

## Pointing the way (interview)

by **Edward Goldsmith** · July 1, 1992 · [Leave a Comment](#) · [Share](#) · [Print](#)

Real World magazine Interviews *Teddy Goldsmith about A Blueprint for Survival, The Way, and the need to move towards a sustainable society. Published in Real World No. 6, summer 1992.*

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Our discussion started by going back to *A Blueprint for Survival*. Its warnings about the future were dismissed by many at the time. It was attacked for excessive alarmism and lack of faith in human technological prowess. Today, Goldsmith remains unrepentant. Indeed, he said, the *Blueprint's* predictions were if anything too conservative and that, in many areas, things have turned out to be worse than he feared at the time.

*Real World* asked whether he now saw any failings with the *Blueprint*. In reply, he pinpointed its naive assumption that governments would adopt the necessary programme to save the Earth. In fact, there has been no sign of them doing so. Nevertheless, he would still stress the importance of co-ordination since the phasing out of harmful things depends upon the introduction of more benign alternatives but now he emphasises citizen action.

He also thought that the *Blueprint* had not been very clear about the real root of our problems. For example, though population growth is a terribly serious problem, he now views it as the consequence of economic development, the real enemy.

### **The modernist fallacy**

We turned to his new book [*The Way*] which explores the world views that have brought humanity to the brink of social and environmental ruin. First we looked at what is wrong with what Goldsmith calls “modernism”. The dominant view, he argued, wrongly assumes that all wealth is human-made. For example, it treats health as the product of hospitals while law and order is equated with more police and jails. In particular, science, technology, and industry are seen as the providers of all benefits. Furthermore, it is assumed that we should strive to maximise human-made benefits, in other words, pursue more economic development.

When questioned about the world view appropriate to truly sustainable societies, Goldsmith argued that it must recognise that all benefits flow from the normal functioning of the living world, the biosphere. Everything, he stresses, depends upon respect for its integrity. He includes not just environmental services such as a stable and favourable climate, fertile soil, clean and ample water. If we cut down forests, for example, we lose soil and water supply.

More controversially, he regards social structures such as the family and cultural patterns found in what he calls “vernacular” societies as part of the “natural” order of things. Such societies knew and accepted these facts of life. Their social structures sought to maintain the critical order of the biosphere. Such behaviour patterns are “the way”, a term used in cultures around the world, sometimes explicitly as in the ease of Taoism, at other times more implicitly in tribal religions.

The notion of ecological stability is central to Goldsmith’s approach, so the discussion moved to certain theoretical issues surrounding it. *Real World* raised the point that many scientists and others argue that stability and order are meaningless concepts, that there is no ‘goal’, that everything is random. Goldsmith remained unmoved. He regarded such views as the by-products of the reductionism that holds sway over many scientists. He argued that in fact it is characteristic of all living things, from individual cells to ecosystems, to maintain the order of the whole. Mainstream science has not started from this holistic perspective and therefore is deeply flawed.

[Back to top](#)

### **What is Nature?**

Not surprisingly he had little patience with another popular argument, namely that, since people are part of nature, everything they do is therefore ‘natural’. Genetic engineering, for example, has been defended on such grounds. Of course, he replied, words can be used to mean whatever their user

wants. Yet if everything is 'natural', the word has no meaning – something has to be 'unnatural' for something else to be 'natural'.

In the ensuing discussion, Goldsmith focused upon what is normal. For example, he argued, in a pioneer ecosystem, randomness is normal, yet, over time, order develops creating greater stability. Similarly, individualism is natural in 'pioneer' societies as well as ones that are disintegrating – Goldsmith cited Los Angeles as an example of the latter. Egoism and aggression thrive. He also quoted examples from other species. Baboons, he pointed out, are highly aggressive when confined in zoos yet back in the wild such behaviour is minimal.

Warming to his argument, Goldsmith referred to heavy metals and chemical compounds such as mercury and chlorinated hydrocarbons which may be naturally occurring but which are not normally taken in by living things. Therefore, he concluded, that humans should avoid technologies that depend upon their use. More generally, Goldsmith rejected the claims of those who view evolution as an open-ended process. What people today call 'progress', he argued, is in fact anti-evolution since it is simplifying and destabilising the biosphere.

Back to top

### **Systems theory**

*Real World* then switched the discussion to the possibility that Goldsmith's approach might not be reductionist but it could be seen as highly mechanistic. Goldsmith replied by first recognising his debt to Ludwig von Bertalanffy's General Systems Theory. He stressed that he is well aware that the term 'systems' has been used and abused in all kinds of ways contrary to the ecological world view he advocates.

Indeed, some of the worst offenders, he argued, have been professional ecologists. Although the term does give the impression of a very mechanistic approach, he claimed that the reality is very different. It is about general laws governing structure and function which apply to all systems – individual cells and organisms, whole species and ecosystems – as they seek to maintain homeostasis. The key difference was between natural systems and technological ones which Goldsmith calls a "*surrogate world*".

The problem of deducing values and norms from scientific 'facts' was discussed next, in particular whether there was a danger that he had fallen to the old trap of conflating 'is' with 'ought', the so-called 'naturalistic' fallacy. Goldsmith denied the very existence of such distinctions. Facts, he argued, are nothing more than disconnected fragments of information. Inevitably they are value-laden, no matter how disguised this might be: implicit in all of them is a world view.

In support of his contention that there is no such thing as objective knowledge, Goldsmith cited no less a figure than Francis Bacon, one of the founding fathers of the modern world view, who saw the accumulation of knowledge as the means of control, the key to human domination of nature.

The discussion next turned to the nature of a sustainable society. Goldsmith advocated small-scale, low technology, family-centred communities. He agreed with *Real World's* suggestion that many might regard that as a very restrictive way of living. This, he argued, was simply a reflection of the society in which they have been raised.

He stressed the penalties to be paid by not recognising the need for community and family structures as mechanisms of social controls. Without them, the road leads straight to the social disaster that is Los Angeles, and to the amoral behaviour of the modern business corporation. Constraints, in the sense of limitations upon behaviour, are, he pointed out, survival mechanisms: if parents do not behave in certain ways, for example, their children have no future.

During the discussion, Goldsmith frequently cited "*vernacular*" cultures as examples of a more ecological way of living. So *Real World* drew attention to the great environmental destruction that was done in many pre-industrial, even stone age, societies.

Goldsmith's response was to look at the circumstances in which this happened. Usually it was in the context of population movement. For example, both the North American Indians and the Maoris destroyed many species as they moved into new lands. He drew a comparison with the introduction of exotic species into alien environments such as rabbits into Australia. They have not co-evolved with other parts of the ecosystem and do great damage before a balance is struck. He stressed that the Indians and the Maoris did learn eventually to live in their new environments. However, it takes time, which is the one thing, he concluded, we lack today because of our numbers and the of our technologies.

Back to top

### **The way forward**

*Real World* then raised the thorny problem of how the ecological world view is to be sold, say, to a worker worried about mortgage repayments. Goldsmith was pessimistic in some respects. He said that it is probably too late for many people, particularly middle-aged men, to make what he called the equivalent of a religious conversion. He was, however, more hopeful about women who, he argued, are often more sensitive to the dangers inherent in our way of living. He also emphasised the importance of children both as possible converts as well as the means to persuade their parents of the need for a different society.

He also added that industrial society holds out bleak prospects for people like the car worker. The transnational corporations want bigger units in which to operate. There may be a huge influx of workers from Eastern Europe dragging down hard-won wages and conditions in countries like Britain. Alternatively, these firms might relocate in low wage countries – with the same effect.

Finally, we talked about Goldsmith's own lifestyle. A recent *Observer* portrait depicted him denouncing the evils of materialism from the comfort of his very affluent surroundings. Was he worried that people might think him hypocritical?

Goldsmith replied that he had never disguised his background. The real point is whether an individual is dominated by materialism which, he claimed, wasn't true in his case. His money had been spent on subsidising *The Ecologist* and similar ventures. He had devoted his life fighting for the Earth, donating his services free. Indeed, his fight is also a fight for the poor since they are the main victims of the ecocrisis.

He drew attention to a recurrent fact in history; namely, that revolutionaries had tended to come from outside the ranks of the most exploited and oppressed. It is the more well-to-do who are able to step back and diagnose the ills of the world.

On that note, the discussion ended. Given Goldsmith's record in battling against the Earth's many enemies, there are doubtless many politicians, bankers and corporate tycoons who wish that he had remained loyal to his class.

## The Way – a synthesis

by Edward Goldsmith · March 1, 1997 · Leave a Comment · Share · Print

Pages: 1 2 3 4 5 ALL

*This article by Edward Goldsmith represents the ‘synthesized statement’ of his great work The Way: an ecological worldview. It was published in InterCulture Vol. XXX no. 1, Winter – Spring 1997, Issue no 132.*

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### **Ecosophy and silvilization (Editor’s preface—InterCulture)**

*These two connected and complementary shock words, key ideas, emerging myths might summarize this whole issue.*

**Ecosophy:** *it means the wisdom of the biosphere, of the ecosphere, of nature, of the universe, rather than that of human thought concerning nature. Nature has a tendency to maintain its fundamental structure, to which Man must learn to adjust (Goldsmith). Nature is the great educator, the great economy. It could be said that it is the way of ontonomy, the one to which our primordial ancestors have tried to gear into and that we unfortunately try to replace with the alienating way of autonomy and heteronomy.*

**Silvilization:** *(from the Latin silva (forest)) by thus contrasting ‘civilization’ and ‘silvilization’, one does not mean to make a direct critique of civilization nor to replace it with silvilization, but to shatter the myths of civilization, of citizenship and of civil society, as having to be the unique point of reference or horizon of intelligibility of the social order. So one makes room for ‘silvilization’, natural and primordial living, thus refusing to equate the beautiful word ‘savage’ (from silva, the savage being the forest-dweller, the man of nature) with primitive, fierce, brutal, ferocious backward.*

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IT MUST BE CLEAR to all thinking people that the policies adopted by governments just about everywhere to solve the problems that confront us today, such as poverty, unemployment, homelessness, disease, malnutrition, crime, drug addiction and environmental degradation, do not work. If they did, then these problems would not be increasing as they all are, and at an unprecedented rate.

This being so, the only responsible – indeed the only honest – course of action, must be to step back to reconsider the basic assumptions on which these policies are based.

Such assumptions, we would find, are closely interrelated – so much so that together they constitute a very coherent world view, one that in my book *The Way* I refer to as the world view of modernism.

A world view is the “*conceptual framework*” to use Michael Polanyi’s expression, into which society’s knowledge is organized, and in the light of which its individual members and the groupings into which they are organized – families and communities in the case of a traditional society and corporations and state institutions in the case of an atomised industrial society – and the society itself – seek to understand their relationship to the environment (in particular, the man made environment in the latter case), i.e. to the world of which they are part and to the all-encompassing cosmos or the world of the gods and spirits.

It is on the basis of such a purely subjective world view and that of its ‘constituent paradigms’ that a society’s behaviour pattern, and – in modern society – its political and economic policies are mediated. It is on the basis of them too that such policies are rationalized and hence legitimized.

Thus Adam Smith’s *Wealth of Nations* showed that it is by behaving in the most egoistic way possible that we maximize not only our own material interests but also those of society at large – a cheerful philosophy which rationalized the individualism and egoism that marked the breakdown of society during the industrial revolution. Darwinism was rightly described by Oswald Spengler as “*the*

*application of economics to biology*”, Darwin’s “*natural selection*” being but a biological version of Smith’s “*invisible hand*” and serving, above all, to legitimize the Promethean enterprise of our modern society by making it appear to be a natural process.

To modify a world view is very difficult, since it constitutes a highly coherent and self-consistent whole, and thereby enjoys great credibility regardless of whether or not it reflects a society’s relationship with its environment with any sort of accuracy.

Its coherence is largely due to the fact that, like all organizations of information in the natural world (such as a genome or a mind), it exerts a determinant influence on the nature of its constituent parts. Thus each of the disciplines into which modern knowledge is divided depicts its subject matter in terms of a specific paradigm, one which slavishly reflects the worldview of modernism. Thus the living world, at every level of organization, is seen as made up of discreet particles that are individualistic, competitive, and geared only to maximizing their individual interests and their survival, without any regard for the interests and survival of the larger natural systems of which they are, in effect, but the differentiated parts, and whose very existence is often denied.

What also makes a world view difficult to modify is that individuals and societies themselves have a psychological stake in maintaining the integrity of their world view in the face of any new knowledge that might serve to discredit it. The American anthropologist A. F. C. Wallace refers to this as “*the principle of the preservation of cognitive structure*”.

It can be shown that the same is true of professionals who seek to preserve that paradigm in terms of which they see their particular discipline, long after it appears, in the eyes of most sensible people, to have been totally discredited.

What is more, theories that do not conform with an established paradigm, and hence with the world view as a whole, tend sooner or later to be moulded into that shape that enables them to do so. Thus, in the last 60 years, the behaviourists made psychology conform to the paradigm of science. The neo-Darwinians and, even more so, the sociobiologists did the same for theoretical biology.

Modern sociology has also become mechanistic and reductionistic, and the development of the New Ecology in the 1940s and 1950s has given rise to what is in effect a Newtonian ecology, that, rather than provide the theoretical foundations for the environmental movement of today, as most environmentalists tend to believe, serves instead to rationalize and hence validate the very process of economic development or progress that is the principal, if not the only, cause of the environmental degradation that it strives so ardently to combat.

In this way our academic knowledge has been made, Procrustean-like, to conform to the paradigm of science, and hence to the world view of modernism, stretched or shrunk to fit an atomized and mechanistic vision of the world in which people are no more than machines and their needs purely material and technological – precisely those that the state and the industrial system are capable of satisfying.

What is more, knowledge that cannot be moulded into the desired shape, however true and important it might be, is by the same token ruthlessly rejected. This disposes of all theories based on the assumption that the world is orderly and purposive rather than random, organized rather than atomized, co-operative rather than purely competitive, dynamic, creative and intelligent rather than passive and robot-like, self-regulating rather than managed by some external agent such as the State or the corporation, and tending to maintain its stability or homeostasis rather than geared to perpetual change in an undefined direction. It disposes, in fact, of any knowledge that might enable us to understand the true nature of the world we live in.

It follows that in terms of this aberrant world view we can never correctly interpret the problems that threaten our survival, nor determine what must be the policies needed to bring to an end the destruction of the planet nor develop a non-destructive and fulfilling way of life. An ecological world view in the light of which all this becomes possible must thereby be a most urgent requirement.

I have tried in my book *The Way: an ecological world view* to state what must be the basic principles underlying it. These principles are all closely interrelated, forming an all-embracing and self-consistent model of our relationship with the world in which we live as well as an associated explicit or implicit set of instructions designed to lead those imbued with it to adopt the associated pattern of behaviour.

It was always clear to me that the inspiration for this world view must come from the world view of the earliest period when people everywhere really knew how to live in harmony with the natural world. I have often been criticized on this score. However, it seems to me highly presumptuous to postulate an ideal world view, as it is to postulate an ideal society for which there is no precedent in the human experience on this planet, and whose biological, social and ecological viability has never been demonstrated.

If Karl Marx made that mistake, so too do today's adepts of economic development or progress, who seek to create a man-made technological world without asking themselves whether we are capable of adapting to it or whether the ecosphere is capable of sustaining it for more than a few decades. (see *The Way*)

What has struck me more recently is that the basic principles underlying the world view of early vernacular societies were everywhere the same, as is emphasized by Mircea Eliade in his many books, and by the proponents of the Perennial Philosophy, such as Ananda Coomaraswamy, René Guénon, Titus Burckhardt, and others, and that these principles must also necessarily underlie a truly ecological world view. The first of these principles is that the living world or ecosphere is the basic source of all benefits, hence of all wealth.

The second is that the ecosphere [1] will only dispense these benefits if we religiously preserve its critical order. From these two fundamental principles follows the third, which is that the overriding goal of an ecological society must be to preserve the critical order of the natural world or of the cosmos. I will not say very much about the first of these principles as it is implicit to the other two. I will deal briefly with the second principle though this is also implicit in the third, the only one I shall deal with in any great detail.

Order is a basic feature of the Gaian hierarchy, as traditional man fully understood. His own body, his home, his temple, his society, the natural world and the cosmos itself he saw as organized according to the same plan, governed by the same law, and hence as constituting a single organized whole. [2]

The word 'cosmos' itself originally meant order. In many cosmologies, as Mircea Eliade notes, the cosmos came into being once God had succeeded in vanquishing a vast primordial monster or dragon that symbolized the original chaos. Often, the monster's body served as raw material out of which the cosmos was fashioned.

Thus Marduk fashioned the cosmos out of the body of the marine monster Tiamat, and Yahveh built the cosmos out of the body of the primordial monster Rahab. However, so as to prevent the cosmos from reverting to the original chaos, that victory had to be re-enacted every year. [3]

Order is usually defined as the influence of the whole over the parts. Rupert Riedl sees it as "*an expression of conformity to law*". [4] I prefer to define it as

"an expression of the constraints that are imposed on the whole by the parts, which the latter must observe if they are to fulfil their homeotelic [5] functions within the larger systems of which they are part, and thereby maintain their integrity and stability."

That the world is orderly is evident. If it were not, we could not understand it. There could be no science of any kind, however we wished to define the term. To quote Rupert Riedl once more, "*A world without order would have no meaning. It would be neither recognizable nor conceivable*". [6]

Evolution and its constituent life processes build up order. Individualistic systems become organized, differentiated, and hence specialized in the fulfilment of various functions. As this occurs, so competition yields to co-operation, so the incidence and severity of discontinuities is reduced, and so the systems become more stable. Indeed, order implies organization, differentiation, specialization, co-operation, and stability. They are but different ways of looking at the same fundamental feature of the living world.

But order cannot increase indefinitely. There is an optimum degree of order at each level of organization of the Gaian hierarchy, for the natural systems that make up the Gaian hierarchy must, in different conditions, display a specific degree of order. Organisms must display a higher degree of order than do families, which in turn must be more orderly than the communities of which they are part, and which must in turn be more orderly than societies which in normal conditions tend to be loose organizations of families and communities. The ecosystems of which they are all part must also be more loosely organized and hence display a still lower degree of order.

These differences must be respected, or those key natural systems would become incapable of fulfilling their respective homeotelic functions that they alone, at their particular level of organization, are capable of fulfilling.

The ecosphere, of course, exists in time as well as space. It is best seen as a spatio-temporal entity. The spatial aspect is but an abstraction, as is its temporal aspect. Ludwig von Bertalanffy sees structures as “*slow processes of long duration*” and functions as “*quick processes of short duration*”. [7]

If we accentuate the temporal aspect of a natural system and see it more as a process than as a structure, then a disordered or random process is one that can move in any direction. Its behaviour is unpredictable. As order builds up, however, the process becomes subject to the influence of the whole of which it is a part. Its range of choices becomes limited as it becomes a differentiated part of the larger ecospheric process committed to the achievement of a single overriding goal. Hence purposiveness is just another word for order or organization as applied to life processes. The two are inseparable.

Indeed, animals will eat and drink and reproduce because these processes are as much part of them as are the organs that assure these purposive functions. The same is true for families, communities, ecosystems and the ecosphere itself. As the biologist Colin Pittendrigh notes “*organization without purpose is an absurdity*”. [8]

In terms of an ecological world view the hierarchy of the ecosphere must be seen as displaying a single spatio-temporal order, and its structure and function must be governed by a single set of laws, whose generalities apply equally well to biological organisms, vernacular communities, societies, ecosystems and the Gaia herself. Vernacular man knew this. Thus Radcliffe Brown tells us that while for us the order of nature is one thing, and the social order is another, to the Australian (aborigine) they are part of a single order – as indeed they were, for all traditional peoples who were imbued with the chthonic world view.

If the order of the living world, whether seen spatially or temporally, is not apparent to reductionist science, it is that unless one sees a natural system holistically within its correct field – as part of the hierarchy of larger systems in which it evolved, to which it is homeotelic and to whose influence it is subjected, one cannot see that it is orderly and hence purposive.

### **Critical Order**

Equally important is the critical nature of the order displayed by the natural systems that make up the ecosphere. Thus, clearly the structure of an organism, like that of any other natural system, is critical: its various body fluids, for instance, must have the ‘normal’ chemical and biological composition, or what would be the point of pharmacological tests? The basic features of a human community are also critical. However much it may differ in its details, it must be composed of extended families, and intermediary social groupings which link people together to form a cohesive unit of social behaviour capable of maintaining its homeostasis in the face of change.

A cultural pattern must also display a critical order and cultural traits can only be understood in accordance with their functions within it. The suppression of vernacular customs and institutions because they appear undesirable, when judged by our particular standard of morality, can have fatal results on the culture involved, very much as the extraction of a key organ can result in the demise of an organism.

If societies have a critical order, so too must ecosystems. They must be made up of green plants that are capable, via photosynthesis, of mobilizing the energy of the sun, herbivores that can feed off the plants, predators that can feed off the herbivores, applying quantitative and qualitative controls on their populations, and decomposers that can break down biological material into its constituent parts to serve as the raw materials for the perpetuation of the whole cycle.

