negotiation of self-interest (not selfishness) at all levels of human society from the individual to the global economy. Such non-hostile negotiations will naturally lead to cooperation if we truly seek the best practices of not merely survival, but *thrival*.

The health of nature and people in Africa is our direct concern in Europe also. Resource use, population growth, the gap between rich and poor, are all proceeding along exponential curves heading quickly toward infinity—and none of them, of course, can reach it. There is no way to have an infinitely large population, to use an infinite amount of resources, etc. So we *know* things will change. *Something* will alter the direction of change. The question is only, what will it be? Total disaster followed by utter misery and possible extinction? Lesser disasters, such as further economic crashes or more debilitating prolonged wars between haves and have-nots? Or a real awakening and resolve to actually implement sustainability?

The creative self-organisation of the Internet is our greatest tool for peaceful global collaboration and we must work hard to safeguard it against the obsolete controllers of inequitable economies and politics that are still fighting for their survival. We must understand that all we now recognize as unsustainable literally means it *cannot* survive and must be reinvented! At the same time we need to protect our fledgling inventions such as the Internet through the period in which greed is replaced by truly human values.

Are we truly homo sapiens sapiens as we have designated ourselves? Our current crises in climate change, energy, food, water, economics and finance—all the natural consequences of our wildly creative juvenile phase—are the indicators that our youthful phase has been pushed as far as it can go and it's time to grow up into a cooperative species. It's our call to be hugely courageous and resourcefully cooperative in building the mature version of global humanity.

Toward a Healthy Earth Holarchy

We have seen that the healthy life systems of planet Earth consist of multiple cooperating and competitive species in the life systems of its Holarchy. The crises we face indicate how severely the planetary system is out of balance because of the behavior of one wildly creative young species: our own. Al Gore shows us convincing evidence of the results of

our devastation in his recent film, shown all around the world: *An Inconvenient Truth*. In addition tens of thousands of highly trained scientists continue to try to make sense of the climate changes, assisted by satellite images showing the rapid deterioration of glaciers and polar ice regions. The only thing that is clear is that year after year their predictions are revised to show that the process is speeding up dramatically faster than anticipated, flooding islands and coasts, drying up large regions, forcing species to migrate, killing off others, causing storms and floods and fires of unprecedented magnitude, with all the attendant devastation of human life and that of other species.

The ecosystem-devastating empire-building mode never lasts. Empires simply are not, and cannot be, healthy living systems. That is why they have failed again and again. Individuals in healthy evolved living systems contribute to each other's well-being rather than exploiting, damaging and killing each other and other species. Tachi Kiuchi and Bill Shireman's book *What We Learned in the Rainforest*, is a great example of what human business enterprises can learn from such ecosystems.

Over the past few centuries we have struggled to end the human empire-building process by initiating an alternative process of peoples' self-rule that was pioneered in an incomplete form by the ancient Greeks, who named it *democracy*—the rule of the people. Unfortunately, the habits of empire building, economic growth and wealth concentration have been hard to break and democracy is still an experiment without its intended results being as yet fully implemented.

If we see our Earth as a living holon in our universe and understand our human economics as an integral part of it, then we have no choice but to implement a healthy, truly democratic win/win world economy that can continue sustainably indefinitely. As long as you are personally healthy and avoid accidents, you are sustainable for a natural lifetime. In the same sense, a healthy human world is a sustainable world for the natural lifetime of our species.

In all the crises we face, one thing is abundantly clear now: For the Earth holarchy including our human systems within it to be healthy, we must radically reinvent our lifestyles. Three things are critical:

- 1) ending our burning of fossil fuels and replacing them with clean green renewable energy,
- 2) reinventing our economies from predatory to cooperative with each other and with the rest of nature, and
- 3) returning to organic food production.

Healthy Global Agriculture

Let us take here just the third of these and look at the agricultural situation we are in and where we could be in a sustainable future.

Standing on the Moon looking for evidence of human life on Earth, we would see only the extent of deserts that have spread since our arrival, with our ability to cut trees by the

hundreds and thousands of millions, eroding vast quantities of soil, and to domesticate hooved animals, especially goats, to assist in our desertification before we invented the required machinery. Now, it is almost as if Mother Earth said, "All right my darlings, I see how much you love deserts; I will make you much bigger ones than you can make on your own!" And so, we tipped her balance into a Hot Age. And our response must be to wake up to our own creative but juvenile predations and become, not a desert-making species but a desert-greening species. That this is possible is beautifully exemplified in the box on the Ansokia Valley's transition. (see box)

The Ansokia Valley: from Famine to Feast

During the 1985 famine in Africa, the people of Ethiopia's Ansokia Valley were starvation's poster children. Now their utterly hopeless dustbowl has become a lush green oasis producing piles of food amidst millions of green trees. Gloriously healthy children go to school and adults tell them the story of the man who came carrying a digging stick to create this miracle of abundance when they'd lost all hope. John McMillin, working through World Vision, taught local people to plant trees and creeping ground cover, to grow native tilapia fish and vegetables for a low-cost high protein diet. He sets up tightly coupled systems of fish ponds and veggie gardens—tilapia feeding on garden waste while their waste water nourishes the veggies. John has personally saved twenty deathly ill babies on a liquid diet of his fish and veggies. Now some are in college. He has built his gardens of bounty in many other deserts of Africa and elsewhere in the world, currently in Dominica. This magic man who greens deserts loves to bet locals they can't feed more people than he can in three to five years—and he loves losing!