The ecosphere itself, the overall ecosystem, must for the same reason display a critical order. That the earth's atmosphere must do so at a chemical level is clearly noted by James Lovelock. Among other things, its carbon dioxide content is critical; if it were too low, the earth would be too cold, and if too high, its temperature would exceed that which most forms of life could support. Its oxygen content is also critical; if it were too low, then some species would not be able to breathe, while if it were too high, the earth's atmosphere would become so inflammable that a single spark could set off uncontrollable fires.

It must follow that adaptive changes occurring to any natural system are those that serve to maintain its critical order and hence its stability within the context of the critical order or stability of the whole Gaian hierarchy.

Vernacular man when imbued with a chthonic world view fully realized this, so much so that his main preoccupation was to maintain the critical order of the cosmos, for he knew that it was by doing so that his welfare would be maximized. The corollary of this was that to violate the critical order of the cosmos could only lead to the most terrible calamities. Hence, the elaborate system of 'taboos' or prohibitions that prevailed in all vernacular societies.

This all-pervading fear of disrupting the critical order of the cosmos is reflected in the taboos set up in all tribal societies against mixing things that are seen as belonging to different classes or provinces into which the cosmos is seen to be divided. This goes a long way towards explaining food taboos. Thus it is taboo to eat pork among the Hebrews, this is because the pig, as Mary Douglas notes, "*is put into the class of abominable, unclean creatures*" [9] along with water creatures that do not have fins and scales.

They do not fall into natural cosmic categories either. Nor do air creatures that do not fly or hop on the earth, and do not have wings and two legs. To eat such creatures can only reduce a person's vital force and simultaneously threaten the critical order of the cosmos. Mixed marriages between people from naturally exogamous social groups are seen in the same light; they threaten the critical order of society and thereby that of the cosmos of which it is part.

Among the Igbo of Nigeria, according to Emefie Ikenga Metuh, "*deviations which disrupt the natural order are called Aru; literally, abominations*". The word *Aru*, however, also means "*crime against nature*". Such crimes include a number of unnatural acts that defy normal behavioural categories, such as a man having sexual intercourse with his father's wife or with an animal. The birth of twins and a hen hatching but one chick also fall into this category. These taboo events are *Aru* because the Igbo believe "*that they transgress the laws guiding the ontological order and will therefore bring disaster to the community*". [10]

Unfortunately, economic progress cannot occur without disrupting the critical order of the natural world, so, not surprisingly, as the world view of modernism and the associated paradigm of science slowly developed to rationalize and hence validate this anti-evolutionary enterprise, the idea that the world was orderly and that this order was critical was slowly abandoned. Instead the ecosphere was increasingly seen as random, in particular its temporal aspect – and also as highly malleable. Thus for



Descartes, living things in general – and for John Locke, the human mind itself – are but pieces of wax: “flexible, malleable, ours to shape as we please” as Passmore puts it. [11]

Most modern historians and sociologists also see society in this way. H. A. L. Fisher, for instance, tells us that man does not have a nature, only a history, rationalizing in this way his contention that history is but a series of random and unconnected events. Edward O. Wilson also talks of the “*extreme plasticity of social behaviour*”, implying that we can adapt to living in just about any social and environmental conditions, including of course those that economic development or progress impose upon us.

When ecology developed, partly as a reaction against the reductionist and mechanistic paradigm of science, (12) it sought to re-establish the essential notion that the ecosphere is organized or orderly, and that this order is critical. This notion was largely embodied in the principle of the ‘balance of nature’, which was then seen as a basic principle of ecology. Thus S.A. Forbes saw “*an ideal balance of nature as one promotive of the highest good of all the species*”. [13] W. C. Allee and the other principal members of the Chicago school of ecology in the 1940s also accepted the principle of the balance of nature, according to which “*the community maintains a certain balance, establishes a biotic order, and has a certain unity paralleling the dynamic equilibrium and organization of other living systems*”. [14]

In the 1930s and 40s however, ecology was systematically perverted so as to make it conform to the paradigm of science and hence to rationalize economic development or progress, and ecologists sought to discredit the concept of the balance of nature in the same way as they questioned the established ecological principles: that ecological succession leads to a climax, that the whole is more than the sum of its parts, and that complexity gives rise to stability.

### **Stability**

A natural system at any level of organization that is capable of maintaining the basic features of its critical order in the face of internal or external challenges, is referred to as ‘stable’. A stable system is not thereby geared towards change but towards the avoidance of change. Change occurs not because it is desirable per se, but because in certain conditions, it is necessary, as a means of preventing larger and more disruptive changes. It follows that stability is not the same as immobility. An immobile system is not stable because it is not capable of adapting to environmental challenges, and its order is thereby vulnerable to large-scale disruption.

Needless to say, mainstream science as well as mainstream ecology accentuate change – perpetual change – so as to make it appear that economic development or progress is a natural process. Needless to say, the opposite is true. Stability has been the most striking feature of the world of living things.

The great biologists C. H. Waddington and Jacques Monod, among others, were impressed by the constancy of living things, as was the Cambridge ethologist W. H. Thorpe, who fully realized that the constancy of certain biological forms is more difficult to explain “*than it is to account for their evolution*”. He notes for instance that

“The Wagtail (*Motacilla*) there in the garden was here before the Himalayas were lifted up! This constancy is so extraordinary, that it seems to demand a special mechanism to account not for the evolution but for the fixity of some groups.” [15]

Paul Weiss also realized this. There is so great a preoccupation with change, he noted, that we have totally neglected the less glamorous but more fundamental constancy of the living world.

“In our educational system we are acting very much like newspaper editors, who highlight the spectacular and neglect the far more constant phenomena”.

Thus we accentuate evolution, but we do not impress on our children that the most fundamental features of all living things are exactly the same and “*have remained the same from the simplest living system that we know, all the way up to man*”. They should all be told that

“all the biochemical mechanisms of macromolecular synthesis, energy utilization, respiration, storage, proliferation, cell division, membrane structure and function, contractility, excitability, fibre-formation, pigmentation, and so forth, have all remained unaltered in essence through the ages.” [16]

What is true of biological evolution is true of social evolution as well. [17] The main feature of vernacular societies, within which man has spent well over ninety per cent of his experience on this planet, has been their stability. This is particularly true of hunter-gatherer societies. During the old stone age, for instance, flint-chipping techniques did not change for some 200,000 years, nor did the lifestyle of Australian Aborigines for at least 30,000 years. The anthropologist W. E. H. Stanner writes,

“The Australian ethos appears to be continuity, constancy, balance, symmetry, regularity. The value given to continuity is so high that they are not simply a people ‘without history.’ They are a people who have been able, in some sense, to ‘defeat’ history, to become a-historical in mood, outlook and life.” [18]

It is probable that the same could be said of all hunter-gatherer societies and tribal societies in general when living in the environment to which they have been adapted by their social evolution.

### **Homeostasis**

Biological organisms are self-regulating cybernetic systems capable by their own efforts of maintaining their stability in the face of internal and external challenges – a quality referred to as ‘homeostasis’. The French physiologist Claude Bernard – one of the first scientists to note the capacity of living cells to maintain their constancy in the face of change considered that it was the goal of all living things to do so. The term was later coined by the physiologist Walter Cannon in his seminal book *The Wisdom of the Body*. He was struck by the fact that organisms

“composed of material which is characterized by the utmost inconstancy and unsteadiness, have somehow learned the method of maintaining constancy and keeping steady in the presence of conditions which might reasonably be expected to prove profoundly disturbing.” [19]

An obvious example is the ability of mammals to maintain the constancy of their body temperature in spite of external changes.

Interestingly enough, Cannon considered that the mechanisms he found in biological organisms may be operative in other natural systems which could also explain their constancy. A comparative study, he suggests, might show that every complex organization must be capable of “*more or less effective self-righting adjustments in order to prevent a check on its functions, or rapid disintegration of its parts, when it is subjected to stress*”. [20]

Eugene Odum notes how ecosystems are endowed with the necessary mechanisms for self-regulation and hence homeostasis.

“Besides energy flows and material cycles, ecosystems are rich in information networks comprising physical and chemical communication flows that connect all parts and steer or regulate the system as a whole. Accordingly, ecosystems can be considered cybernetic in nature, but control functions are internal and diffuse rather than external and specified as in human engineered cybernetic devices.” [21]

Roy Rappaport was probably one of the first anthropologists to show that tribal societies are capable of such behaviour. In his seminal book *Pigs for the Ancestors*, he interpreted the ritual cycle of a small social group in New Guinea in cybernetic terms, showing it to be above all a means of controlling its impact on its natural environment so as to assure its sustainability or stability. [22]

Gerardo Reichel-Dolmatoff, quite independently of Rappaport, interpreted the cultural pattern of the Tukano Indians of Colombia in much the same way. Thomas Harding also sees tribal societies as capable of homeostatic behaviour and thereby of maintaining their stability.

“When acted upon by external forces a culture will, if necessary, undergo specific changes only to the extent of, and with the effect of preserving unchanged its fundamental structure and character.” [23]

James Lovelock, in his seminal book *Gaia: a new look at life on Earth*, shows that Gaia herself displays homeostasis. He was also struck by the extraordinary stability of the earth’s relationship with its atmospheric environment. As Sagan and Margulis note, it must have been maintained very much as it is now at least “*since the time that air-breathing animals have been living in forests*” – or for about 300 million years. Fossil records show that the climate has changed very little since life first appeared on earth about 3,500 million years ago. Yet the output of heat from the sun, the surface properties of the earth, and the composition of the atmosphere have almost certainly varied greatly over the same period. [24]

What is missing however from the whole discussion of homeostasis is the realization that natural systems are integral parts of the Gaian hierarchy, and that a system cannot maintain its homeostasis and hence its stability unless the hierarchy of natural systems of which it is part is also capable of doing so. There is no stable economy, for instance, within an unstable society, no stable society within an unstable ecosystem, and no stable anything when the ecosphere itself is being destabilized, as is happening today. Hence for a natural system to maintain its homeostasis, its behaviour must be homeotelic to the Gaian hierarchy, which means subordinating all other considerations to that of maintaining the critical order or stability of the ecosphere.

### **Homeorhesis**

In spite of the basic tendency in nature towards relative immobility, living things are changing dynamically all the time. Thus a fertilized egg develops into a foetus, a child into an adult, a pioneer ecosystem into a climax ecosystem and unicellular organisms (sometimes) into multicellular organisms. How does one reconcile this tendency towards change with the thesis of overall stability?

From the evolutionary point of view these processes of change do not violate the principle of stability so long as one sees them holistically. Individual generations or ontogenies can be regarded as feelers enabling the long term evolutionary process – the Gaian process – to monitor its interactions with and thereby permit its adaptation to its spatio-temporal environment. [25]

Seen cybernetically, ontogenetic development occurs along a closely integrated constellation of set paths which Waddington refers to as “*chreods*” (from the Greek root *chre* (it is necessary), and *odos* (a route or path)). The total constellation of chreods along which a system develops constitutes what Waddington refers to as the “*epigenetic landscape*” – the developmental path the system is constrained to follow by virtue of the instructions with which it is endowed and the homearchic (26) constraints imposed upon it by the larger systems of which it is part. A developing system thereby displays “*a certain lack of flexibility*”; its development has “*a strong tendency to proceed to some definite end point*”.

This ability has been noticed by many students of development, among them Driesch who noted the remarkable “*equipotentiality*” of the sea urchin embryo. He and others also pointed to the ability of a fertilized egg to develop into a normal embryo even after undergoing severe amputations. This goal – seeking behaviour of a developing embryo remains inexplicable in terms of mechanistic science.

The tendency of a developing system to maintain itself on its preset path along its constellation of chreods and to correct any disturbances that might divert it from its path, Waddington refers to as “*homeorhesis*” (from the Greek *homeo* (same) and *rhexis* (flow)). Homeorhesis is the principle of homeostasis applied to a predetermined path or trajectory rather than to a fixed point in space-time. [27] The ecologist G. H. Orians refers to it as “*trajectory stability*”, which he defines as “*the property of a system to move towards some final end point or zone despite differences in starting points*”. [28]

Of course, this process is subject to homearchic control by the Gaian hierarchy. It is Gaian homeostasis which homeorhetic systems seek to achieve – since this is a prerequisite of their own stability. In this essay I shall seek to show that all life processes are homeorhetic regardless of the level of organization at which they occur. It is with those occurring at the level of a vernacular society that I shall be particularly concerned with.

### **Homeotely**

As we have seen, natural systems, as differentiated parts of the Gaian hierarchy, share the common goal of maintaining its critical order or stability, for only in this way can they maintain their own critical order and hence their own stability. It is significant that there is no word in the English language that makes explicit the essential purposive and whole-maintaining character of life processes, so I have had to coin a new word – ‘homeotely’, from the Greek *homeo* (same) and *telos* (goal).

The principle of homeotely must clearly apply to all natural systems. Thus von Bertalanffy accentuates the “*whole-maintaining character*” of life processes at the level of the biological organism:

“The most convinced representative of an ateleological point of view must admit that actually an enormous preponderance of vital processes and mechanisms have a whole-maintaining character; were this not so the organism could not exist at all. But if this is so, then the establishment of the significance of the processes for the life of the organism is a necessary branch of investigation.” [29]

He cites E. Ungerer as being so impressed by the “*whole-maintaining*” function of life processes that he decided to replace the biological “*consideration of purpose*” with that of “*wholeness*”. [30]

The same principle applies to a community and a society. At least some anthropologists of the ‘functional’ school saw cultural behaviour as ensuring the integrity and stability of social systems. For Radcliffe-Brown the function of a behavioural trait is the contribution it makes “*to the total activity of which it is part*”, while “*the function of a particular social usage is the contribution it makes to the total social life as a functioning unit of the total social system*”. [31]

It must be clear that the teleological nature of life processes only becomes apparent when one sees them holistically in terms of their relationship with the spatio-temporal whole of which they are part. Mainstream scientists, who insist on looking at them in isolation from the whole, continue to insist that they are random, goalless and self-serving. This could not be better illustrated than by the preposterous writings of Professor Richard Dawkins at Oxford University.

The coordination of homeotelic processes is particularly impressive. Radcliffe-Brown saw the essential “*functional unity*” of a society as

“a condition in which all parts of the social system work together with a sufficient degree of harmony or internal consistency, i.e. without producing persistent conflicts which could neither be resolved nor regulated.”

He notes that this view of society is in direct conflict with the view that culture is no more than a collection of “*shreds and patches*” for which there are “*no discoverable significant social laws*”. [32] Without the coordination required to prevent “persistent conflicts,” life processes, however, could not conceivably achieve their common goal of maintaining the critical order of the Gaian hierarchy.

As I have already mentioned, living things behave homeotelically towards the Gaian hierarchy because it is the only way of maintaining its integrity and stability and hence their own integrity and stability. This is clear if one realizes that they are but the differentiated parts of such systems in isolation from which they have no meaning, cannot survive or, in the case of a loosely integrated system, can survive only imperfectly and precariously. As Eugene Odum writes,

“because each level in the biosystem’s spectrum is integrated or interdependent with other levels, there can be no sharp lines or breaks in a functional sense, not even between organism and

population. The individual organisms, for example, cannot survive for long without its population, any more than the organ would be able to survive for long as a self-perpetuating unit without its organism.” [33]

From another perspective, they must behave homeotelically to the hierarchy of larger systems of which they are part, because the latter provides them with their ‘field’, i.e. the environment to which they have been adapted by their evolution and upbringing and which, as Stephen Boyden points out, must best satisfy their most fundamental needs. [34] For these reasons, one can go so far as to say that in a stable biosphere, behaviour that satisfies the requirements of the whole must also be that which best satisfies the requirements of its differentiated (as opposed to random) parts. I refer to this as “the principle of hierarchical mutualism”.

Of course, with the increasing social and ecological disintegration that occurs under the impact of economic development or progress, behaviour ceases to be homeotelic; it becomes misdirected, and though it may continue to serve, superficially at least, some of the interests of the parts, it no longer serves those of the whole Gaian hierarchy. I refer to such behaviour as heterotelic (from the Greek, *hetero* (different) and *telos* (goal)).

I think we can say that just about all the policies adopted in our modern industrial society fall into this category. All are technological and institutional, and though some may seem superficially to serve the interests of individual people, they are designed above all to serve those of the state and the corporations, without any regard whatsoever for their invariably destructive effects on society, the natural world and the ecosphere as a whole.

The critical distinction between homeotelic and heterotelic behaviour, or between normal and abnormal behaviour, is foreign to the paradigm of science. If behaviour is looked at reductionistically, there is no way in which its purposive and “*whole-maintaining*” function can be established, and hence no way of distinguishing between behaviour that serves to maintain the critical order of the ecosphere and that on the contrary that serves to disrupt it. Reductionist science is thus above all an instrument of scientific obscurantism and mystification-among other things, it prevents people from understanding the true nature of the conflict between their interests and those of their political and industrial leaders.

### **Education**

Education in a normal vernacular society is socialization and ecologization (if such a word exists) i.e. a process whereby a child born with a potential for becoming a member of almost any family, community, society, or ecosystem, learns to become a member of a specific family community, society and ecosystem. From the point of view of the society it provides the means of renewing itself, or progressively reproducing itself by integrating successive generations into its critical spatio-temporal structure.

A functionally similar process occurs at all levels of organization. Thus a cell, immediately after division, is endowed with the potential for becoming a member of a large number of possible tissues or organs, and slowly learns to fulfil its specialized functions within that tissue or organ in which it is situated. The process of cell development or differentiation is also the means whereby the organ or tissue, and indeed the organism itself, can reconcile the necessarily short life span of its constituent cells with its overall goal of maintaining its stability and that of the biospheric hierarchy of which it is part.

Not surprisingly, the educational process is governed by precisely the same general laws that govern the differentiation of a cell, the development of an embryo and indeed all other homeorhetic life processes at different levels of organization. One such law is that behaviour proceeds from the general to the particular. It is during the earlier phases that the generalities of a child’s behaviour pattern will be determined. It is these earlier stages which are the most important and that is why the mother is the most important educator and the quality of the family environment the most significant factor in determining a child’s character and capabilities.

Another complementary law is that behavioural processes are sequential, their various stages occurring in a specific order. If one is left out, it must follow then the subsequent ones will either not be able to occur at all, or will occur at best imperfectly. Thus what a child learns during its formal institutionalized education cannot make up for any deficiency in the earlier phases of its upbringing. This is the conclusion that most serious studies have revealed.

J. S. Coleman for instance, whose massive study led him to examine the career of 600,000 children, 6,000 teachers and 4,000 schools, reported in 1966 “*that family background differences account for much more variation in achievement than do school differences*”. [35]

As the educational function has been usurped by state institutions and increasingly today by corporations, it has been disembedded from the social process and ceases thereby to serve its normal social and ecological functions. Instead children are imbued with the world view of modernism which must necessarily lead them to adopt a heterotelic way of life, disrupting rather than preserving what remains of the critical order of the ecosphere.

### **Settlements**

The structure of the settlements of vernacular man reflected above all that of the societies whose physical infrastructure they provided. The basic social unit was undoubtedly the extended family and it is this that must first of all be accommodated, but the settlements must also accommodate the lineage group and the community. Each of these social groupings, moreover, must have the element of privacy required to maintain its identity and integrity, which is essential to maintain the critical order of the ecosphere.

In an Australian Aboriginal encampment, for instance, we find that each family has its own space—the area that the family sweeps several times a day. This place is protected by a windbreak (*wiltja*) and at the edge of it there is a fire. The family spaces are grouped around a larger central space. In the darkness of the night they cannot see each other and thereby have the privacy they require, further enhanced by the custom that once it is dark people do not leave their family space – for fear of malignant spirits that lurk around it. [36]

The cities of the Yoruba of Western Nigeria are also divided into areas inhabited by different extended families, which are further organized into neighbourhoods inhabited by closely related families. Those inhabiting adjoining areas are also related, although less closely. The traditional city is thus a hierarchical system of houses, compounds, neighbourhoods and clusters of neighbourhoods of related people: these are closely built and larger spaces separate less closely related groups. In this way the settlement pattern reflects the society’s social structure.

Conversely, a number of anthropological studies have noted the socially disastrous consequences of modernizing the settlements of stable societies to satisfy market requirements. Jaulin has shown how such changes led to the disintegration of the society of the Motilone Indians. Claude Levi Strauss has also described the same process as it affected the Bori Indians of Brazil.

However, to accommodate critical social structures is not enough – a settlement must be sanctified if it is to be preserved. Among other things this means that it must be made to reflect, in the eyes of its members, the whole structure of the cosmos. Thus vernacular man could not consider living in a house, village or city, that had not been sanctified and hence ritually integrated into the cosmic hierarchy.

Thus before a wild and uninhabited area could be inhabited, sacred rites had to be performed so as to “*cosmicize*” it. Ananda Coomaraswamy tells us that in the Rig Veda, the word *vima*, meaning to ‘measure out’ or to ‘lay out’, is used to refer to “*the bringing into being of inhabitable space*”, or the laying out of “*abodes of cosmic order*”. [37]

To build a new village or city meant first building a holy house or temple, on the cosmic model. In this way, the settlement that surrounded it was integrated into the cosmic hierarchy. The traditional

ceremony performed for that purpose was, as Eliade puts it, a re-enactment of the original act of creation, or cosmogenesis.