See: www.globalregen.org for programs based on John McMillin's wonderful work

Mature, healthy living systems show enormous diversity: there are no monocultures in nature. Referring to the list of healthy features of living systems above, you can see that the principles by which they are organized lead to full employment of all members, distributed leadership governance, equitable distribution of goods and services and 100% recycling.

Global agriculture, as presently done, is highly energy inefficient and extremely destructive to soils and water tables. While wholesome family farms of balanced organic animal and plant food production required 1 calorie input for every 10 calories of food produced, improved soil and conserved water tables, the current hi-tech agriculture system requires 150 to 300 calories input for every 1 calorie of food produced, poisons the soil and reduces water tables steadily. Therefore it is scientifically indefensible and exists only because it is enormously profitable to the multi-nationals on which farmers have been made dependent for seeds, chemicals, irrigation, farm machinery and market contracts.

Biodynamic farming, permaculture and other forms of ecological farming have developed efficient models which can be implemented in diverse climates. There is no reason not to make the whole planet's food production organic again as it once was, but with these more recent innovations. Bio-regions and watersheds are important structuring principles from which to understand and act. Pesticides and fertilizers, genetic engineering with its patenting of life and other malpractices are putting our future at risk as has been well

documented by physicist Vandana Shiva in her books *The Violence of the Green Revolution*, *Biopiracy*, and others.

In documenting the Green Revolution in India, Shiva traced the development of nitrate-dependent agriculture to the need to maintain the production and profits of nitrate explosives factories after the Second World War. Nitrate dependent crops were deliberately bred for this much-touted Green Revolution. The resulting yields of rice per hectare, for example, were shown to be far greater than those using traditional methods—but the measures were misleading because they ignored the fact that the same hectares were not only producing rice traditionally, but fish, pigs, vegetables, fruit, natural fertilizer and mulch on soil and in water that remained healthy with no chemical input. None of that was counted in the comparison. In fact, Green Revolution fields over wide areas of India became salt deserts, as the World Bank had acknowledged by the mid 1980s!

Hi-tech agriculture was sold to us with other misleading statistics. We were told, as one success story, that a single U.S. farmer at the turn of the century could feed only four people, while with hi-tech agriculture he could feed seventy or eighty or more people. Such statistics ignored the veritable army of people and resources producing the chemical herbicides, pesticides and fertilizers, the rapidly obsolete heavy machinery, the fuels and irrigation systems, the genetically engineered sterile seed that must be bought annually. In short, they ignored the 150-300 calories of energy input required by this “one farmer” to produce one food calorie from his crops.

It is a myth that we cannot produce enough food by organic means to feed the world’s population. In the Philippines, one of the countries where hi-tech Green Revolution techniques were pioneered, the restoration of traditional organic rice-growing methods proved superior in quantity of production. The case of India cited above also belies this, as do the production figures of restored traditional techniques in other parts of the world.

A century ago, a British agricultural expert toured India to see how he could best advise Indian farmers to improve their agricultural practices. His conclusion, reported in *The Ecologist* magazine, was that the Indian farmers had more to offer English farmers in the way of advice, because they knew so much about soil composition and health, pest control, water management, crop breeding, and all other aspects of agriculture. They were highly knowledgeable and productive, failing only when they lacked access to natural resources.

Oswaldo Rivera and Alan Kolata have reported on the restoration of the ancient (400 to 1,000 A.D.) pre-Inca *waru waru* or *chinampa*-type agriculture in the altiplano of Peru and Bolivia. It increased local annual production from the norm of 2.5 tons per hectare to 40 tons in only five years with no chemical fertilizer or pesticides and very little work beyond filling the ditches between soil mounds with water from Lake Titicaca through sluice gates annually and planting seeds on the mounds without plowing.

In this system Nature creates its own fertilizers, the canals becoming a nutrient sump for nitrogen and phosphorus through colonization by fish, birds and water plants. The

system's automatic irrigation is also a form of climate- control that prevents freezing in winter. The usual crops were varieties of potatoes, grains such as maize, quinoa and amaranth, legumes, etc. Now winter wheat, barley, oats, turnips and other vegetables have been added, including even lettuce at 2,300 meters altitude.