Thus when Romulus founded Rome, he dug a small ditch in the form of a circle. He threw into it some sacred earth that he brought with him from the town where his ancestors were buried, and each of his companions did likewise. In this way, Rome remained *terra patrum*. The ditch was always known as *mundus*, which apparently referred to the place the *manes* or ancestors lived, and which also meant the world or cosmos.(38)

Believing that he, his artefacts and his settlements were integral parts of the cosmic hierarchy, chthonic man saw them all as designed on the same basic plan. According to Fred Eiseman, in Bali

“man is a tiny part of the overall Hindu-Balinese universe but he contains its structure in microcosm. Man’s body has three parts-head, body and feet just as the universe, the macrocosm, has three parts; the upper world of God and heaven, the middle world of man, and the underworld. Man is a kind of scale model of the universe, with exactly the same structure – as is the island of Bali and each village, temple, house, compound, building and occupant of it.” [39]

By seeing his body, his house and his settlement as reflecting the same critical order, which is also that of his society, of the natural world and of the cosmos itself, it becomes clear to vernacular man that his life is subject to the same single law that governs the cosmic hierarchy, and that he is a participant in the great Gaian enterprise, whose goal is to maintain the critical order of the cosmos.

Needless to say, during the industrial age, those who have planned and built our cities have almost totally ignored such considerations. Over the last fifty years particularly, our settlements have been designed almost exclusively with purely economic and utilitarian ends in view, and the results, as we all know, have been catastrophic.

### **Economics**

I like George Dalton’s view of economics as dealing with the provision of material goods to satisfy biological and social needs. This is what Karl Polanyi refers to as the “*substantive*” use of the term economics as opposed to the “*formal*” use. I propose a still more general use of the term ‘economics’ to refer to the study of how resources are distributed within a natural system. In this way we could extend the use of the term to include the economics of biological organisms, ecosystems, vernacular societies and the ecosphere itself.

Clearly all require resources of various sorts such as nutrients to ensure their sustenance and hence to preserve their critical order or stability. In addition, if we accept the thesis of von Bertalanffy’s General Systems Theory, we may also suppose that the same fundamental laws govern the distributions of resources in all natural systems regardless of their level of organization.

The most fundamental of such laws – and this must be the basic law of a realistic economics – is that resources must be distributed so as to maintain the integrity and stability of the system within which they are distributed, which also means helping to maintain the integrity and stability of the Gaian hierarchy of which the system is part. This is clear at the level of a biological organism. Thus, oxygen is transported via the red corpuscles to all parts of the body in accordance with the latter’s requirements; so are the various nutrients that the body requires.

The principle becomes even clearer when scarcity occurs. In such conditions, a natural system is perfectly capable of setting up its own very effective rationing system, and one that clearly reflects its priorities. Nutrients are provided to the parts in accordance with the importance of their contribution to the preservation and hence the stability of the living whole.

Thus in cold weather, as Ralph Gerard notes, a rationing system becomes operative in preserving the necessary temperature of the critical parts of the body. To begin with, there is a reduction in the blood flow to the surface of the skin, reducing radiation and conduction. This may proceed so far that the

skin is frozen and dies, the subordinate unit sacrificed “*for the protection of the larger unit*”. [40] Such behaviour is an essential part of an organism’s homeostatic mechanisms.

That resources are distributed in a vernacular society (as in all stable natural systems) in such a way as to assure the integrity and stability of the Gaian hierarchy, rather than to maximize economic development or GNP in accordance with modern economics, has many implications.

To begin with it means that modern economics, which is entirely based on the economic behaviour of modern heterotelic societies, simply does not apply to the behaviour of vernacular societies any more than it does to that of any other stable natural systems.

This is the thesis of the economic historian Karl Polanyi in his seminal book *The Great Transformation* (1944), much to the discomfiture of the economics community. He noted that in the vernacular world, homo economicus is conspicuous by his absence, and economic activities are largely conducted to satisfy social rather than commercial goals. In the language of Karl Polanyi they were “*embedded*” or “*submerged*” in social relationships.

This means that such an economy was under social control, and thereby designed to satisfy the social requirements and hence maintain the society’s integrity and stability. Once social relations actually become embedded in the economic system, as is the case today, then the latter ceases to be under control, becoming random to the society and to the ecosphere and disrupting their critical order.

How the economy was once embedded in social relationships is clear. Vernacular families were organized into extended families and small communities that were often loosely organized to form larger social groupings. However, it was at the level of the family and the community that most social and economic functions were fulfilled. It was at those levels that the children were brought up and educated, the old and the sick cared for, the rituals and ceremonies organized and conducted and law and order maintained, (the latter via the force of public opinion that faithfully reflected the society’s traditional values).

It was also at the levels of the family and the community that the functions of government itself were carried out, largely by the council of elders, sometimes by a chief or village headman, but almost always by people, who were integral parts of the community and thereby imbued with its cultural pattern and traditional values. It was also, at the level of the family and the community that what we regard today as the economic activities were fulfilled, i.e. that the food and artefacts were produced and distributed.

Economic functions fulfilled in this way occur without any external inducements – no money needs to change hands. Thus a mother looks after her children, because by doing so she is satisfying her own psychological needs, but by the same token because she is assuring the integrity and stability of her family, hence of the community of which it is part.

Whether she is doing this consciously or not is totally irrelevant to the argument. We are in any case largely unconscious of our true motivations and the reasons we give to explain them tend to be but pure rationalizations, as is generally accepted. Members of cohesive vernacular communities tended to behave homeotetically towards their community for the same reasons, thereby contributing in the same manner towards maintaining the stability and integrity of the whole Gaian hierarchy.

In such a society, as Sahlins notes, a man does not act as a purely economic animal. “*He produces in his capacity as a social person, as husband and father, brother and lineage mate, member of a clan and village*”. He works as an integral member of these social groups, as a “*whole man*”. [41]

This means that the modern concept of work used in modern economics, simply does not apply to people living in such a society. Not surprisingly there is no word for it in their vocabularies. As Mungo Park wrote towards the end of the 18th century “*paid service is unknown to the negro, indeed, the African language ignores the word*”. [42] Jean Liedloff tells us that though the Yequana Indians of



Venezuela, with whom she lived for two and a half years, did have a word for work – *tarabajo*, it obviously came from the Spanish word *trabajo*, pointing to its relatively recent origin. [43]

If primitive economic behaviour is largely an aspect of kinship behaviour, as Sahlins puts it, then it must be “*organized by means completely different from capitalistic production and market transaction*” [44] – and also, one might add, from socialist production and distribution via a state bureaucracy.

Polanyi sees the distribution of food and other products in a vernacular society as governed by two basic principles; reciprocity and redistribution. [45] When a hunter kills a game animal he will not sell it or even store it for a rainy day; instead, he will give a feast. In a sense this will provide him with all the advantages he could have derived from selling or storing it, because he knows that his hospitality will one day be reciprocated.

At the same time, it contributes, as does reciprocity, to social cohesion. It also prevents the accumulation of goods that might otherwise be translated into capital leading to the development of large-scale economic enterprises that are no longer subject to effective social control, and also to the development of the market with the corresponding reorganization of the society and of its natural environment to satisfy its exigencies.

Economic behaviour in a stable society serves, in other words, to fulfil essential social and ecological functions. Malinowski came to this conclusion after his exhaustive study of the Trobriand Islanders. He regarded their elaborate system of reciprocity and redistribution as “*one of the main instruments of social organization, of the power of the chief, of the bonds of kinship and of relationship in law*”. [46]

### **Technology**

In a vernacular society, technology is also ‘embedded’ in social relations-in other words, it is under social and hence ecological and Gaian control. The technology used by a vernacular society in the production of its artefacts or in the cultivation of its fields is not that which maximizes productivity, but that which best suits the strategies that the society exploits for achieving its goal of maintaining its homeostasis and hence the homeostasis of the ecosphere itself. This technology is also rationalized and legitimized by its mythology.

All economic activities in vernacular society are highly ritualized. Every stage in an economic activity is marked by a ceremony that endows it with a cosmic meaning enabling it to contribute to maintaining that wider critical order on which the survival of every society depends. That this was the case among the ancient Greeks is made clear by Hesiod in his *Works and Days*. The art of agriculture, in order to be effective, he tells us, must above all be in keeping with the *Nomos*, or the traditional law, and hence with nature’s course. As Cornford puts it, “*Man must keep straight upon the path of custom (Nomos) or right (Dike) or else the answering processes of natural life would likewise leave the track*”. [47]

Thus the technology of vernacular man was not designed to dominate or transform the environment, but rather to enable him to live with it. Reichel Dolmatoff notes how this is true of the Tukano Indians of Colombia. They have

“little interest in new knowledge that might be used for exploring the environment more effectively, and there is little concern for maximizing short term gains or for obtaining more food or raw materials than are actually needed. But there is always a great deal of interest in accumulating more factual knowledge about biological reality and, above all, about knowing what the physical world requires from man. This knowledge, the Indians believe, is essential for survival because man must bring himself into conformity with nature if he wants to exist as part of nature’s unity, and must fit his demands to nature’s availabilities.” [48]

He notes how highly developed is the Indian’s knowledge of ecology and animal behaviour.

“Such phenomena as parasitism, symbiosis, commensalism and other relationships between co-occurring species have been well observed by them and are pointed out as possible methods of adaptation.”

They are also well aware of what would be the consequences for them of violating basic ecological laws. Thus their mythology describes how various animal species have been punished and occasionally made extinct

“for not obeying certain prescribed rules of adaptive significance. Thus, gluttony, improvidence, aggressiveness and all forms of over-indulgence are punished by the superior forces to serve as examples not only to the animal community, but also to human society. Animals, then, are metaphors for survival. By analysing animal behaviour the Indians try to discover an order in the physical world, a world-order to which human activities can then be adjusted.” [49]

Robert Fernea, who describes the traditional irrigation system of the El Shabana tribe of Mesopotamia, accentuates its sustainability and contrasts this with the non-sustainability of modern irrigation methods. He believes that all the ancient tribal societies who once practised irrigated agriculture in Mesopotamia achieved a “*congruence of fit*” between their methods of cultivation, their land-tenure systems and “*the nature of land, water and climate*” which modern society cannot begin to emulate. [50]

It is among other things because vernacular society adapted its technology to its environment that it was sustainable, which modern industrial society, by seeking, on the contrary, to adapt its environment to its technology, cannot conceivably be.

### **The Way**

Like the developing embryo in the womb, each life process must follow an appointed constellation of chreods or path, or Way, if it is to achieve its end-state and thereby contribute to maintaining the critical order of the cosmos. Thus one can talk – as does Rupert Sheldrake – of “*behavioural chreods*” and also of “*cultural chreods*”, in that a society, by means of its specific cultural pattern, is capable of maintaining itself on its path by correcting any diversions from it-so long as they occur within its tolerance range (i.e. so long as its environment does not diverge too drastically from that to which it has been adapted by its evolution) and hence its field.

The Way a society must follow is that which conforms to its traditional law which the ancient Greeks referred to as the *Nomos*. The Way was also referred to by them as *Dike*, which meant justice, righteousness or morality. Jane Harrison tells us that *Dike* was also “*the Way of the world, the way things happen*”. [51]

The Way was also referred to as *Themis*, which Jane Harrison regards as “*that specialized way for human beings which is sanctioned by the collective conscience*”. [52] So *Themis* was also taken to be the Way of the Earth, and sometimes the Way of the cosmos itself, that which governed the behaviour of the Gods. Later, when these concepts were personalized, *Themis* became the goddess of law and justice, and hence of morality. The Way was also seen to coincide with *Moirai*, the path of destiny or fate. The Chthonic gods were subordinated to *Moirai*, as they were to *Dike*, the two actually coinciding with each other.

Thus for Anaximander, all things are attributed to different provinces that provide the basis of the critical order of the natural world “*according to what is ordained*”, [53] a concept in which, according to Cornford “*necessity and right are united*”. In Homer, the gods are seen as subordinate to *Moirai*, and indeed to *Dike* – cosmic forces that are older than the gods themselves and that are moral. Against fate, and hence against the moral law, the gods can do nothing.

As Homer tells us in the *Odyssey*, the gods cannot even save a man whom they love, if the “*dread fate of death*” is upon him. [54] Herodotus tells us that “*it is impossible even for a god to avoid the fate that is ordained*”. [55]

The Way to be followed by all human beings was the same as that which must be followed by society as a whole, by the natural world, by the cosmos and therefore by the gods themselves. There is thus a single law which governs the behaviour of the whole cosmic hierarchy. As Pythagoras writes,

“Themis in the world of Zeus, and *Dike* in the world below, hold the same place and rank as *Nomos* in the cities of men; so that he who does not justly perform his appointed duty may appear as a violator of the whole order of the universe.” [56]

The higher the status of an individual, and hence the greater the vital force with which he was endowed, the more important it was that he should rigorously follow the Way. Thus Odysseus tells us that when a blameless King maintains the *Dike*

“The black earth bears wheat and barley, and the trees are laden with fruit, and the sheep bring forth and fail not, and the sea gives store of fish and all out of his good guidance, and the people prosper under him.” [57]

Among the Chinese the concept of *Tao* refers at once to the order and to the Way of the cosmos. The term is applied to the daily and yearly “*revolution of the heavens*” [58] and of the two powers of light and darkness, day and night, summer and winter, heat and cold. E. de Groot tells us that

“It represents all that is correct, normal or right (ching or twan) in the universe; it does, indeed, never deviate from its course. It consequently includes all correct and righteous dealings of men and spirits, which alone promote universal happiness and life.” [59]

Feng Yu-Lan sees the *Tao* as the all-embracing first principle of things. All living things, including humans, are part of this all-embracing natural order, subject to the *Tao* which is its governing principle. [60] *Tao*, as the order of nature, Yu-Lan Feng writes, governs their very action. Humans follow the *Tao*, or Way, by behaving naturally. Wing-Tsit Chan writes,

“When all things obey the laws of the *Tao* they will form a harmonious whole, and the universe will become an integrated organism.” [61]

A similar concept existed in Vedic India. It was referred to as *R'ta*. As Maurice Bloomfield writes,

“The processes whose perpetual sameness or regular recurrence give rise to the representation of order, obey *R'ta* or their occurrence is *R'ta*.” [62]

*R'ta* also stands for the truth, though in a philosophical context truth is usually *Satya*. Untruth, though it is sometimes *Asatya*, is usually expressed as an *An-R'ta*, hence as a divergence from *R'ta* or the Way.

The Vedic poet, as Krishna Chaitanya notes, fully realizes that to obtain nature's bounty, man must obey *R'ta*:

“for one who lives according to eternal law, the winds are full of sweetness, the rivers pour sweets. So may the plants be full of sweetness for us.”

The great Vedic *Hymn to the Earth* clearly expresses the belief in man's dependence on the order of the cosmos and in man's role in maintaining it by observing the ancient law. In this hymn, the poet expresses his faith in the eternal order and in man's duty to preserve it.

It is this order which has bound “*rock, soil, stone and dust*” in such a way that “*trees, lords of the forest, stand very firm*”. It is this order that maintains in “*unfailing flow, day and night, the waters that are common to all*” and nurtures “*cornfields that nourish quadrupeds and bipeds*”. In all this the poet displays a respect that unites the spiritual and the practical:

“Whatever I dig from thee, Earth, may it have quick growth again. O purifier, may we not injure thy vitals or thy heart.” [63]

Later, the concept of *Dharma* was also used by the Hindus in the same way. A. M. Hocart writes,

“That regularity, that normality of the universe, which produces good crops, fat cattle, peace and contentment is expressed by the word *Dharma* which etymologically means ‘support’, ‘upholding’. It describes the way in which animals, men or things are expected to behave; it is natural law. The sun is sometimes identified with *Dharma* because it regulates the seasons; sometimes it is considered to be regulated by it.”

Among the Gods, Varuna is the Lord of Right, who lays down ordinances for the universe. The king on his accession is seen to have become to his people what Varuna is to the gods. For that reason, he too is known as the “*Lord of Right*”. [64] In Balinese Hinduism, Eiseman writes, *Dharma* is seen as

“the organizing force that maintains order, the organization that governs the universe as a whole, the relationships between various parts of the universe and actions within the various parts of the universe.” [65]

The concept of *Dharma* was also taken up by the Buddhists who brought it to China where the *Dharma* of Mahayana Buddhism was identified with the *Tao*. De Groot describes the Buddhist *Dharma* as the universal law which embraces the world in its entirety.

“It exists for the benefit of all beings, for does not its chief manifestation, the light of the world, shine its blessing on all men and all things?” [66]

When a Buddhist Lama sets his prayer wheel turning, he is performing a ritual that has deep meaning both in terms of the *Dharma* and the *R'ta*. Not only are the prayers printed on it repeated by his audience, but as Jane Harrison notes,

“he finds himself in sympathetic touch with the Wheel of the Universe; he performs the act, ‘Justice-Wheel-Setting in motion’. He dare not turn the wheel contrariwise; lest that were to upset the whole order of nature.” [67]

If to follow the Way is to maintain the critical order of the cosmos – then a society can be seen as doing so when its behaviour pattern is homeotelic to the Gaian hierarchy. When, on the contrary, it is heterotelic, then a society must be seen as following the anti-Way, that which threatens the order of the cosmos and must thereby give rise to the worst possible discontinuities.

Thus in the Vedas, as Chaitanya notes, we read that *R'ta*, though benign, can also be “*stern and fierce*” when it comes to transgressions. [68] “*Brihaspati rides a fearsome chariot of R'ta for destroying the wicked*”, [69] meaning those who violate the eternal laws and so threaten the critical order of the cosmos. The latter are best seen as following the Anti-Way, or in Vedic India, the *An-R'ta*, the opposite to the *R'ta*, and later, among the Buddhists, the *adharma*, the opposite to the *Dharma*.

Our modern society has quite clearly set out systematically to diverge from the Way. Its overriding goal is economic development or progress, the supreme heterotelic enterprise, which can only be achieved by methodically disrupting the critical order of the ecosphere so as to replace it with a totally different organization: the technosphere, which derives its resources from the ecosphere and consigns to it its ever more voluminous and more toxic wastes. Technospheric expansion is thereby but another way of looking at ecospheric disintegration and contraction and the pattern of behaviour that must be adopted to achieve this suicidal goal is the anti-Way.

### **Vital Force**

Vernacular man follows the Way even in those societies in which the concept has not been clearly articulated. Many have developed an associated concept, that of vital force. Cornford tells us that in the classical world, a place was regarded as sacred because of the presence in it of a dangerous power which made it sacrosanct – “*not to be set foot on by the profane*”. [70]

Sacred things had to be treated with great respect, indeed with trepidation. They were the source of every benefit but also of all misfortunes, for sacred things contained dangerous energy or 'vital force'. Most traditional society had its word for it: *Mana* among the Melanesians and Polynesians; *orenda* among the Sioux and *muntu* among the Baluba – to name but a few.

Durkheim regards vital force as “*the source of all religiosity*”. He sees “*the spirits, demons, genii and gods of every sort*” as “*the concrete forms taken by this energy*”. It is partly, at least, because they are endowed with this vital force that they are sacred and have become objects of religious cults. The sun, the moon and the stars are also worshipped for this reason.

“They have not owed this honour to their intrinsic nature or their distinctive properties but to the fact that they are thought to participate in this force which alone is able to give things a sacred character, and which is also found in a multitude of other beings even the smallest.” [71]

Lods considers that

“the very ancient term which is found in all Semitic languages to express the idea of ‘god,’ one of the various forms of *el* (Hebrew), *ilu* (Babylonian), *Rah* (Arabic), originally denoted the vague force which was the source of all strength and life. [72]

Vital force is seen as powering the whole living world. To acquire it personally is the only sure avenue to success. Among the Baluba, vital force is referred to as *muntu*. A powerful man is described as ‘*muntu mukcdumpe*’, a man with a great deal of *muntu*, whereas a man of no social significance is referred to as a ‘*muntu mutupu*’, or one who has but a small amount of *muntu*. [73] A complex vocabulary is used to describe all the changes that can affect a man’s stock of *muntu*. All illnesses, depressions, failures in any field of activity are taken to be evidence of a reduction in this vital force and can be avoided only by maintaining one’s stock of it. A man with none left at all is known as *mufu*. He is as good as dead. [74]

Vital force was not just accumulated by individuals; it is usually seen as flowing through the cosmos and concentrating in certain things and beings, and in so doing, forming a pattern of power and hence of sanctity – a philosophy known as Hylozoism. Paul Schebesta tells us that for the Pygmies of the Ituri forest in Zaire, vital force or *megbe*

“is spread out everywhere, but its power does not manifest itself everywhere with the same force nor in the same way. Certain animals are richly endowed with it. Humans possess a lot more of some types of *megbe* but less of other types. Able men are precisely those who have accumulated a lot of *megbe*: this is true of witch-doctors.” [75]

Significantly, the amount of vital force residing at the different levels of social organization reflects the extent to which the society is integrated or centralized. Thus in a very loose society, individuals and families are endowed with a considerable proportion of the society’s vital force. On the other hand, in highly centralized traditional kingdoms such as ancient Egypt, or the old kingdom of Benin (now in Nigeria), the vital force becomes concentrated in the person of the divine king, who was divine precisely for that reason.

In such a society, what is more, the welfare of all the inhabitants is regarded as totally dependent on the fulfilment of the important rituals and ceremonies designed to preserve and increase the king’s stock of vital force, and on the observance of the many taboos surrounding his person.

The relationship between things and beings at different echelons in the hierarchy of the cosmos is not symmetrical. Vital power flows downwards to vitalize and hence sanctify things and beings at the lower echelons, though it will only do so if the latter fulfil their obligations towards the higher echelons and hence towards the cosmos as a whole.

It is thus understandable that so many of the rituals and ceremonies of a traditional people – and indeed, their whole way of life-should be designed to maintain the correct distribution of vital force at

each level in the cosmic hierarchy. In this way they can maintain the critical order and stability of the cosmos, and thereby enable the people to follow The Way.

To neglect the performance of these sacred rituals and ceremonies worse still, to break the sacred laws that govern their performance – is to violate a taboo. This can only lead to a disastrous change in the distribution of vital force within the cosmic hierarchy. An act is taboo, according to Roger Caillois, because it disrupts

“the universal order, which is at once that of nature and society [and as a result,] the Earth might no longer yield a harvest, the cattle might be struck with infertility, the stars might no longer follow their appointed course, death and disease could stalk the land.” [76]

Once we abandon tribal man’s notion of vital force, and the closely associated notion of the sacred, we go a long way towards desanctifying society and the natural world; in doing so, we leave it wide open to the depredations of modern industrial man who follows the anti-Way. Thus one has to agree with Hans Jonas that what is most required today is to restore the category of the sacred, which he regards as that which has been most thoroughly destroyed by the scientific establishment.

### **The Gods**

The deities of chthonic man were above all the guardians of the critical order of the cosmic hierarchy. As such, they personified the laws that were seen as governing the cosmos and that man had to observe if he was to assure the preservation of its critical structure. This meant that by observing those laws man was also fulfilling his obligations to the appropriate deities. Thus to follow the Way in Vedic India was to fulfil one’s obligations to Varuna, the God who personified the *R’ta*; in ancient Egypt to Re, who personified the *Maat*, in Greece to Themis, once the cosmic force bearing that name came to be represented by that Goddess.

The Gods also personified the vital force that flowed through the living world, reflecting its critical structure and sanctifying it. Jane Harrison notes that, originally, the gods of the Romans were impersonal and ill-defined, and that rather than being referred to as *dei* or gods, they were seen as *numina*, the plural of *numen* which meant ‘vital force’, [77] suggesting along with Marett [78] and later Durkheim and Lods that the notion of vital force preceded that of the gods and spirits.

Whether this is so or not, the two concepts are complementary. It is probable that, as the gods grew in importance, so did they in turn reinforce the sacred nature of the vital force with which they were imbued. In this way, they sanctified each other as well as the structure of the living world which their organization faithfully reflected.

The role of the gods of vernacular man in sanctifying and hence in preserving the critical order of society is particularly well documented. ‘ancestor worship’ seems to be common to all known tribal peoples throughout the world, though the term is misleading, for the ancestors were not worshipped as modern man worships his gods. His relationship with them was rather one of mutual obligations.

The gods had needs, and their principal need was for the living to fulfil their ritual and ceremonial obligations, observing the laws that the ancestors had enacted *in illo tempore*. [79] For their part, the living and their families, clans and tribes, needed the gods to protect them from malnutrition, disease, enemy invasions and other disasters. In Japan, as Lafcadio Hearn puts it,

“The happiness of the dead depends upon the respectful service rendered them by the living; and the happiness of the living depends upon the fulfilment of their pious duty to the dead.” [80]

– a clear case of hierarchical mutualism. Thus rather than pray for favours, tribal man reminded his gods instead that he had fulfilled his obligations towards them and expected them to do likewise. He would even curse them if they did not reciprocate. Jomo Kenyatta prefers to refer to this relationship as “*communion with the ancestors*”. [81]

Underlying this form of religion is the principle that a dead ancestor, or a deity, remains a member of his family, his community and his society, rather than gravitating to some distant paradise—a concept unknown to chthonic man. In this way, the ancestral gods in chthonic society are as much part of society as are the living—a point made particularly eloquently by William Robertson Smith some 80 years ago.

Significantly, the gods of vernacular man, like his vital force, were seen as faithfully reflecting the hierarchical structure of his society. E. Driver shows how the differences in the organization of the gods among North American Indian societies could be explained in terms of their degree of integration or centralization:

“There was a strong tendency to arrange gods in a ranked hierarchy in areas where people were ranked in a similar manner, and to ignore such ranking where egalitarianism dominated human societies. Thus the people of meso-America carefully ranked their gods, while those in the sub-Arctic Plateau and Great Basin believed in large numbers of spirits of about equal rank. Other areas tended to be intermediate in this respect. Among the Pueblos where many spiritual personalities were widely recognized to be designated as gods, there was little tendency towards ranking, just as there was more equality among human beings.” [82]

The Swazi, on the other hand, have developed a cohesive and hierarchically organized society and, according to Hilda Kuper, their gods are organized in exactly the same way:

“In the ancestral cult, the world of the living is projected onto a world of spirit (*emadloti*). Men and women, old and young, aristocrats and commoners, continue the patterns of superiority and inferiority established by earthly experiences. Paternal and maternal spirits exercise complementary roles, similar to those operating in daily life on earth; the paternal role reinforces legal and economic obligations; the maternal exercises a less formalized protective influence. Although the cult is set in a kinship framework, it is extended to the nation through the king, who is regarded as the father of all Swazi. His ancestors are the most powerful of all the spirits.” [83]

The ancestral gods and thus the vital force which they personify are organized in such a way as to reflect the critical order of vernacular society. Just as the spirits of nature are organized to reflect that of the natural world. In this way, the critical structure of the ecosphere is sanctified and its human members forced to preserve it, come what may for fear of incurring the most terrible penalties.

Robert T. Parsons, writing on the Kono of Nigeria, sums up the nature and function of vernacular religion: it is

“not only an organization of human relationships, but it includes also the relationships of people with the earth as a whole, with their own land and with the unseen world of constructive forces and beings in which they believe. Religion brings them all into a consistent whole.” [84]

What is more, the behaviour pattern associated with such a religion must be that which serves to maintain the critical order of “*this consistent whole*“, i.e. of the whole cosmic hierarchy.

However, chthonic religion dies as society disintegrates. The Olympian Gods were the products of this social disintegration. Whereas the behaviour of the original chthonic deities was subjected to the great powers that governed the cosmos (the *Moira*, or fate, which once also referred to the spatial order of the cosmos. and *Dike*, or justice, which was responsible for assuring its temporal order), the Olympian Gods were set above these cosmic powers. Their behaviour and indeed that of the disintegrating society whose organization they reflected was no longer subject to the constraints that previously served to maintain the critical order of the cosmos.

As social disintegration proceeded still further, the Olympian gods ceased to have any relationship with society, for society was no more. The accent was then on the cult of a national God and eventually on that of the universal God. As society further disintegrated, the only remaining vernacular social

grouping was the nuclear family and, not surprisingly, the universal god acquired a wife and a child so that the now truncated pantheon faithfully reflected the newly atomized society.

As society further disintegrates and religion becomes increasingly ‘other-worldly’, as man is severed from nature and indeed from the entire Gaian hierarchy, so his behaviour towards his Gods ceases to occur within its correct field – that provided by the Gaian hierarchy of which he is part. Instead, it becomes misdirected or heterotelic to this hierarchy, ceasing to fulfil its true social, ecological and cosmic role, and leads man even further along the anti-Way.

### **Correcting divergences from The Way**

Developing natural systems can only maintain themselves on their course or along their constellation of chreods if they can deal effectively with any external or internal challenges that might divert them from it. To do this, they must either isolate themselves from such challenges or, alternatively, correct diversions from their path or Way, which requires that they interpret the problems caused -by such diversions correctly.

Vernacular man in the classical world understood, as Hughes notes, that “*hunger, ill-health, erosion, poverty and general ruin*” were only different forms “*that the Earth’s revenge could take for the terrible mistreatment meted out to her by man*” – punishments for having diverted from the Way in pursuit of the anti-Way or what the ancient Greeks would have called the *ou Themis*. The only way to combat these ills, therefore, was to treat the earth with greater care, which meant to return to the Way of the ancestors who lived in the Golden Age when such ills were unknown. [85]

Vernacular people invariably interpreted disease in this way. Thus among the Tukano of Colombia, as Reichel-Dolmatoff notes,

“Illness is taken to be the consequence of a person’s upsetting a certain aspect of the ecological balance. Overhunting is a common cause and so are harvesting activities in which some relatively scarce natural resource has been wasted. The delicate balance existing within the natural environment, between nature and society, and within society itself, is bound to affect the whole.

“To restore this ‘delicate balance,’ the shaman as a healer of illness does not so much interfere on the individual level, but operates on the level of those supra-individual structures that have been disturbed by the person. To be effective, he has to apply his treatment to the disturbed part of the ecosystem. It might be said then that a Tukano shaman does not have individual patients: his task is to cure a social malfunctioning.” [86]

He does this by re-establishing the rules that “*will avoid overhunting, the depletion of certain plant resources and unchecked population increase*”.

Quite clearly then, the shaman is more than a medical practitioner. He is a “*truly powerful source in the control and management of resources*”, [87] for he can really affect the incidence and severity of diseases over which the modern medical practitioner, with his very limited brief, has no control whatsoever.

The philosophy underlying this interpretation of disease and the means of curing it is even more explicit in the case of the Qollahuaya diviners of the community of Kaata in the Bolivian Andes. They see their community as an integral part of an *ayllu* – conceptualizing their mountainous territory as a human body, with communities living on the high ground, the central areas and in the lowlands. According to Joseph W. Bastien, the head of the *ayllu* is the “*moist puna area . . . where herders graze alpacas, llamas, sheep and pigs; the grasses that grow there are its hair; its eyes are the lakes of Apacheta. Its trunk is formed by the sloping terraced fields of potatoes, oca and barley*”.

The Kaata also has a heart, and a liver, which produce blood and fat and are the “*principles of life and power*”. They are circulated by the diviners throughout the community and in particular into the “*earth shrines*” by means of rituals and ceremonies in which the sick people “*eat with the mountain*”. For the people of Kaata, human health is thereby identified with the integrity of



their *ayllu*: it follows that when people, their society and its environment “*work together to form one body, the bodies of sick individuals become whole*” and the sick are restored to health.

The body metaphor provides in this way “*a systemic model in which there is an analogy between the human body and the environmental and social bodies*”. Diseases are diagnosed as “*signs of disorders between man and his land, or between his vertical ayllu and Ayllu Kaata*”. The disease is then combated “*not by isolating the individual in a hospital away from his land*” but instead by “*gathering the members of his social group in ritual and together feeding all the parts of Ayllu Kaata*”.(88)

Bastien sees this as being very much the approach to disease of the people of the Andes in general. For them disease

“is an organic, cultural, environmental and social phenomenon . . . .By means of the body metaphor, diviners not only examine, but also interrelate the complex networks of environmental factors and social structure with physical distress. This often prevents subsequent illness because action is taken to change social and environmental causes of the sickness.” [89]

In this manner, vernacular man correctly diagnoses heterotelic diseases as the symptoms of social and ecological maladjustments brought about by diverging from the Way, and thereby violating the laws of the cosmos and disrupting its critical order. What is more he fully realizes that maladjustments can only be eliminated by correcting such a divergence and returning to the Way.

Modern man, on the other hand, interprets problems in terms of cause and effect relationships on the basis of which a disease is attributed to a discreet event such as the action of a bacterium, virus or other pathogen – which must be eliminated, usually by waging chemical warfare against it.

The same is true of all the other ever more daunting problems that confront our society today, such as crime, delinquency, drug addiction, poverty, unemployment, etc. All are interpreted in such a way as to make them appear soluble by the expedients that science, technology and industry can provide and whose application is rationalized and hence legitimized in terms of the world view of modernism. Needless to say, everywhere the incidence of all these problems is escalating.

That is the essence of the Great Misinterpretation – the ultimate manifestation of modern man’s cognitive maladjustment to the industrial world that he has created. It draws us into a chain-reaction leading to ever greater social and environmental destruction, from which we must waste no time in extracting ourselves if we are to have any future on this planet.

### **The Great Re-interpretation**

No amount of empirical or theoretical evidence is likely to persuade mainstream scientists or other protagonists of the world view of modernism to accept any of the principles of the world view of ecology. What is more, if they are eventually accepted, it will not be because they will have been ‘proved’ to be true in the scientific sense of the term, but because the ‘reigning paradigm’ or ‘canonical knowledge’ will have changed to such an extent that they will have become consistent with it.

Similarly, no amount of empirical or theoretical ‘evidence’ as to the untenability of the basic ideas of today can lead scientists to abandon them if they are part of ‘current wisdom’, the ‘reigning paradigm’, or ‘canonical knowledge’.

Clearly then, so long as we argue from within the accepted ‘conceptual framework’, or the reigning paradigm, or the canonical knowledge of the day, we can never dissuade people either to accept new ideas or to abandon old ones. “*Demonstration*”, Polanyi insists, “*must be supplemented . . . by forms of persuasion which can induce a conversion*”. [90] Such a conversion, or generalized paradigm shift, involves a profound rearrangement or recombination of the knowledge that makes up our world view. It must affect its very metaphysical, ethical and aesthetic foundations.

In the same way the members of a society are converted to a new religion or world view when that with which they are imbued proves to be unadaptive to the new conditions – in particular the social and ecological chaos caused by colonialism and economic development. The new religio-political movements to which they are converted is generally referred to as ‘millenarian’.

They proliferated in Europe during the 10th century, a period of socio-economic change that caused very serious social stress. Many of the movements which sought to establish new cultural patterns during those troubled times were convinced that the year 1000 presaged the end of the world and they called upon their adepts to prepare themselves spiritually for this momentous event. Such movements are also referred to as ‘messianic’ in that they are often led by a prophet who sees himself as divinely inspired-as a re-incarnation of a previous great religious figure, or in the case of movements of this sort occurring among the Jews, as the Messiah himself. These movements have proliferated throughout the Third World, during the colonial period in particular. In Lagos, there has been such a proliferation of messianic cults that their leaders went so far as to set up the world’s first trade union of messiahs. Anthony Wallace refers to such cults as “*revitalist*”. [91]

The increasing failure of all policies based on the world view of modernism and its derivative paradigms – those of science and modern economics in particular – to satisfy our most fundamental psychic needs or indeed solve any of the worsening problems that threaten our very survival on this planet gives rise to psychic conditions increasingly propitious to the emergence of revitalist movements. The chances are that such movements will be affected, among other things, by ecological ideas that are increasingly in the air and whose relevance is becoming ever more apparent to even the blindest among us. They may also preach a return to the vernacular way of life. Thus while the rise of Islamic fundamentalism in the Moslem world and of Hindu fundamentalism in India can be seen as an unpleasant trend towards chauvinism, bigotry and intolerance, these movements are clearly also a reaction against Western economic imperialism and the disruption of their cultures and traditions by Western science, technology and industrial development.

Significantly, too, a considerable proportion of the revitalist movements that have so far sprung up in the Third World have been ‘nativistic’ – which is to say that they correctly attributed the ills against which they were reacting to the way of life imposed upon their members by their colonial masters, and preached a return to the Way of their ancestors.

Many such movements have been violent and unpleasant, of that there is no doubt. Usually too, they have been put down with equal violence and unpleasantness as their ideas were rightly seen as a threat to the established order. However, there is reason to hope that the ecology-based revitalist movements of the future will seek to achieve their ends in the true Gandhian tradition. It could be that Deep Ecology, with its ethical and metaphysical preoccupations, might well develop into such a movement. So could the Earth First movement in the U.S.A., whose religious and metaphysical basis has recently been described by Bron Taylor. [92]

We cannot afford to wait and see whether such movements will develop into revitalist cults that are powerful enough to transform our society. Instead, we should work towards their development by helping to create the conditions in which they are likely to emerge. Let us remember that the world view of ecology is very much that of a vernacular community-based society, whereas the world view of modernism is that of an industrial society.

We must thereby set out to combat and systematically weaken the main institutions of the industrial system – the state, the corporations – and the science and technology which they use to transform society and the natural world. At the same time, we must do everything to help recreate the family and the community, and above all a localized and diversified economy based on them, reducing in this way our increasingly universal dependence on a destructive economic system that, in any case, is in decline and may well be close to collapse.

As we multiply our efforts in these directions, so we must create the terrain in which ecological ideas can take root and flourish. May they inspire those who will lead us back to the Way, and thereby restore and preserve what still remains of the beautiful world we have been so privileged to inherit.

1. The term 'ecosphere' was coined by the American ecologist Lamont Cole. I shall take the 'biosphere' to be the organization of living things, and the 'ecosphere' to be the biosphere together with its geological substrate and its atmospheric environment. This is how James Lovelock uses the term biosphere, as opposed to Vernadsky and others. The word ecosphere corresponds to Lovelock's Gaia and the two will be used interchangeably.
2. Gaia, or the ecosphere, is seen to constitute a hierarchy of natural systems. Each natural system is part of a series of larger systems and is itself made up of smaller systems. Thus, a human being is part of a family, a community, an ecosystem and Gaia herself, and is in turn made up of tissues and organs, cells, molecules, etc. The hierarchical nature of the living world is stressed by the ecologist Eugene Odum, especially in his latest textbook *Basic Ecology*. For him ecology is largely concerned with the study of the upper end of the hierarchy, i.e. from the ecosystems upwards. He also defines it as "*the study of the structure and function of nature*" or of Gaia. If the latter is hierarchically organized, then the subject matter of ecology can only be the Gaian hierarchy as a whole. Ecology then becomes a super-science – as it was seen in the early decades of this century by the leading ecologists of the time.
3. see Eliade, Mircea, 1971, *The Myth of the Eternal Return, or Cosmos and History*, pp. 55-56. Oxford University Press.
4. see Rupert Riedl's book *Order in Living Organisms*, p. 1. John Wiley, New York, 1978.
5. Homeotelic behaviour. From the Greek *homeo* (same) and *telos* (goal). A term coined by the author. The behaviour of natural systems is seen to be homeotelic if its goal is to maintain the critical order and hence the stability of the larger system, and indeed of the Gaian hierarchy. It is the basic thesis of *The Way* that such behaviour has prevailed at all levels of organization until recently. Homeotelic behaviour is also that which best serves the real interests of all natural systems, which can only be secured by maintaining the critical order of the whole of which they are but the differentiated parts, and which provide them with the environment to which they have been adapted by their evolution.. This view is the very opposite of that entertained by neo-Darwinians and socio-biologists. For them, there is no 'selective advantage' in displaying any concern for the stability or integrity of the larger whole.
6. Riedl, Rupert, 1978 *Order in Living Organisms*, p. 1. John Wiley, New York.
7. von Bertalanffy, Ludwig, was co-founder of the General Systems Theory, which is unfortunately no longer very much in fashion, though its main journal *The General Systems Yearbook* is still published today. It seems to me that it is only in the light of this theory that one can develop a coherent organization of knowledge in terms of which one can understand the workings of the ecosphere as a whole-in other words, a true ecology.
8. Pittendrigh, Colin, 1958, "Adaptation, Natural Selection and Behaviour," in Roe, Anne, and Simpson, George Gaylord, Eds, *Evolution and Behaviour*, p. 394. Yale University Press, New Haven.
9. Douglas, Mary, 1966. "Purity and Danger. Routledge and Kegan Paul, London. Quoted by Hildyard, Nicholas, 1978, "There is more to Food than Eating", *The New Ecologist* No. 5, September/October, pp. 166-168.
10. Metuh, Emefie Ikenga, 1981, *God and Man in African Religion*, p. 57. Geoffrey Chapman, London.
11. Passmore, John, 1978, *Science and its Critics*, pp. 108-109. Duckworth, London.
12. I deal with the nature of early academic ecology, in *The Way* in particular in chapters 1 and 4.
13. Forbes, S. A., 1880, "On Some Interactions of Organisms," *Bulletin of the Illinois State Laboratory of Natural History*, I. pp. 11-18.
14. Allee, W. C., Emerson, W. S. W. A., Park, O., Park, T., Schmidt, K. P., 1949, *Principles of Animal Ecology*, pp. 7-8. Philadelphia, W. B. Saunders.
15. Thorpe, W. H., in Koestler, Arthur and Smythies, J. R., eds., 1972, *Beyond Reductionism*, p. 393. Hutchinson, London.
16. Weiss, Paul, in Koestler and Smythies, *ibid*, p. 46.
17. *Ibid*, p. 46.