Few indigenous peoples of the Americas used plows, which are a major cause of soil erosion. All over North and South America, not to mention other parts of the world, indigenous agricultural peoples without the urban social organization of the Inca were equally sophisticated in smaller scale agricultural practices. Each culture understood, through scientific researches over centuries of time, how to breed and grow food, medicine and building material crops appropriate to their bioregions in sustainable ways.

Another reason given in support of hi-tech agriculture is the low price of supermarket food in relation to organically grown food. Yet every year at the annual Bioneers Conferences in California and Massachusetts, it is demonstrated that organic food can be grown more cheaply than hi-tech food. We are never told the real cost of supermarket food, most of which is government subsidized, but clearly it is far less expensive to grow labor intensive organic food, which could create much-needed employment.

GMOs

Genetic engineering has become the source of great public controversy around the world, with Europe having been most active toward banning it. Just as DDT was originally promoted as good for us all, and as nuclear energy was supposed to solve our problems but brought us Three Mile Island and Chernobyl and the problem of isolating and storing wastes for tens of thousands of years, not to mention how the Green Revolution would end hunger, we should be leery of yet another panacea—especially one that has become a multi-billion dollar industry worldwide with not a single proven improvement to our health! Even the United States Department of Agriculture has reported that its success is more due to market hyperbole than proven success.

Happily, in both Europe and the Americas, there is now increasing in public demand for healthy organic food and its production has risen dramatically over the past few decades, creating a very significant shift in agricultural production. Before the turn of the millennium, organic food production in the U.S. had become the only agricultural growth industry, and in California, public schools began to implement organic food lunches for children. Meanwhile, in Europe, the public outcry against genetically engineered foods had caused England to make new labeling laws even for restaurants and the European Common Market to reject them entirely as imports, and test fields for such crops were being burned around the world in protest.

Let me end this section with a very positive example of what can be done to make organic agriculture a win/win/win proposition for farmers, consumers and ecosystems, by telling the story of Japan's Eniwa Farms and Bikkuri Donki restaurants.

(insert box next page)

Japan's Eniwa Farms and Bikkuri Donki restaurants

Businessman Akio Shoji founded Aleph, Inc. in Hokkaido with the mission to feed the children of Japan the highest quality diet at the lowest possible price. Beginning in 1968 as a small restaurant serving hamburgers and salads in Morioka on Japan's main island, Aleph now has a chain of 300 *Bikkuri Donkey* (*Donkey Surprise*) restaurants nationwide largely serving organic dairy products and veggies grown on two huge Aleph farms in Hokkaido and importing natural meat from New Zealand. Families are lined up all day and well into the evening to eat this high quality but fun food at MacDonal'd's prices.

Organic farms were a rare breed in Japan when Mr. Shoji began; policy measures to ensure safety, and technologies to protect the environment, were still insufficient. In order to learn how to put his business concepts into practice, he started with one experimental farm and livestock operation to serve his company in Eniwa, Sapporo, capital of Hokkaido prefecture, later expanding to a second farm for fruit and vegetable production.

The farms have since expanded to experimenting with hydroponic tomato growing—a single tree-sized plant has produced over 12,000 tomatoes in a season and Mrs. Shoji is producing tomato jelly and a lovely clear non-alcoholic tomato wine. Traditional medical plants are also being brought back into production and a popular retail garden center has been added to Aleph's highly successful business venture.

The farms, their farm-based production plants and the restaurants are constantly working on energy efficiency. All the chopsticks from the 300 restaurants are recycled on the farm into natural fertilizer and biofuels are produced to run the necessary farm equipment. Guests are escorted around the farm in horse drawn carriages. Further, the farms are teaching centers for children who come daily in school buses from all over Hokkaido to watch through a glass wall as cows come in from free-range feeding to be milked in the immaculate barn, to see exhibits on organic food production and see other demonstrations and participate in hands-on workshops.

The Eniwa Farms and Bikkuri Donki restaurants of Aleph Inc. are a wonderful role model business for all the world to see, proving how well businesses that exist for social and ecological good can do.

ⁱ EarthDance: Living Systems in Evolution, http://www.amazon.com/s/ref=nb_ss_gw?url=search-alias%3Dstripbooks&field-keywords=Sahtouris&x=21&y=17

ⁱⁱ Living Systems, the Internet and the Human Future <http://www.ratical.org/LifeWeb/Articles/LSinetHF.html>

ⁱⁱⁱ The Biology of Globalization, (1998. Adapted from first publication in *Perspectives in Business and Social Change*) <http://www.ratical.org/LifeWeb/Articles/globalize.html>

^{iv} Paul Hawken, *Blessed Unrest: How the Largest Social Movement in History Is Restoring Grace, Justice, and Beauty to the World*, Penguin, 2008