18. Stanner, W. E. H., in Hammond, Peter Boyd, ed., 1971, *An Introduction to Cultural and Social Anthropology*, pp. 289-290. Macmillan and Collier Macmillan, London.
19. Cannon, Walter, 1932, *The Wisdom of the Body*. Norton, New York, p. 22.
20. Cannon, Walter, *ibid*, p. 25.
21. Odum, Eugene P., 1983, *Basic Ecology*. Saunders College Publishing, Philadelphia, p. 46.
22. Rappaport, Roy A., 1967, *Pigs for the Ancestors*. Yale University Press, New Haven, p. 4.
23. Harding, Thomas G., 1960, "Adaptation and Stability" in Sahlins and Elman, eds., *Evolution and Culture*, p. 54.
24. Sagan, Dorion, and Margulis, Lynn, 1983, "The Gaian perspective of ecology", *The Ecologist* Vol. 13, No. 5, pp. 160-167.
25. This statement will sound very odd to those who are accustomed to thinking of evolution as a process that affects the individual organism, (or – in statistical terms – a large number of individual organisms), and that changes to the natural world as a whole can be understood in terms of the changes occurring to these individual organisms. Needless to say, this thesis is untenable if the natural world is an organized whole of which the individual organisms are but the differentiated parts. In other words, if the Gaian thesis is correct, the unit of evolution cannot be the individual but Gaia herself. Since Gaia is a spatio-temporal entity, Gaia, in a sense, is evolution. However, I prefer to see evolution (less accurately) as the 'Gaian process'. This issue is dealt with in *The Way* chapter 21.
26. I use the term homearchy (from the Greek *homeo* (same) and *archos* (to rule)) to refer to the control of differentiated natural systems by the hierarchy of larger systems of which they are part. for instance, the control (much of which is likely to be internalized) of people by their families, communities and ecosystems. I also use the term heterarchy (from the Greek *hetero*, different and *archos* to rule) to refer to the control of natural systems by agents that are external to the Gaian hierarchy, such as corporations and state institutions, since the later have a totally different agenda, this can only give rise to behaviour that is heterotelic to Gaia.
27. Waddington, C. H., 1975, *The Evolution of an Evolutionist*. Edinburgh University Press, Edinburgh, pp. 221-223.
28. Orians, G. H., 1975, "Diversity, stability and maturity in natural ecosystems", in van Dobben, W. H., and Lowe-McConnell, R., eds., *Unifying Concepts in Ecology*, pp. 139-150. Funk, The Hague.
29. von Bertalanffy, Ludwig, 1962, *Modern Theories of Development: An Introduction to Theoretical Biology*. Translation by Woodger, J. H. Harper Torchbook, New York, p. 123.
30. Ungerer, E., 1930, "Der Aufbau des naturwissens", *Pedagogische Hochschule ii*, quoted by von Bertalanffy, 1962, *Modern Theories of Development*, p. 12.
31. Radcliffe-Brown, A. R. 1965, *Structure and Function in Primitive Society* p. 181. Cohen and West, London. A general discussion of this issue will be found on pp. 178-187.
32. *Ibid*, p. 186.
33. Odum, Eugene P., 1983, *Basic Ecology*, p. 5. Saunders College Publishing, Philadelphia.
34. Stephen Boyden is a biologist at the Australian National University. He deals with this thesis in an article published in *The Ecologist* 1973, Vol. 3, No. 8, entitled "Evolution and Health". I have devoted a number of chapters in *The Way* to it and to its various ramifications. See chapters 46, 47, 48 and 49.
35. Coleman, J. S., 1968, *The Adolescent Society*. The Free Press of Glencoe, New York, p. 103.
36. Rappaport, Amos, 1978, "Culture and environment," *Ecologist Quarterly* No. 4, Winter, p. 270.
37. Coomaraswamy, Ananda, 1983, *Symbolism in Indian Architecture*. The Historical Research Documentation Centre, Jaipur, p. 8.

38. This whole issue is described in great detail by Mircea Eliade in *The Myth of the Eternal Return, or Cosmos and History*, Princeton University Press, Princeton, 1971.
39. Eiseman, Fred, 1989, *Bali: Sekala and Niskala*, Vol. 1, ed. David Pickell, p. 5. Pickell-Periplus, Berkeley.
40. Gerard, Ralph, in Whyte, Lancelot Law, Wilson, Albert G., Wilson, Donna eds., 1969, "Hierarchical Structures" (Proceedings of the symposium held Nov. 18-19, 1968 at Douglas Advanced Research Laboratories, Huntington Beach, Calif.). American Elsevier, New York, p. 224.
41. Sahlins, Marshall, "Tribal economics" in Dalton, George, ed. 1971, *Economic Development and Social Change, The Modernization of Village Communities*, pp. 43-61. The Natural History Press, New York.
42. Park, Mungo, 1984 (original edition 1799), *Travels in the Interior of Africa*, p. 154. Folio Society, London.
43. Personal communication to the author.
44. Sahlins, Marshall, *op. cit.* pp. 43-61.
45. Polanyi, Karl, 1957, (original edition 1944), *The Great Transformation*. Beacon Press, Boston, p. 46.
46. Malinowski, Bronislaw, 1937, "Anthropology as the basis of social science," in Cattell, Cohen and Travers, eds., *Human Affairs: Essays on the Application of Science to the Study of Society*, p. 232. Macmillan, London.
47. Cornford, F. M., 1957, *From Religion to Philosophy*, p. 167. Harper Brothers, New York.
48. Reichel-Dolmatoff, Gerardo, 1977, "Cosmology as ecological analysis: a view from the rainforest", *The Ecologist* Vol. 7 No. 1, January/February 1977, pp. 4-11.
49. *Ibid*, pp. 4-11.
50. Fernea, Robert A., 1970, *Shayk and Effendi: Changing Patterns of Authority Among the El Shabana of Southern Iraq*, p. 315. Harvard University Press. Cambridge, Mass.
51. Harrison, Jane, 1927, *Themis: A Study of the Social Origins of Greek Religion*, p. 517. Cambridge University Press, Cambridge.
52. *Ibid* p. 517.
53. Anaximander. Quoted by Cornford, F. M., 1957, *From Religion to Philosophy*, p. 8. Harper Brothers, New York.
54. Cornford, *Ibid*, p. 12.
55. Herodotus. Quoted by Cornford, *Ibid*, p. 12.
56. Iamblichus; "Life of Pythagoras". Quoted by Cornford, *Ibid* p. 54.
57. Homer, *The Odyssey*, 1854 translation by Alexander Pope, Cooke, London. Quoted by Harrison, *Ibid*, p. 532.
58. de Groot, Jan Jacob Maria, 1910, *The Religion of the Chinese*. Macmillan, New York. Quoted by Cornford, *op. cit.* , p. 45.
59. *Ibid*, p. 174.
60. Feng, Yu-Lan, 1984, "A Short History of Chinese Philosophy," trans. Derek Boddler. Macmillan, New York, "quoted by Peerenboom, R. P., "Beyond naturalism: a reconstruction of Taoist environmental ethics", *Environmental Ethics* Vol. XIII, spring 1991, p. 4.
61. Wing-Tsit Chan, ed. 1963, "A Source Book in Chinese Philosophy". quoted by Peerenboom, R. P., *ibid*, p. 9.
62. Bloomfield, Maurice, 1908, "The Religion of the Veda, the Ancient Religion of India from Rig-Veda to Upanishads," quoted by Cornford, *op. cit.*, p. 175.

63. Chaitanya, Krishna, 1983, "A Profounder ecology: the Hindu view of man and nature", *The Ecologist* Vol. 13 No. 4, pp. 127-128.
64. Hocart, A. M., 1970, *Kings and Councillors*, p. 112. University of Chicago Press, Chicago.
65. Eiseman, Fred, 1989, *ibid*, p. 12.
66. de Groot, Jan Jacob Maria, *ibid*, 1910, page 166, quoted by Cornford, *op. cit.*, p. 176.
67. Harrison, Jane, 1927, *Themis: A Study of the Social Origins of Greek Religion*, p. 526. Cambridge University Press, Cambridge.
68. Chaitanya, Krishna, 1983, *ibid*, pp. 127-135.
69. *Ibid*, pp. 121-135.
70. Cornford, F. M., 1957, *ibid*, p. 32.
71. Durkheim, Emile, 1964, (original edition 1915), *The Elementary Forms of the Religious Life*, p. 199. George Allen and Unwin, London.
72. Lods, Adolphe, 1932, *Israel: From its Beginnings to the Middle of the Eighth Century*, trans. S. H. Hooke, p. 250. Routledge and Kegan Paul, London.
73. Tempels, Placide, 1984, *La Philosophie Bantoue*, p. 69. Presence Africaine, Paris.
76. *Ibid*, p. 33.
74. *Ibid*, p33.
75. Schebesta, Paul, 1940, *Les Pygmées*, p. 62. Gallimard, Paris.
76. Caillois, Roger, 1988, *L'Homme et le Sacré*, p. 24. Gallimard, Paris.
77. Harrison, Jane, *op. cit.*, p. 447.
78. R. R. Marett's *The Threshold of Religion* was published in 1909 (Methuen and Company Ltd, London). It was very much an answer to Tylor's thesis that man's original religion was animism (see his classic *Primitive Culture*, 1903, John Murray, London.) Marett saw the belief in an "indwelling psychic power", referred to as *mana* by the Melanesians and Polynesians, as predating animism. He referred to it as "the pre-animistic religion". Though this idea aroused a lot of interest at the time, mainstream anthropologists now seem to have lost interest in it and on the whole the idea has been discredited in anthropological circles.
79. The term 'in illo tempore' is a term much used by Mircea Eliade. It refers to the mythical period in which the heroes lived and the laws enacted. Radcliffe-Brown refers to it as "the dawn period", as it is known among certain Australian tribes.
80. Hearn, Lafcadio, 1904, *Japan: An Attempt at Interpretation*, p. 37. Macmillan, New York.
81. Jomo Kenyatta, 1979, *Facing Mount Kenya*, p. 232. Seeker and Warburg, London.
82. Driver, E. 1961, *Indians of North America*, p. 428. University of Chicago Press, Chicago.
83. Kuper, Hilda, 1963, *The Swazi. A South African Kingdom*, p. 58. Holt, Rinehart and Winston, New York.
84. Parsons, Robert T., 1964, *Religion in an African Society*, p. 176. E. J. Brill, Leiden.
85. Hughes, J. Donald, 1983, *ibid*, pp. 54-60.
86. Reichel-Dolmatoff, Gerardo, 1977, *ibid*, pp. 4-11.
87. *Ibid*, pp. 4-11.
88. Bastien, Joseph W., 1981, "Metaphorical relations between sickness, society and land in Qollahuaya ritual", *American Anthropological Association Bulletin* No. 12, 1981, pp. 19-37.

89. *Ibid*, p. 488.
90. Polanyi, p. 151.
91. Wallace, A. F. C., *op. cit.*, pp. 264-281.
92. Taylor, Bron, "The religion and politics of Earth First", *The Ecologist* Vol. 21 No. 6, November/December 1991, pp. 258-266.

## The Way – an overview (World Review)

by **Edward Goldsmith** · January 1, 1996 · Leave a Comment · Share · Print

*An overview of The Way published in World Review – New Books for a New Century Vol 1 No 3, 1996*

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MODERN MAN is rapidly destroying the natural world on which he depends for his survival. Everywhere on our planet, the picture is the same. Forests are being cut down, wetlands drained, coral reefs grubbed up, agricultural lands eroded, salinized, desertified, or simply paved over. Pollution is now generalised—our groundwater, streams, rivers, estuaries, seas and oceans, the air we breathe, the food we eat, are all affected. Just about every living creature on earth now contains in its body traces of agricultural and industrial chemicals—many of which are known or suspected carcinogens and mutagens.

As a result of mankind's activities, it is probable that hundreds of species are being made extinct every day, with only a fraction of these being known to science. The earth's magnetic field is being changed, with unknown possible consequences. The ozone layer that protects humans and other living things from ultra-violet radiation is being rapidly depleted; and our very climate is being so transformed and destabilised that within the next forty years we will probably experience climatic conditions in which no human has ever lived before.

By destroying the natural world in this way we are making our planet progressively less habitable and, if current trends persist, in no more than a few decades it may cease to be capable of supporting complex forms of life. This may sound far-fetched; unfortunately, it is only too realistic. My colleagues and I have documented the trends and the likely outcome *ad nauseam* in *The Ecologist* over the last twenty-six years.

Why, we might ask, are we doing this? The answer is that our society is committed to economic development or progress—a process which by its very nature must systematically increase the impact of our economic activities on an environment ever less capable of sustaining it, and hence ever more deeply degraded by it. An idea of the gross mismatch between the impact of human activities and the environment's capacity to sustain them, is provided by the fact we now coop for our own use and for our various economic activities, fully 40 per cent of the biosphere's terrestrial net primary production (NPP). What is more, if economic activities continue to expand at the present rate, within no more than a few decades we would be co-opting more than 100 per cent of NPP—which, of course, is not remotely conceivable.

All this is of little, if any, concern to our political leaders. They continue to go about their normal business as if the problem did not exist. Thus, though all the scientists sitting on the Inter-Governmental Panel on Climate Change (IPCC), set up by the United Nations, have warned that carbon dioxide emissions must be reduced by 60-80 per cent immediately in order to stabilise climate—and hence prevent a world climatic catastrophe—no government has made any serious moves in this direction. If the emissions of carbon-dioxide, the principal greenhouse gas has fallen in the UK, it is only that our manufacturing base has seriously declined and that coal has been largely replaced by natural gas to power the generation of electricity. In general, the main constraint on governmental action to tackle the serious environmental problems that face us are the lobbying campaigns of powerful industrial groups, such as the oil industry, intent on defending their petty short-term interests, come what may.

More surprising, however, has been the almost total indifference with which the scientific world, in general, has viewed this critical problem. Its acknowledged role is to provide governments and society at large with knowledge that serves the public interest and maximises the general welfare. But how can it achieve this task if it systematically ignores the fatal process that is rendering our planet ever less habitable and if unchecked, must inevitably lead to the extinction of our species along with countless others? Our scientists bring to mind those Australian Aborigines, who, when they first sighted Captain Cook's impressive ship sailing up the Australian coast north of Botany Bay went about



their normal activities as if this strange monster were simply not there. Perhaps they hoped that by ignoring it to the point of not recognising its very existence, it might just vanish and leave them alone.

The parallel is more than superficial. In both cases a life-threatening challenge is systematically ignored because its occurrence is irreconcilable with the prevailing worldview, which would be totally discredited were the challenge shown to be real. American anthropologist, A.F.C. Wallace, has shown convincingly that tribal peoples will go to any lengths to preserve their ‘cognitive structure’ or ‘mazeway’ as he refers to their worldview. A scientist will go to equal lengths to do so—as Thomas Kuhn, Michael Polanyi, Gunther Stent, and other enlightened philosophers of science have shown.

The worldview, which today’s scientists share with everybody else in our society, I refer to as the worldview of modernism, which is faithfully reflected in the paradigm of economics and the paradigm of science. One of the two most fundamental tenets of this worldview and its derivative paradigms is that all benefits, and therefore our welfare and real wealth, are manmade—the product of science, technology and industry. Thus, health is seen as something that is dispensed in hospitals, or at least by the medical profession, with the aid of the latest technological devices and pharmaceutical preparations. Education is seen as a commodity that can be acquired in schools and universities. Law and order, rather than being natural features of human society, are seen instead as provided by our police force in conjunction with the law courts and the prison system. Even society is seen as man-made, brought into being by the ‘social contract’. Not surprisingly, a country’s wealth is measured by its per capita Gross National Product (GNP), which provides a rough measure of its ability to provide its citizens with man-made commodities, a principle faithfully reflected in modern economics.

For economists trained in these ideas, natural benefits—those provided by the normal workings of biospheric processes, assuring the stability of our climate, the fertility of our soil, the replenishment of our water supplies, and the integrity and cohesion of our families and communities—are not regarded as benefits at all. Indeed, our economists attribute no value of any kind to these benefits. It follows that to be deprived of these non-benefits cannot constitute a ‘cost’ and the natural systems that provide them can, thereby, be destroyed with economic impunity.

The second fundamental tenet of the worldview of modernism follows quite logically from the first: it is that to maximise all benefits, and hence our welfare and our wealth, we must maximize economic development or progress. I define this process, above all, as the methodical substitution of the technosphere or surrogate world—the source of man-made benefits—for the ecosphere or real world, that is the source of natural benefits. To question the efficacy of this fatal process, or to suggest that it might not be entirely beneficial, is to blaspheme against the holy writ of what is, in effect, the religion of the modern world. Thus, no true believer will accept that the terrible social and environmental destruction we are witnessing today is the inevitable product of this sacred process. Instead, it will be imputed to deficiencies or difficulties in its implementation—government interference, corruption among local officials, or totally freak conditions that could not possibly recur.

In this way, the worldview of modernism and its specialised paradigms prevent us from understanding our relationship with the world we live in and, hence, from adapting to it so as to maximise our welfare and our real wealth. Instead, they serve primarily to rationalise economic development or ‘progress’—the very process that is leading to the destruction of society and of the natural world with consequences that are only too evident to all.

How, one might ask, is it possible for our ‘objective’ scientists to behave in so unobjective a manner? The answer is that science is not objective, but is influenced by the scientists’ metaphysical beliefs<sup>1</sup>. In reality, scientists slavishly reflect the paradigm of science, with which they have been imbued, and hence the world-view of modernism which this paradigm in turn so faithfully reflects.

One reason why scientists accept the paradigm of science, and hence the worldview of modernism, is that these serve to rationalise the policies that have given rise to the modern world. This is the world in which they, and indeed all of us, have been brought up, and which it is very difficult to avoid regarding as the normal condition of human life on this planet.

Just as the abandoned children who sleep in the sewers of Rio de Janeiro and live off petty crime and prostitution regard their lot as totally normal, so scientists regard it as normal that our rivers have been transformed into sewers; that our drinking water is contaminated with human excrement, pesticide residues, nitrates, radionuclides and heavy metals; that our agricultural land is eroding faster than soil can possibly form by natural processes; that our natural forests are being systematically replaced by ecologically vulnerable and soil-destroying monocultures of fast-growing exotics; that our cities are increasingly ugly, chaotic and polluted; and, that our children spend most of their spare time watching violent and sadistic films on television.

This general human tendency to regard the only world we know as normal is reflected in just about all the disciplines that are taught in our schools and universities. Thus, the modern discipline of economics is based on the assumption that the destructive economic system operative today is normal; the discipline of sociology on the assumption that our modern, atomised and crime-ridden society is normal; our political science on the assumption that the elected dictatorships that govern modern nation states are normal; and our agricultural science on the assumption that large-scale, mechanised, chemical-based agriculture (which rapidly transforms arable land into desert) is normal. It simply does not occur to our academics that what they take to be normal is highly atypical of humanity's total experience on this planet—necessarily short-lived, and totally aberrant. They are like biologists who have only seen cancerous tissue and understandably mistake it for a healthy organism.

Another reason why our academics remain religiously imbued with the worldview of modernism is that the view is totally coherent and self-consistent. This must be so, for scientific theories are not adopted by mainstream science because they have been proved to be true by experimentation in controlled laboratory conditions, or even as a result of simulation on a mathematical model, but because, above all, they conform to the paradigm of science and hence with the worldview of modernism. Those that do not conform, what is more, are systematically tortured into a shape that enables them to do so.

Thus, in the last sixty years the behaviourists made psychology conform to the paradigm of science. The neo-Darwinians and, even more so, the sociobiologists did the same for theoretical biology. Modern sociology has also become mechanistic and reductionistic. In addition, the development of the New Ecology in the 1940s and 1950s has engendered a Newtonian ecology that rather than provide the theoretical foundations for the environmental movement of today (as most environmentalists firmly believe) serves, instead, further to rationalise, and hence legitimise, the very process of economic development or progress that is the principal, if not the only cause of the environmental degradation that they seek so ardently to bring to an end.

In this way all academic knowledge has been made, Procrustean-like, to conform with the paradigm of science, and hence with the worldview of modernism. It has been stretched or shrunk to fit an atomised and mechanistic vision of the world in which people are no more than machines and their needs purely material and technological—precisely those that the state and the industrial system are capable of satisfying.

Knowledge that cannot, by its very nature, be moulded into the desired shape, however true and important it might be, is by the same token ruthlessly rejected. This disposes of all theories based on the assumption that the world is orderly and purposive rather than random; organised rather than atomised; cooperative rather than purely competitive; dynamic, creative and intelligent rather than passive and robot-like; self-regulating rather than managed by some external agent (such as the state and the transnational corporations); and, tending to maintain its stability or homeostasis rather than geared to perpetual change in an undefined direction. In other words, it disposes of any knowledge that might contribute a real understanding of the world we live in.

It follows that in terms of the aberrant worldview we can never correctly interpret the problems that threaten our survival nor determine what must be the policies needed to bring to an end the destruction of the planet, nor develop a non-destructive and fulfilling way of life. In these conditions, an ecological worldview is a most urgent requirement.

I have tried to state clearly the basic principles underlying such a worldview. These principles are all closely interrelated, forming an all-embracing and, I hope, self-consistent model of our relationship with the world in which we live. I have worked on this subject for several decades but in recent years my approach has undergone a considerable change. It was always clear to me that the inspiration must come from the worldview of vernacular societies, in particular from the chthonic (earth-oriented) worldview of the earliest period, when people everywhere really knew how to live in harmony with the natural world. I have often been criticised on this score. However, it seems to me highly presumptuous to postulate an ideal worldview as it is to postulate an ideal society for which there is no precedent in the human experience on this planet and whose biological, social and ecological viability has never been demonstrated.

If Karl Marx made that mistake, so too do today's adepts of economic development or progress, who seek to create a man-made technological world without asking themselves whether we are capable of adapting to it or whether indeed the ecosphere is capable of sustaining it for more than a few decades.

What has struck me more recently is that everywhere the fundamental features of the worldview of early vernacular societies were basically the same. They emphasised three fundamental principles that must necessarily underlie an ecological worldview. The first is that the living world or ecosphere is the basic source of all benefits and, hence, of all wealth. The second is that the living world will only dispense these benefits if we religiously preserve its critical order. The third, which follows logically from the others, is that the overriding goal of the behaviour pattern of an ecological society must be to preserve the critical order of society, the natural world and of the cosmos (that encompasses them).

A cursory study of the worldview of vernacular and, in particular, chthonic peoples, shows that many societies actually had a word or term for such a behaviour pattern.<sup>2</sup> These terms can often refer to the critical order of the cosmos, but they are generally used to denote the path or Way that must be taken in order to preserve this critical order. If other societies do not have a specific term for it, the concept of the Way is, nevertheless, built into their worldview. Explicit or implicit adherence to the Way is critical. It is only by following it that we can hope to subordinate the petty, short-term, political and economic considerations that at present alone preoccupy us, to fundamental social, ecological and moral imperatives—the basic condition for survival on this beleaguered planet.

### **Notes**

1. This is a fact that has been well established by philosophers of science such as Michael Polanyi, Thomas Kuhn, Karl Popper, A.N. Whitehead and Paul Feyerabend. It is also supported by thoughtful biologists such as C.H. Waddington and Ludwig von Bertalanffy.
2. The terms used by various societies include 'the R'ta' of the Hindus in Vedic times, which later became 'the Dharma'—a term also used by the Buddhists; 'the Asha' of the Avestas; the 'Ma'at' of the ancient Egyptians; and the ancient Chinese 'Tao'.

## The Way – an ecological worldview (talk)

by **Edward Goldsmith** · May 1, 1995 · Share · Print

Pages: 1 2 ALL

*A lecture by Edward Goldsmith organised by The Scientific & Medical Network, Fife, Scotland, May 1995, which provides an introduction to the philosophy presented in his book The Way: an ecological worldview.*

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*“The whole of our experience is nothing more than a massive divergence from that path which we should have taken if we had wanted to maintain the critical order of the cosmos, on which we depend for our survival – and in fact, we have no alternative, but to return.”*

I HAVE BEEN INVOLVED in publishing, editing and co-editing *The Ecologist* for the last 25 years. My main pre-occupation has been the destruction of the natural world – the world in which we live. Looking at our planet, I adopt a fairly pessimistic view, just like Jean Harding who talked to us earlier on. I see things very much like she does.

What are the changes that are required if we are going to survive on this planet in perpetuity? It is clear to me that these changes are of a very radical nature. I think we have to change the whole structure of our society. It is quite clear to me that since the world is now being destroyed so quickly, then it is largely because our economic activities are no longer under any control at all.

### **Corporations**

The corporations that now dominate this world, do exactly what they like. They are becoming more and more powerful, with the vast technology and finance now at their disposal, and this *huge* market we are creating for their goods, which will be even greater if the Uruguay Round of the GATT Treaty is ratified.

If that Round of the Treaty is accepted and allowed to materialise, then we are actually delivering the world on a platter to the large corporations to do whatever they like. There will no longer be any constraints whatsoever on their economic activities. The constraints will become automatically ‘GATT-illegal’. For instance, 90% of American environmental legislation would almost certainly be made GATT-illegal—so I was told recently by my friends in the media in Washington. So it is clear to me that man cannot co-exist with the multinational and transnational corporations. I find it difficult to avoid facing that conclusion.

### **The State, its institutions and the legal system**

It is the structure of our society which is the problem, and the State is particularly destructive. The modern State is a development agency just as much as a corporation is. They are both propped up by our Prime Ministers who are little more than managing directors. They buzz around the world trying to create markets for products and services which they want to sell. They are not concerned with any of the real issues – any of our own social, ecological or biological issues – they are *only* concerned with economics.

Even the law is not immune. It is an astonishing thought that we can completely destroy this planet, make it uninhabitable, and assure the extinction of our species, without violating a single law (*audience laughter*). It is a horrifying thought, is it not?

We obviously need a totally new law, designed to protect the world we live in, and hence ourselves, rather than just to protect private property, which is basically what the present law is doing. For instance, when Camelford had a terrible accident – the water supply became badly polluted – the health of a lot of people was affected. But they discovered that there was nothing they could do – the law was not on their side. If you demonstrated that you had been very badly damaged, physically,

it made no difference. You could not sue on those grounds, but you could sue if one of your cows had been killed (*audience laughter*), or even simply just damaged, because cows are classified as property – but the health of individual humans, is not. So the law will protect the cow (the property), but it will not protect you.

We need fundamental changes to our institutions, the corporations, the state itself, the legal system and everything else – fundamental changes. In my opinion, the only type of social and economic structure that works, is a traditional one – the one in which we always have lived, for 99% of our tenancy on this planet; that is, in families—and by families I mean, extended families and communities. You might say it is difficult to recreate them, and I agree. It is very difficult to recreate them. In fact, to solve any of our problems is extremely difficult, but to go on in the present direction is impossible.

That is the difference. What our leaders want to do is impossible—at the current rate, we will be extinct within 40 or 50 years. What *we* want to do is only difficult.

### **Traditional societies and their worldviews**

To me, there is no alternative to returning to the family and community, which are the units of all sorts of activities including economic activities – which is what they always were in the past. But, it is not just the structure which is critical as I discuss in my book *The Way*.

It is not only because of the way we are organised today that we are heading towards disaster, it is also because of the worldview with which we are imbued. It is a worldview which I see as being totally ineffective in terms of what we might call the paradigm of science, or what I think Fritjof Capra calls “*the picture of the world that science paints*”. This picture of the world that science paints, this whole paradigm of science, totally reflects the worldview with which we are imbued.

What is this worldview? It is quite clear that there is a close relationship between the structure of our society and its worldview. To me, a worldview basically serves to rationalise and hence legitimise a particular way. I think it is quite easy to see that, when looking at the behaviour of a tribal society. You can see that their mythology serves above all to legitimise their behaviour. The mythologies tell us exactly what their original ancestors believed – the laws that they enacted . . . it all tells a story – the story of their lives. If you read the story of their lives, you can almost see what they believed.

There is a writer called Gerardo Reichel-Dolmatoff, who is a very famous Colombian anthropologist, who sees the mythology of a tribal society as the model. For him, instead of there being normal variables to the model as in a quantitative mathematical model, instead, the variables relate to the spirits, and there are clear relationships between them. This is so true that you can stimulate events in the real world, that affect a particular spirit in a particular way, and this will affect the other spirits in a different way. You know precisely what behaviour is required to re-establish the correct balance between these spirits – this is certainly the way that Reichel-Dolmatoff sees it: mythology is of enormous importance.

### **The paradigm of science and the worldview of modernism**

In a sense, I see much of our science as being a mythology which serves to rationalise all sorts of behaviour patterns. I once wrote a long article in *The Ecologist* attacking the philosophy of Ilya Prigogine who is a Nobel Laureate in chemistry and a cult figure in the intellectual world of Belgium and France. He is a ‘God’, like Hitler. He wanders around with all sorts of geneticists, anthropologists and biologists. He is a sort of pop-singer who wanders around with his trombonists and everything else. He is a cult-figure. But I think he is fundamentally wrong, and I tried to show that his whole thesis is little more than a scientific mythology serving to rationalise what he is really alluding to which is, genetic engineering. That is his principle pre-occupation, and to justify this genetic engineering and other super-style technologies, he has invented this massive scientific mythology, which in my opinion has no basis in the world of reality whatsoever.

For me, the most fundamental feature of this worldview, the most fundamental tenet, if you like, is that all benefits and hence all wealth is man-made. Nothing – none of this wealth – is derived from

the normal functioning of the biosphere. Everything is man-made. Health is something that is acquired in hospitals by doctors, and in chemists by buying pills. Law and order – if there are crime waves in Los Angeles, you solve that by hiring more policeman, buying more burglar alarms and spending more money on prisons. It is man-made, you see – even society is man-made. It is a product of the ‘social contract’.

Primitive, normal society was ‘totally chaotic’ – for the people of luxury. The citizens we cannot take care of anymore must sign the contract, and agree to delegate power to some authority who will run with their voice. That is the social contract. Even social order is man-made. Before social order, in the words of Hobbes, man’s life was a “*nasty, brutish and short*” life – nasty, brutish and short. Astonishing. “*Solitary, poor, nasty, brutish and short*” (audience laughter).

Now if you really believe that all benefits are man-made, then clearly, economic development is inevitable – because economic development is the only means of assuring the proliferation of man-made institutions and technological devices – hence it must be the only means of maximising benefits and health, and hence our wealth. They fit in perfectly. These things follow perfectly, one from the other. These to me are the most fundamental principles.

### **Diverging from the Way**

There is a path or ‘way’ (which is the term I have used as the title of my book), which enables us to maximise benefits in health and wealth. Today, however, this path is economic development, which we are taught to identify with progress. Any problems, such as the ones occurring in Los Angeles today, are attributed to our failure to diverge sufficiently from this ‘way’ – from progress – we have apparently not progressed enough. People are starving in the Third World we are told, and the reason is because they have not invested sufficiently in fertilisers, pesticides, irrigation water, hybrid seeds and everything else. The problem of this lack of investment can apparently only be solved by more economic progress – to give them the wealth to buy all these things. If they are poor, then again, it is because there has not been enough economic growth. Now you will find these claims in the statements of all our main institutions, in particular, the World Bank and the Food & Agricultural Organization (FAO). This, to me, is their main thesis.

### **Mechanomorphism**

Now there are many other aspects to this worldview of modernism, some of which, were described by Dr Rupert Sheldrake. It is a mechanistic, or mechanomorphic worldview, one where all living things are regarded as machines. The world is seen to be a machine, which of course made sense in the days of Descartes, because you could not have the world as a machine if there was no God to create the machine. But since then, we have abolished God. So we are now faced with a most absurd, *the* most absurd, dogma – because we are now faced with a machine that has come into being by itself, without a God who made it!

This idea is defined by Woodger. I do not know if you are familiar with *The Biological Principles*, but he goes into this in some depth in a book that is no longer widely-read. He points out that we now exist faced with a machine without a maker and without a heart. It is a self-created, or self-functioning, machine. That is the world we live in, which is most astonishing. If we talk about superstition, this must be the most absurd of all superstitions in existence, yet it is fundamental to the notion of the mechanistic world, and of mechanomorphism, which underlies the modern worldview.

### **Sacred Ecology**

Well of course, there are other aspects to this worldview. It is a world where the world is de-sanctified. The notion of sanctity, as Rupert Sheldrake talked about, is a very important notion too. It is not at all certain that we can survive in a world which has lost the notion of the sacred. The notion of the sacred, seems to me, fundamental, for any sort of sustainable society. I do not see that it possible to survive without it.

What is, in fact, the sacred? Well, it is a very difficult question to answer. But there are some answers that I like better than others. Mircea Eliade’s answer is, to me, very important. Both he and Titus Burckhardt, of the Perennial Philosophy school, provide a similar definition of the sacred.

Fundamental to the ecological worldview, which I will come to in a minute, is the notion that the biosphere is one, and that it is organised in a hierarchical fashion.

### **The Cosmos**

We also regard the cosmos as more than just the biosphere – and this cosmos has a definite structure, which tribal man, the original man, saw himself as part of. He believed very much in what became to be regarded as the microcosm-macrocosm worldview. He saw for instance, the structure of his body as being reflected in the body of his family, and of his community, and of the cosmos itself, as well as all his artefacts. For instance, the house of traditional man, was designed so as to reflect the order of the cosmos. It was designed according to the same principles. It was absolutely critical that it should be designed in this way, just as the society was designed so as to reflect the order of the cosmos. This concept is examined in great detail by Ananda Coomaraswamy who is another one of the great members of the Perennial Philosophy group.

Now for Coomaraswamy, and Eliade, something is sacred to the extent that it has been cosmicized (or brought into the structure of the cosmos). So for instance, if you started a new settlement or made a new village, it had to be sanctified. To sanctify it, meant bringing it within the structure of the cosmos, so you could relate to it in peace. This whole notion of cosmicization, or maybe only part of the notion, was so you could relate to it – so that it had meaning to you – for everything you did, because everything was related to the cosmos as a whole. Everything you did had an effect on the cosmos. The structure of your house, the structure of your tribe and your family, reflected the structure of the cosmos, which gave meaning to everything that you did, whereas the things we do today have no meaning at all.

So, this notion of the sacred seems to me essential, and once something is sacred you cannot destroy it – it is holy. You cannot change it – it is *there*. It is something which cannot be changed in any way, because it has been created by the gods who created the cosmos. As soon as you de-sanctify something, then it is open to exploitation, and once the whole cosmos itself is de-sanctified, then it is something that can be changed until the heart is content. You can do what you like to it – wipe it out. So this notion of the cosmos as sacred, to me, is a critical thing.

### **Chthonic religion**

But without going into all this, let us look at the opposite worldview – what I take to be the worldview of ecology. First of all, for me, the worldview of ecology is necessarily the worldview of Chthonic man. Now let us consider this Chthonic religion. Chthon was the god of the Earth. The Chthonic religion was really the religion of the Earth, and you find that people living in their families and communities – before they were organised into larger groups like nations – had a fundamentally Chthonic religion. The religion of the ancient Greeks, for instance, is very well described. Now this, Chthonic religion, has a very different worldview to the worldview of the modern world – it is the total opposite.

To begin with, the basic tenet of this Chthonic religion, which I take to be also the basic tenet of an ecological worldview, is that all benefits, instead of being derived from the man-made world, the technosphere, are derived instead, from the biosphere, or the world of living things. It's exactly the opposite.

### **The normal functioning of the biosphere**

Now this is extremely important, if you think about it. What are the most important benefits we have? Clearly, it must be a favourable and stable climate, which is something we benefit from, and which is available on no other planet in our solar system, and, although it is by no means certain, exists nowhere else. This must be the most important – *the* most important – form of wealth that we have at our disposal. Obviously, fertile soil, abundant and clean water, all the wildlife, etc. – all these things must be, and are, our natural wealth as well.

And it is important to note that the biosphere itself, by and through its normal functioning, solves most of the problems which face us today. For instance, we may make pesticides, but probably 99% of all pests and potential pests are still controlled by the normal functioning of the biosphere – by all the different predators and parasites to which they are subjected.

We may make fertiliser in our factories, but it is probable that 99%, if not more, of all the fertility that is required to grow our crops and to keep our forests going is also provided by the normal functioning of the biosphere. If you were to kill off nitrogen-fixing bacteria you just would not be able to build all the fertiliser factories that we would require to make up for it, in so far as artificial fertiliser could make up for it.

So in fact, we depend *totally* on the normal functioning of the biosphere, yet we are destroying this biosphere *rapidly*, to fulfil our goal of expanding, instead, the technosphere, and to maximise the availability of technospheric 'benefits'.

### **Conflicting worldviews**

Now, one can best illustrate this difference between the two worldviews with reference to the Chipko movement in the Himalayas. This is a movement which has been started by the villagers, who are trying to preserve their forests, because they know that their welfare depends entirely on the normal functioning of the forests. What happens is that when the loggers – usually government loggers – appear, the women stream out of their villages, and they go and hug the trees, and they tell the loggers that if they want to cut the trees down they must first kill them.

This movement has spread throughout the Himalayas and affects quite a substantial area. In fact, the leader of this movement is coming to London on 5th May 1995.

Sunderlal Bahuguna is a remarkable man. They have developed their own culture, their own songs and their own dances. It is quite astonishing how this has spread. The songs are particularly beautiful. In one of the songs, they recall a meeting between the village women and the forest officials, and they ask the question: "*What are the forests for?*", and the forests officials answer: "*The forests are for timber, resin and foreign exchange.*" And then the women reply by asking the question again: "*What are the forests for?*", and their answer is: "*For soil, water and pure air. Soil, water and pure air are the basis of our life.*"

So here you have a fundamental confrontation between two totally different and conflicting worldviews. One you might call the worldview of 'modernism' with which we are *totally pre-occupied*, because of the material and economic benefits to be derived from the forest; and the other worldview, which is the worldview of the village people, who see the forests *only* as a source of soil, water and pure air. They are not the least bit interested in the resin and the foreign exchange – it plays no part in their lives. So this is a confrontation between the two worldviews.

### **The integrity of the biosphere**

The second most important tenet of the ecological worldview, and hence the Chthonic worldview, must be that these benefits are only provided by the biosphere – *so long as we respect its integrity*. Now this is very clear. If you cut the forests down, clearly they will no longer provide you with the benefits. You won't get the soil, the water and the pure air.

Let us consider today, what are the problems that we face? The problems that we face today are caused by the disruption of natural systems at all levels – the many diseases that we suffer from, or the degenerative diseases that are epidemic and escalating throughout the industrial world – whatever the problems may be. Social problems are caused by the breakdown of the family and the community, so hence we get all of these terrible problems like delinquency, crime and drug addiction, which are little more than symptoms of social deprivation and family and community breakdown.

Similarly, these floods, which we get now throughout the world, and which are increasing, and getting worse and worse; the epidemics, the droughts, climate change – *all these problems are caused by the destruction of natural systems*.

### **Science and technology**

What is important, is that against these problems, modern technology can do *nothing*. Technology is very good at solving technological problems, like going to the moon. It is a very impressive feat to go



the moon, but it doesn't solve any basic human problems. Man has suffered from lots of things but he has never suffered from not going to the moon (*audience laughter*).

There is no technological solution to these problems. Surprisingly enough, our scientists still think that there are technological solutions. If you had read the US National Academy of Science's recent report on climate change, which is the most disgraceful thing you could ever see, they do not actually say we have got to do anything. They suggest the possibility of 'geo-engineering'. 'Geo-engineering?!' They say we can combat climate change by putting out in space, fifty-thousand, 100 square kilometre mirrors, which will reflect the heat of the sun away from the earth. They also say that they can equip aeroplanes with new engines that do not burn up the fuel properly, so that they emit a vast amount of soot as they fly, which 'will protect us' from the sun's radiation.

Now imagine living on a planet whose climate is entirely regulated by these sort of absurd technological devices. You could not imagine anything more absurd. You can imagine the 'sustainability' of a society of this sort. How do we know we can maintain these things? Will we have the money to keep one hundred thousand, or fifty thousand, 100 kilometre mirrors in space, indefinitely. The whole thing is farcical. I mean, you have got to be a child to believe this is possible – and we are being offered more and more of these 'geo-engineering' solutions.

There is a man called Professor Adler who actually suggested that the world's climate was due to the moon – that the moon had a very bad influence on climate and that the answer is to 'nuke' the moon (*audience laughter*). He said that perhaps certain people with poetic inclinations, or with romantic inclinations, might not like this (*audience laughter*), but they shouldn't worry, because with the development of modern science it was just a matter of time before we'd be able to 'pluck' another moon from some remote galaxy and re-locate it in the sky – but at a more convenient distance (*audience laughter*) – you know, so it doesn't interfere with the climate, and still fulfils its romantic and poetic functions (*audience laughter*). This man has been taken seriously, of course. The Czech Academy of Sciences apparently wrote to him to ask for more details (*audience laughter*).

So you see, we think that technical, scientific solutions are possible. There are *no* technological solutions to any of these problems. For instance, science and technology, are hopeless at dealing with degenerative diseases. There is very little you can do against diabetes, and all these many forms of cancer, eschismic heart disease, diverticulosis, etc. Their incidence simply continues to grow, and we are just incapable of dealing with them.

### **'The Way' of archaic societies**

Why do I mention all this? Well, the answer to all this is the Way. Clearly, the most basic, fundamental and essential thing we can do is to maintain and preserve the integrity of the biosphere and the cosmos – as Chthonic man fully realised. We must realise too, that eventually there must be a particular behaviour pattern that we must design, whose goal is to achieve this end. That is to say, there must be a path – and we must work out, the path – which we must follow if we want to maintain the critical order of the biosphere.

Looking through the literature concerning the lives of traditional peoples, it seems clear that traditional man always did this. There is such a path, and it is easy to see that the basic behaviour pattern of traditional man was designed to do just this.

Now, this is what I have tried to show in this book (*The Way*). In many of these archaic societies, to use this term, there was a word for this path, or way. The most obvious one, which everybody knows about, is the *Tao* (you know, the Taoists). But it was actually something that was interceded – that means, something that was anticipated, that was developed – long before Lao-Tzu who later adopted it. This *Tao* is nothing but that. It is, and means, the path. It means 'the Way'. It means 'the way of Nature'. It means the path that maintains the order of the cosmos. It *means* that.

In the Indian literature you will find it in the Vedas. In the Vedas, there is the term *R'ta*. The *R'ta* was precisely that – the path that maintains the order of the cosmos, [i.e.] the path you must *follow* to

maintain the order of the cosmos. It was the natural path. It is behaving naturally – and if you took a contrary path it was known as the *An-R'ta*. And you see that in all the other literature.

Eventually it was personalised. You will find that again in all these archaic societies: a god, or goddess, who represented the *R'ta*. *Bahoon* in India; it was *Themis* in Greece. The Greeks called the path the *Dike*. It was also called *Themis*, and I will come back to that in a moment.

Particularly important, in ancient Egypt it was called the *Ma'at*. In the Avestas of Persia it was called the *Asher*. Later in India it became the *Dharma*. The term *R'ta* ceased to be used, though the term *An-R'ta* subsisted, and the term *Dharma* replaced it, and the *Dharma* was taken up by the Buddhists. The term *Dharma* is still used in the Buddhist religion – very explicitly indeed. It is very important to their worldview.

So what is particularly important about these terms, is that it is by following this path that you observe the traditional law of your society – enacted by the heroes and the gods in the mythical period where all laws were enacted – in *illo tempore* (to use a term used by Mircea Eliade), meaning ‘in the dawn period’ – a term also used by Natalie Brown.

Now this law, and these laws, are very interesting in terms of today's total dis-identification between the laws that govern societies and the laws that govern the natural world and those that govern the cosmos. Pythagoras said it himself with his *nomos* and the cities of man. *Nomos* was the law that governed society, and *Dike* in the natural world – I forget the terms he used – and *Themis* in the world of the gods. They are exactly the same – exactly the same. If you think about it, it has to be so.

Now, as I said earlier, our legal system is currently such that you can destroy the planet without violating any laws! You can destroy your society without violating these laws! In the case of Chthonic man – traditional man – this is not so. On the contrary, the laws that govern society were exactly the same as those which governed nature – which it has to be.

To try and develop a new law, which I think we have to do, you have to remember that seeking new paths is the goal. It is quite evident that we have one single law governing the whole of the Gaian hierarchy – from man and his society, all the way up.

### **Vital force**

Well now, what is important to me, is that this same notion exists, not only in these archaic societies that invented terms for the Way, but also in societies that had not yet developed a term for the Way. Now you can find that one of the things that seems to be common to all known tribal societies (I just don't know of any exceptions to this) is the notion of vital force – known by the Polynesians and the Melanesians as *mana*. And there is a word for it in just about every traditional society that you can name.

Now this notion of vital force is very critical, because your success in life is seen in our traditional society as depending entirely on your stock of vital force. For instance, if you are interested in agriculture, you have got to behave in such a way that you are not so worried about maximising yields, and not so worried about availability of fertiliser. Instead, you are worried about following the traditional laws in such a way as to maximise your stock of vital force. It is not just a question of maximising your own stock of vital force; rather, it is a way of maximising the vital force within your society, and indeed within the biosphere itself – because each society sees vital force as being distributed within society and in the biosphere, in accordance with a particular pattern. And the literature on the subject is very interesting, because it shows that the way in which vital force is distributed depends on the structure of the society.

### **Tribal societies**

In a society which is highly decentralised, like the Ibos of Nigeria, who live in villages and have no hierarchical structure: they see vital force as being present largely at each level of the village – they do not think of it at any high level. Each person has vital force for the village community itself.

In contrast, for the people in a society which is highly centralised – like for example Japan – most of the vital force will reside in the person [the Emperor] who influences [society] at the top, and there will be far less in the subsidiary people. Nobles would have their stock, but most of it would reside in the person who was the divine King. This is gone into at great length by James Fraser in *The Golden Bough*.

As you may remember, in *The Golden Bough* there was this whole phenomenon about killing the King – like in the Sikh religion. In many societies, you killed the king after a certain number of years. In other words, you killed him when he shows signs of ageing – if his hair fell out, you would have to kill the poor bastard (*audience laughter*). In other words, he could no longer satisfy his wives, which is a horrific thought (*audience laughter*). He is immediately wiped out you see (*Goldsmith laughs*). Now in some societies, they actually kill the King every year, and Fraser shows in enormous detail how they used to kill the King for many reasons – to create a continuum of character for instance, the King was killed every year.

Eventually it was frightfully difficult to find a man who was willing to be King (*audience laughter*), so what they did was solve this by commissioning a slave who would be the King for one day, and for the length of this day he would enjoy all the prerogatives of the King, and live in unbelievable splendour with a massive numbers of elephants and all things at a King's disposal. He would live like the King for one day, and by the end of the evening they would wipe him out you see (*audience laughter*).

Now why? How do you explain this astonishing phenomenon which you find everywhere where you have a divine King? The answer is because the King was the repository of this vital force, and if he was no longer fit for the repository of this vital force, the people would run into the most unbelievable things. There would be nothing to protect them against epidemics, enemy attacks, floods and droughts – all the horrors of the world – so somehow or other they had to find a fitting repository for the King, for the vital force.

Now this is the significance of vital force. You can see that if this vital force is organised within a society in such a way so as to reflect its basic structure, and within the biosphere as well, so as to reflect its basic structure. The behaviour pattern of the members of the society must be that which maintains this correct distribution of vital force – which means the correct traditional structure of that society and of the biosphere – it is exactly the same thing. It is really by doing that, that you maximise all benefits. And it is by failing to do that, that you run into all the problems, and things start going wrong.

### **Animism**

Well, it is very similar with the religion of tribal man, because the religion of tribal man is animism.

They had their holy mountains and their holy rivers. Even today, the tribal society in New Zealand – located as far away as you can get from Auckland (New Zealand's capital) – have a mountain, a huge mountain and a river. They are associated with the holy river and the holy mountain.

As you know, there were holy mountains among the Jews. Pre-mosaic Jews were tribal people who had their holy mountains. As soon as they created a national religion, they were deprived of their holy mountains. They were told that only one mountain was holy – and the others were no longer holy. The ecological gods, the Chthonic gods, were killed. They had to be uprooted and removed to make way for the national god, who was Yahveh – a process which is well described in that quite remarkable book called *Essays On The Religion Of The Semites* by Robertson-Smith. He was not referring to the Jews – he was writing about the Arabs in northern Arabia.

You show in this animistic religion that everything is alive. The whole notion of the world being alive is critical to the animistic view. Absolutely critical. Tribal peoples were alive because they had their spirits, whether they are stones, or whatever they are. Everything is part of the cosmic hierarchy and represented by spirits. The spirits are graduated according to their needs, and I am sure the amount of vital force they have is a measure of their importance to the functioning of the cosmos.

The cosmos for tribal man was really the world of the gods. Now these gods are organised hierarchically, as I have said. The most obvious and most important gods that people worshipped, were important – in the sense that everybody worshipped them – were the gods of the heart.

### **The Gods**

The *Penates* were the gods of the family in Rome. Almost all religions have this ancestor worship, at the level of the family – though the word worship is probably wrong. Jomo Kenyatta was one of the first Africans to write an account of the worldview and behaviour of his own tribe – the Kikuyus. The Kikuyus and other Africans do not actually worship their gods – they *talk* to them. They have certain obligations towards their gods and if they fulfil these obligations, they expect the gods to fulfil theirs towards their people.

He describes their ancestor ‘worship’, but he does not like the term. He prefers to call it ‘communion with the ancestors’, because they do not actually worship them. They have certain obligations towards you, and you have certain obligations towards them, and if you fulfil your obligations, you expect them to fulfil theirs – and if you talk to them and say “*You’re the son of a bitch. I’ve fulfilled my obligations, why haven’t you fulfilled yours?*”, it is more a sort of relationship than the one of just kneeling there, you see. It is ‘communion with the ancestors’, as he refers to it.

Now, this whole notion is critical, and the gods of the family are tremendously important to people’s lives, and so are the gods of the clan, of the community etc. (if you live in these highly centralised societies, it is the gods of the emperor himself). It is the ancestors you are talking about. The gods of the family are the ancestors, the spirits.

### **Social cybernetics**

Now, they are organised in such a way as to reflect the social structure of their society, and if you look at the literature on the subject you will see that this is just the case. In Japan, there is a tremendous hierarchy of the gods, with the ancestors on top being tremendously important.

The people of Allor are not a highly centralised people, they are, on the contrary, individualised with very little hierarchy. The gods are seen as organized in exactly the same manner [individualised]. There is an excellent book on the subject, about the highly individualised society on the islands of Indonesia [where] the gods are [also] seen as being highly individualistic.

So you can see that within all these societies, your organisation of your gods reflects the structure of your society; and of the biosphere itself, because you have the gods of nature. Now it seems to me tremendously important, because in such societies, to serve your gods is to maintain the structure of the pantheon, and to maintain the structure of the pantheon means maintaining the structure of your society, and of the biosphere of which they are part.

### **The stable society**

Now when you move away from this religion, it tends to be when the society breaks down. When there is no longer a community you no longer have communal gods, because there is no longer a community for the gods to represent. When you break down the society itself there are no longer the social gods, and when you atomise a society, what happens? You are left with a single world god. Monotheism is something which is associated with the breakdown of society. That is how I see it – it is a breakdown.

Nevertheless, you can see here that whether a society actually entertains the notion of ‘the Way’ explicitly, whether it believes entirely in this notion of vital force – according to Eliade and various others, this notion of vital force pre-dates the notion of personalised gods. The belief in these cosmic forces came first. They were personalised much later. So if you believe in all that, then of course you have to accept this whole notion of trying to maintain the order of the cosmos as a prerequisite to obtain its inestimable benefits.

Now, this brings us to the final consideration. If you accept this ecological worldview, then necessarily you must interpret all our problems as being no more than divergences from the Way. In other words, there is this pattern of behaviour which is sanctified and requires you to maintain the order of the

cosmos, and which [thereby] maximises benefits. If, suddenly, there are terrible problems, you know that it must be caused by the fact that you have diverted from the Way, which upsets the order of the cosmos. It can be the only possible explanation – you have probably caused it. It is a perfectly sound interpretation – it is absolutely correct.

If we have got floods in India, it is because we have cut the forests down. If the climate is changing, it is because we are upsetting the normal conditions of the atmosphere: we are changing the chemical composition of the atmosphere, which is a catastrophe.

So this is inevitable. It means that you are not correcting a divergence from a path. This is perfectly normal cybernetic behaviour, and goes right back to the *chreod* of C. H. Waddington.

### **Epigenesis**

The embryo in the womb has got to move in a particular direction, in order to achieve its end state. The path it takes is called by Waddington the ‘epigenetic landscape’, which is really a constellation of individual ‘*chreods*’ (or paths). These *chreods* come from the Greek word for ‘the necessary path’, and a constellation of paths is called an epigenetic landscape. In other words, the embryo develops along its epigenetic landscape, and is capable of correcting divergences from the epigenetic landscape, returning to its path. This is what is so upsetting.

Hans Driesch, the famous German biologist or geneticist, formulated his particular form of vitalism which we all know is ‘entelechy’, from Aristotle’s ‘*entelekheia*’. He looked at this phenomenon, saying, “*I cannot explain this in mechanistic terms. How can I possibly explain that there is an embryo, and I can change it – mutilate it – do all sorts of things to it, divert it from its course, and it’ll still go back to its [original] course. How can I explain that in mechanistic terms?*” So he postulated this particular form of vitalism, which we call ‘entelechy’.

Well, to me, it is quite evident that the development of an embryo in the womb is not something that occurs by itself. It is not just one process. The process continues, and it is the same process during the time that a child grows up within its family, because that child does not grow up by itself. It grows up as *part* of a family, which is part of a community. The fact that the community behaves in the same way, maintaining itself along the Way, and correcting divergences from it, must be so – it makes perfect sense. First, it is doing exactly the same thing as in nature – it is just observing what must be a basic law of the biosphere – of the way the biosphere functions.

Well, this brings us back again to what I am actually stating, which is that we have diverted from the Way – the Way of our ancestors (and this sounds very romantic, very out of touch with reality, but I think it is inevitably the case) – for the whole of our experience of the last 150 years, and probably much longer.

### **Returning to the Way**

The whole of our [recent] experience is nothing more than a massive divergence from that path which we should have taken if we had wanted to maintain the critical order of the cosmos, on which we depend for our survival, and in fact, we have no alternative but to return. And that means, in fact, reversing what we call economic development or ‘progress’, which is taking us further and further away from it.

It means, in fact, we have no alternative but changing the structure of our society and reducing the scale on which our economic activities are conducted – bringing economic activities back under control. And I do not think they can be brought back under control until they are carried out at a very much smaller level by families and communities – who are not just economic units. They are also units of ceremonial activities, for religion, for bringing up children, for looking after the old. They do all sorts of things. Economic activity is just one of the things they do, and under these conditions economic activities can easily be put under control, or embedded once more in social relations – as the economic historian Karl Polanyi pointed out that they originally were.

Once they are in the hands of corporations, who become more and more powerful, economic activities become dis-embedded from social relations – out of control – and we get the sort of situation that we are in today. So we have no alternative but to return to the sort of social structures that we existed in during the greater part of the tenancy, of our experience, on this planet.

We have no alternative, but to govern ourselves as we previously did. The State does not work. Traditional man governed himself perfectly well, because he knew how to do it. It was done by citizens, who are themselves part of their communities. Whereas we are now governed by a body which is totally external to the community that it is called upon to govern. We have no alternative but to return to governance at the level of the community. Nor do we have any alternative but to adopt a worldview – an ecological worldview which has a great deal in common with the worldview of our traditional Chthonic ancestors – one that leads us to follow the Way that maintains the order of the cosmos, rather than do exactly the opposite which can only lead to total disaster.

Thank you.

*(Audience applause)*

## **The Way – a summary (review)**

by **Edward Goldsmith** · January 1, 1998 · [Leave a Comment](#) · [Share](#) · [Print](#)

*This summary review of The Way: An Ecological Worldview was written for Schumacher College in 1998. First published in 1992, The Way is Edward Goldsmith's magnum opus.*

*This second edition of The Way, was published by University of Georgia Press, Athens, Georgia, in 1998, and was fully revised, incorporating a glossary, page references, and index.*

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THE WAY first provides a radical critique of the 'world view of modernism', which shapes all the disciplines in terms of which we seek to understand the world. It shows how, in particular, its constituent 'paradigm of science' including the neo-Darwinian view of evolution, the reductionist and mechanistic 'new ecology' now taught in our universities, and perhaps even more so, the 'paradigm of economics', slavishly reflect this aberrant world-view, whose role is above all to rationalize and hence to legitimize economic development or 'progress' which the author sees as the real cause of the ever more daunting biological, social and ecological problems that face us today.

*The Way* then provides the underlying principles of a truly ecological world-view in terms of which our real wealth – that on which we really depend for our welfare, indeed for our very survival, is our natural wealth, i.e. our (up till now) favourable and stable climate, our fertile soil, our free-flowing rivers, as well as the traditional families and communities which are the natural and irreplaceable units of social organization.

It is the benefits that they provide that alone can assure our real welfare. Significantly traditional societies when imbued with a chthonic world view or a religion of the Earth see things very much in this way.

Human welfare, for them, is maximized by maintaining the critical order of the cosmos, which is seen as encompassing society, the natural world, and the world of the gods and spirits, which are all organized according to the same basic plan and governed by the same laws. In many archaic societies, a word existed for the fundamental path or Way that had to be followed in order to maintain the critical order of the cosmos – the R'ta of Vedic India, and later the Dharma, the Asha of the ancient Persians and the Tao of China.

Even when there is no word for the Way, the concept is implicit to the behaviour pattern of chthonic societies, including their ritual and ceremonial life, their food producing activities, their economy, their settlement patterns and the technologies that they make use of. All are seen, above all, as designed to maintain the critical order of the cosmos.

Whereas, with us, major problems are interpreted as evidence that economic development or progress has not proceeded far or fast enough, for chthonic society they indicate instead that it has diverted from the Way and has thereby disrupted the critical order of the cosmos.

This interpretation is of course usually correct, as most of the problems we face today are due to the disruption of the natural world – its biological organisms, families, communities, ecosystems and Gaia herself. None of these problems are amenable to technological solutions of the sort our modern society applies, which can only serve to mask the symptoms of the disruption of the natural systems involved. A truly ecological world-view, the author argues, must necessarily be based on the same principles. It is these principles that the author seeks in this book to set out.

## The Way – an overview (Resurgence)

by Edward Goldsmith · January 1, 1992 · [Leave a Comment](#) · [Share](#) · [Print](#)

*An article written for Resurgence magazine around the time of publication of Teddy's great work The Way in 1992.*

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REGARD THE BOOK as my life's work. I started working on it more than forty years ago, and have worked on it, on and off, ever since. It starts off by showing how totally aberrant is the 'world-view of modernism' with which we have all been imbued since our most tender childhood. This world-view unfortunately colours all the disciplines into which modern knowledge has been divided, and in particular what we might refer to as the 'paradigm of science' and that of modern economics – which I consider in some detail.

For me, the most fundamental tenet of the world-view of modernism is that all benefits are man-made, the products of scientific, technological and industrial progress, and made available via the market system. Thus health is seen as something that is dispensed in hospitals, or at least by the medical profession, with the aid of the latest technological devices and pharmaceutical preparations. Education is seen as a commodity that can only be acquired in schools and universities. Law and order, rather than being natural features of human society, are seen instead as provided by our police force in conjunction with the law courts and the prison system.

Even society is seen as man-made, brought into being by the 'social contract'. Not surprisingly, a country's wealth is measured by its per capita Gross National Product (GNP), which provides a rough measure of its ability to provide its citizens with all such man-made commodities, a principle faithfully reflected in modern economics.

For economists trained in these ideas, natural benefits – those provided by the normal workings of biospheric processes, assuring the stability of our climate, the fertility of our soil, the replenishment of our water supplies, and the integrity and cohesion of our families and communities – are not regarded as benefits at all; indeed, our economists attribute to them no value of any kind. It follows that to be deprived of these non-benefits cannot constitute a 'cost' and the natural systems that provide them can thereby be destroyed with total impunity.

If all benefits are man-made, then to maximize human welfare can only mean maximizing their availability – hence economic development, which we equate with 'progress', and in terms of this world-view will create a material paradise on earth from which all the problems that are seen as having confronted us since the beginning of our tenancy of this planet, such as poverty, unemployment, homelessness, crime, delinquency, drug-addiction, malnutrition, disease, even environmental degradation, and, according to some adepts, death itself, will have been eliminated once and for all.

I then try to show that, in terms of the world-view of ecology, real benefits, and hence real wealth, are on the contrary, derived from the normal functioning of the natural world and of the cosmos itself. Our greatest wealth must be the favourable and stable climate that we have enjoyed for hundreds of millions of years, our forests and savannahs and fertile agricultural lands, our rivers and streams, springs and ground waters, our wetlands and coral reefs, our seas and oceans, and the myriad forms of life that inhabit them. Also included in this great wealth are the extended families and cohesive communities within which we have lived for perhaps 95% of our experience on this planet, and which have provided us with inestimable and irreplaceable services.

If the critical order of the natural world and of our society is the source of all benefits and all our real wealth, it must follow that our overriding goal can only be to preserve it, come what may. Significantly this was very much the goal of traditional societies when they were imbued with what is often referred to as a chthonic religion – or the religion of the Earth.



Common to all these societies is the belief that man's welfare depends on preserving the critical order of the cosmos which is seen as encompassing individual people, their families, communities, and societies, the natural world and the world of the ancestral spirits and the spirits of nature (the chthonic gods).

Significantly, the entire cosmos is structured in accordance with the same plan. In Bali, to give a fairly typical example,

“man is a tiny part of the overall Hindu-Balinese universe but he contains its structure in microcosm. Man's body has three parts – head, body and feet – just as the universe, macrocosm, has three parts; the upper world of God and heaven, the middle world of man, and the underworld. Man is a kind of scale model of the universe, with exactly the same structure – as is the island of Bali and each village, temple, house, compound, building and occupant of it.” [Fred Eiseman, 1989, *Bali: Sekala and Niskala, Vol.1*, ed. David Pickell, Pickell-Periplus, Berkeley, USA]

This meant that to preserve the critical order of the cosmos meant preserving that of all its constituent parts, which were all seen as governed by the same fundamental laws. A key concept in the world-view of many ancient societies was that of the path, or Way, that had to be followed in order to observe the cosmic law and to maintain the critical order of the cosmos. It was referred to as *R'ta* in Vedic India, later as *Dharma*, a term also adopted by the Buddhists, as *Asha* among the ancient Persians, as *Tao* in ancient China (a term later taken up by Lao Tsu and the Taoists) and *Dike* or *Themis* among the Hellenes.

Any major disaster occurring in a society imbued with this world-view would automatically be attributed to a failure to observe the cosmic law and follow the Way.

Thus in ancient Greece, as Donald Hughes notes [Donald Hughes, 1983, *Gaia: an ancient view of the planet, The Ecologist, Vol. 13, No. 2-3*] major problems such as “*hunger, ill-health, erosion, poverty and general ruin*” were only different forms “*that the Earth's revenge could take for the terrible mistreatment meted out to her by man*” – punishments for having diverted from the Way in pursuit of the anti-Way or what the ancient Greeks would have called the ‘*ou Themis*’ (the opposite to the Themis). The only way to combat these ills, therefore, “*was to treat the earth with greater care*”, and hence to fulfil one's obligations to its protective deities, which meant to return to the Way of the ancestors who lived in the Golden Age when such ills were unknown.

Disease, in particular, was interpreted in this manner. Thus among the Tukano Indians of Colombia, as Reichel-Dolmatoff notes,

Illness is taken to be the consequence of a person's upsetting a certain aspect of the ecological balance. Overhunting is a common cause and so are harvesting activities in which some relatively scarce natural resource has been wasted. The delicate balance existing within the natural environment, between nature and society, and within society itself, is bound to affect the whole.

To restore this ‘delicate balance’, the shaman as a healer of illness does not so much interfere on the individual level, but operates on the level of those supra-individual structures that have been disturbed by the person. To be effective, he has to apply his treatment to the disturbed part of the ecosystem. It might be said then that a Tukano shaman does not have individual patients: his task is to cure a social malfunctioning, which he does by re-establishing the rules that ‘will avoid overhunting, the depletion of certain plant resources and unchecked population increase.’”

[Gerardo Reichel-Dolmatoff, 1977, *Cosmology as ecological analysis: a view from the rainforest*, *The Ecologist, Vol.7, No.1.*]

In this manner, vernacular man correctly diagnoses diseases and other discontinuities as the symptoms of social and ecological maladjustments brought about by diverging from the Way, and thereby violating the laws of the cosmos and disrupting its critical order: maladjustments that can only be eliminated by correcting the divergence and returning to the Way.

Modern man, on the other hand, interprets problems in terms of cause and effect relationships on the basis of which a disease is attributed to a discreet event such as the action of a bacterium, virus or other pathogen – which must be eliminated, usually by waging chemical warfare against it. To do this, we build factories for manufacturing the chemicals, shops in which to sell them, hospitals in which to administer them and universities in which to train the chemical engineers, pharmacists, doctors and other specialists involved in manufacturing, selling and administering them.

Thus we put our faith in scientific, technological and industrial development, or progress – precisely what our society is organized to provide. This may occasionally serve to cure individual sufferers; it will always serve the interests of industrialists and their political allies; but it will do nothing to reduce the incidence of the disease.

All the other ever more daunting problems which confront our society today are interpreted in much the same way. Each one is made out to appear soluble by the expedients that science, technology and industry can provide and is rationalized and legitimized in terms of the world-view of modernism. Thus poverty is seen to be primarily a shortage of material goods and technological devices and of the money required to purchase them. Economic development can solve this problem, since it will enable us to build factories which can manufacture these commodities, and provide jobs to enable people to earn the money required to pay for them.

The rapid degradation of the world's remaining agricultural lands is invariably attributed by governments and international agencies to traditional agricultural techniques. Thus USAID attributes the rapid deterioration of the “*soil resource base*” in arid lands to mismanagement, based on the use of “*traditional technology and agricultural practices*” – though in fact such traditional methods of cultivation have been used sustainably for thousands of years.

The population explosion is seen above all to be the result of a shortage of family planning devices – so much so, that the World Bank estimates that to achieve “*a rapid fertility decline goal*” in sub-Saharan Africa, would mean increasing the amount of money spent on “*family planning*” 20 times by the end of the century – an extremely convenient approach to the problem from the point of view of the manufacturers of birth-control pills, condoms and IUDs.

So it is with all the other problems that confront us, whether it be unemployment, crime, delinquency, drug-addiction, alcoholism, pollution, resource depletion, global deforestation or global warming. Each is interpreted in terms of our aberrant world-view in such a way that rationalizes policies we have already decided to adopt: those that make the greatest contribution to economic development and hence best satisfy the requirements of the corporations and institutions that dominate our society.

In other words, instead of interpreting our problems as the inevitable consequence of economic development or progress – that anti-evolutionary process that diverts us ever further from the Way – we interpret them instead as evidence that economic development has not proceeded far or fast enough – and that, in effect, we have not deviated sufficiently from the Way.

This can only draw us into a chain-reaction leading to ever greater social and environmental destruction. To extract ourselves we must, among other things, denounce and discredit the world-view of modernism and the paradigms of science and economics that slavishly reflect it. Instead, we must systematically inculcate our youth with an ecological world-view, one that must necessarily draw its inspiration from the chthonic world-view of our ancestors in the light of which they were capable of understanding their relationship with their environment and of adapting to it as we can no longer do.

## The Way – an overview (Ecologist)

by Edward Goldsmith · September 1, 1988 · Leave a Comment · Share · Print

Pages: 1 2 3 4 5 6 ALL

*This was the final outline of what would become Edward Goldsmith's great work The Way: An Ecological Worldview (first published in 1992).*

*Many of the key principles of ecological thinking which it discusses had already been published by Goldsmith in several different forms previously (see Related Articles on the right below).*

*Published in The Ecologist Vol. 18 No. 4–5, 1988.*

I

THINK WE MUST BE very grateful to Arne Naess for having coined the term Deep Ecology, a term that has certainly caught the public's imagination and that is now here to stay. We are also indebted to him and his colleagues, George Sessions, Bill Devall and Warwick Fox, to name the most obvious ones, for having so ably sketched the views and policies of the Deep Ecology Movement.

I thoroughly agree with the eight principles set out by Naess in the *Platform of Deep Ecology*. Deep ecology seems to differ from the more pragmatic and matter-of-fact views and policies of the Ecology or Green movement that has developed during the last twenty years, largely in its very necessary subjective, emotional and slightly mystical approach.

Deep Ecology has of course been much criticised, and the criticisms have often been constructive.

Henryk Skolimowski, for example, thinks that Deep Ecology needs its own cosmology and eschatology. I see eschatology as being very much a part of cosmology. Grover Foley calls for the formulation of the laws of ecology or Deep Ecology; but Arne Naess sees Deep Ecology more as a forum for those who share similar views on man's relationship with nature, than as a clearly formulated world-view or cosmology and does not seem to think that such a set of laws is necessary.

I disagree. In my view, only a clearly formulated world view is likely to give rise to a comprehensive and clearly formulated strategy for assuring the preservation of what remains of the biosphere – and hence the survival of our species.

### 67 principles

What I propose to do in this essay (if what follows can be thus termed) is to propose a very tentative world-view or cosmology in the form of a set of 67 laws or principles, which are seen as governing the Cosmos and the cosmological process.

I shall take the Cosmos to be the ecosphere or Gaia – that is to say nature, or the biosphere, taken together with its interacting atmospheric environment viewed subjectively, emotionally and mystically as it has always been viewed by vernacular man, and as I am convinced it must be viewed, if we are to survive.

I doubt if these laws will be accepted by the Deep Ecology Movement. Among other things, they are concerned with a host of theoretical issues, with which few are likely to be conversant.

Those who are – our mainstream biologists, ecologists and anthropologists – will certainly reject them. I hope they do. If they do not, then I know that the laws must be seriously wanting, for I regard today's mainstream natural sciences (biology, ecology and anthropology) as being very seriously misguided – especially mainstream ecology.

Back to top

### The perversion of ecology

Thus if ecology is "*the study of the structure and function of Nature*" [1] or indeed of Gaia, [2] as Eugene Odum – possibly the last holistic ecologist in academia – sees it, then modern academic or scientific ecology is not ecology at all. It does not even admit that Gaia exists, let alone that the ecosphere (a more formal term for Gaia) has an overall structure or associated function.

Early academic ecologists at the turn of the century, on the other hand, might well have accepted the implications of the Gaia thesis, but since the 1940s and 1950s, ecology has been progressively perverted so as to make it conform ever more closely with modern reductionistic and mechanistic science, a story which is told very eloquently and very convincingly by Donald Worster in his seminal book *Nature's Economy*; [3] a book which should be compulsory reading for all those in the ecology or

Deep Ecology movement.

Significantly, modern scientific ecology has developed little theory and almost no laws. This point has been made by a number of the more thoughtful ecologists. Ramon Margalef, for instance, notes that “ecologists have been reluctant to place their observations and their findings in the frame of general theory. Present day ecology is extremely poor in unified and ordered principles.” [4]

Peters has also noted that

“ecology has been criticised for being richer in metaphor than in true theory”. [5] Haskell has gone so far as to say that “It is no more possible to make present ecological theory produce accurate predictions than it is to make a wild cherry tree produce fancy dessert cherries.” [6]

This is not surprising. Laws are developed to explain observed regularities. A world displaying such regularities is necessarily an orderly world, but the order of our biosphere is denied by modern ecology. Glacken, for instance, tells us that “*there is disorder in the universe and order must be proven not assumed*”. [7] However, I regard it as fundamental to the world-view of ecology or Deep Ecology, that the world is, on the contrary, highly orderly.

Indeed, to accept the Gaia thesis, which even mainstream scientists will very soon have great difficulty in rejecting without serious loss of credibility, is to see the ecosphere as a cybernetic system, capable of acting as a single unit for the purpose of maintaining its stability, or homeostasis, in the face of environmental challenges. For this to be possible the ecosphere must be seen as highly orderly, indeed as a highly organised co-operative enterprise, very much as the Natural Theologists of the 18th century saw it, and very much too as are all other natural cybernetic systems – the human organism for instance. This means that, contrary to what Glacken tells us, the onus must be on mainstream ecologists to prove that the opposite can possibly be true.

In listing what I take to be the principles of ecology (or Deep Ecology), I was faced with the problem that the constraints to which the ecosphere is subjected, and hence the laws that govern its structure and function, are highly interrelated. This means that it is difficult to list any one of them without first having listed the others. I have only been able to get round this problem by resorting to cross-references and to a certain amount of repetition, for which I seek the reader’s indulgence.

Another problem has been that in order to list the laws in something approaching a logical order, I have been forced to intersperse the more fundamental laws with the very much more secondary ones. In order to accentuate the fact that the laws are not of equal importance, the statement of the more fundamental laws has been put in bold italics and the accompanying explanations in italics.

Finally, it may be worth noting that this essay is, in essence, a summary of a book I have been writing (on and off) for some decades, and which may yet, one day, appear somewhere in print.

## **1. Ecology is the study of the structure and function of Gaia, or of Gaia as a total spatio-temporal system.**

Ecology, in the words of Eugene Odum, is the study of “*the structure and function of nature*”. [8]

Since Odum accepts that nature or the biosphere, together with its atmospheric environment, constitutes a single living system which Lovelock refers to as Gaia, after the Greek goddess of the Earth, and which we can also refer to as the ecosphere, we can, and Odum agrees, consider ecology to be the study of “*the structure and function of Gaia*”, or we might say “*the structure and function of the ecosphere*”.

Because Gaia is organised hierarchically, both in space and in time (see Principle 31), being made up of systems at different levels in the spatio-temporal Gaian hierarchy, ecology must include the study of systems or life-processes at all levels in that hierarchy. Studied ecologically, molecules, biological organisms, vernacular societies, populations and ecosystems must all be seen in the light of their role – both structural and functional – in assuring the stability (see Principle 37) of Gaia

This holistic definition is in stark contrast with the current, highly reductionistic definition of ecology as “*the relationship of organisms with their environment*”.

## **2. Ecology is the study of Gaian laws.**

To study the structure and function of the ecosphere is to seek out their pattern and hence to determine how the ecosphere is ordered (see Principle 20). The basic or general features of this pattern, or order, are non-plastic (see Principle 46) which is but a way of saying that they display continuity or stability (see Principle 37). This means that a Gaian, or ecospheric, structure and

function are subject to constraints; that is, they are governed by laws.

Such laws, moreover, are not mere statistical regularities, as mainstream science tells us but the conditions of order – constraints to which Gaian structures and processes must be subjected if they are to display that order. Such constraints can be violated, as in heterotelic life processes (see Principle 65) but then there is a price to pay – namely reduced biospheric order with all its consequent discontinuities and maladjustments.

The increasing incidence and severity of discontinuities of all sorts such as wars, massacres, droughts, floods, famines, epidemics, and now climate changes are but part of the price that our modern industrial society must inevitably pay for violating, in so drastic a manner, the fundamental laws of the ecosphere.

### **3. Ecology is a non-disciplinary study.**

Ecology must accept von Bertalanffy's thesis [9], that natural systems at all levels in the Gaian hierarchy (such as cells, organisms, vernacular societies, ecosystems, etc.) are similar in both structure and function (see Principle 24), which means that they are governed by the same laws. Those laws – the laws of General Systems – which von Bertalanffy sought to establish, must also be the *laws of ecology*, that is, the laws that govern the structure and function of the Gaian hierarchy. Ecology is thereby non-disciplinary.

At a lower level of generality, different specialised disciplines are required to study divergences in structure and function among different forms of life. Such disciplines, however, must share common ecological generalities. In this way, they can be co-ordinated, so that they may serve to paint between them a coherent picture of the structure and function of Gaia, which is impossible today using disciplines that have evolved in isolation and that are often very difficult to reconcile with each other; ecology and economics providing but the most obvious example.

### **4. Ecology is holistic.**

The "*individualistic ecology*" [10] taught in our universities today is an aberration. Reductionist science looks at the parts in isolation but the ecosphere is more than the sum of its parts; it is also the way these parts are organised and, since the parts, both at a molecular and at a cellular level, are very much the same in all living things, that organisation is critical.

Biological, and hence ecological, diversity (see Principle 26) are thus achieved by organising the same basic materials in a multitude of different ways. It is because of the way these materials are organised that a mammal differs from a bird, a bird from a reptile and a tropical ecosystem from an Arctic ecosystem.

The parts, moreover, are organised functionally, indeed purposefully, if this term is to have a meaning within the context of the ecosphere (see Principle 22), so as to fulfil differentiated roles in Gaia's strategy (see Principle 37). They are organised by their evolution and hence their ontogeny and their behaviour (see Principle 17) to fulfil such roles. This means that their status, and meaning, can only be determined by considering what are these specific roles and how they are fulfilled.

To study systems in isolation is thus self-defeating. Such an enterprise cannot reveal either their status or their meaning. It is but an exercise in scientific obscurantism and mystification.

### **5. Ecology is subjective.**

Because of the adaptive nature of the evolutionary life processes – with their ontogenetic and behavioural components, that, over the last 3 billion years, have given rise to the complex and highly stable biosphere that industrial man has inherited – one must postulate that natural systems, including man (see Principle 18) have, in general, been cognitively adjusted to their specific environments. Goethe noted how this was true of man. In the words of Worster: "Goethe considered that there was 'a perfect correspondence between the inner nature of man and the structure of external reality, between the soul and the world.' The World was thereby a reflection of man's own image and man in turn reflected nature's order, the two being inseparable. This called for a subjective and emotional attitude to nature." [11]

It is only with the systematic destruction of the biosphere, or real world, and hence of the environment to which we have been cognitively adapted by our evolution and its equally systematic replacement with the technosphere, or surrogate world, of which we have had no evolutionary experience, that we

have become cognitively maladjusted (see Principle 32) to our environment – as, indeed, have other living things to theirs. In such conditions, we are no longer capable of intuiting its basic features. The attempt to replace subjective by objective knowledge is a vain one. Man has no more been designed to entertain objective knowledge than has any other living thing. Objective science is an illusion. Subjective, value-laden, metaphysical assumptions underlie all scientific propositions. This is admitted by the more thoughtful scientists and philosophers of science. Thus, the great C H Waddington admitted that *“a scientist’s metaphysical beliefs have a definite and ascertainable influence on the work he produces”*. [12] Karl Popper also realised that *“scientific discovery is impossible without faith in ideas which are of a speculative kind, and sometimes even quite hazy; a faith which is completely unwarranted from the point of view of science and which, to that extent, is ‘metaphysical’ “*. [13]

## **6. The generalities of subjective ecological knowledge are subconscious.**

We are not necessarily aware of the metaphysical knowledge that underlies our world-view. Michael Polanyi referred to such knowledge – knowledge that we cannot formulate in words – as *“ineffable”*. [14] Such knowledge, being the most general and fundamental (see Principle 46 and Principle 47), plays a very much more important role in determining our behaviour than does the knowledge of which we are aware.

This does not seem to impress epistemologists, nor philosophers of science, nor scientists themselves, for whom knowledge remains conscious knowledge – that which we can formulate in words, or better still, in figures. Only such knowledge is taken to be based on observation and reason and, thereby, to be objective, scientific and true.

Ecological knowledge must refer to the whole hierarchical organisation of our knowledge (see Principle 46) – including the generalities that are largely subconscious and the particularities that are conscious. It is on the basis of such knowledge that behaviour is mediated at all levels of the Gaian hierarchy.

The role played in our behaviour by conscious, empirical and rational knowledge has in any case been grossly exaggerated. If our digestive systems, and the circulation of our blood were governed by conscious, empirical and rational decisions, we would not survive a single day.

If our adaptive relationship with our internal environment must be conducted by the unconscious parts of the brain, so must our adaptive relationship with our external environment; more precisely, it must be controlled by the predominantly subconscious knowledge, built into the cultural patterns of the vernacular societies in which man, until recently, lived. Things were then done not because they were deemed scientifically desirable, economically viable or politically expedient but because they were originally done that way by the society’s mythical ancestors who lived in the era in which the social laws were definitively established.

In this way, our external environment, like our internal environment, was protected from the depredations that would otherwise have been caused to it by out of control, conscious, empirical and rational knowledge. For this reason alone, as Jim Lovelock [15] points out, one must reject the thesis popular among environmentalists that man is, or can conceivably be, a conscious rational ‘steward’ of the natural world.

## **7. The most fundamental ecological knowledge is acquired by intuition.**

Observation, and induction based on it, are taken by empiricists and mainstream scientists to provide the only means of acquiring scientific knowledge. This can be criticised on many counts. First of all, observation is not the objective measuring rod it is supposed to be. On the contrary, it is highly subjective, involving as it does, the interpretation of data in the light of the observer’s subjective model, or cybernism (see Principle 34) of his relationship with his environment.

Induction simply does not occur, except perhaps in very simple forms of life. Knowledge is not built up that way at all, as Popper and others have clearly demonstrated. It is built up instead by developing a subjective mental model or cybernism by means of a complex organisational process, much of which occurs at the subconscious level.

Other epistemologists and philosophers of science have attached greater importance to ‘reason’ as a means of building up knowledge, without taking a great deal of trouble in defining that term. In particular, such philosophers see deduction from basic principles as an important (rational) means of

acquiring knowledge. This is yet another process that probably does not occur in nature, since it is not from isolated principles but from a subjective, partly subconscious, model or cybernism that knowledge is derived and the process involved is more akin to the model builder's 'simulation' than to the epistemologist's deduction.

All these cognitive processes, however, whether they be observation and induction, or reason and deduction, only provide a means of acquiring conscious knowledge. No legitimate method, however, is proposed for the acquisition of subconscious knowledge. Yet there must be such a method; indeed, it must be that which we make use of to acquire our most fundamental ecological knowledge.

This method is best seen as the process whereby the most fundamental features of this relationship are interpreted in the light of the largely subconscious generalities or metaphysical principles underlying our world-view, one that reflects the total spatio-temporal experience of our cultural group, in its dealings with Gaia. Such knowledge is usually referred to as 'wisdom' and the method of acquiring it is normally called 'intuition'.

### **8. Ecology is emotional.**

Ecology is a way of looking at the world, a subjective and emotional way, not just an objective and rational one. It involves seeing the world, as does the mystic, with wonder, with awe and with humility – as something to feel part of, to love and to cherish rather than to exploit, let alone systematically to transform as modern man is doing.

Thoreau considered that no true understanding of the Earth was possible that was not based on 'love' and 'sympathy'; which for Worster "*is the capacity to feel intensely the bond of identity or kinship, that unites all things within a single organism*" [16] – which indeed man must feel if he is to behave as an integral part of Gaia, rather than as a heterotelic (see Principle 65) parasite that simply churns her up.

This attitude is of course irreconcilable with the paradigm of reductionist science which above all demands total objectivity, and in the words of Roszack, "a Cosmos stripped clear of all the emotional and spiritual qualities men and women theretofore have found in the natural world." [17]

But the elimination of such emotionalism as subjectivity from science – and hence from modern scientific ecology – is an illusion, as is clear from the outbursts of emotional indignation with which the scientific establishment greeted the publication of works such as Rachel Carson's *Silent Spring* and Denis and Donella Meadow's *Limits to Growth*, both of which undermined basic scientific assumptions and thereby threatened their status and prestige.

Reductionist science is in fact as emotional as it is subjective, for scientists are humans and as such have not been designed by their evolution to be unemotional any more than they have been designed to be objective.

### **9. Ecology explains events in terms of their role within the total spatio-temporal Gaian hierarchy, not just in terms of the single event or cause that triggered them off.**

In terms of mainstream science, an event is seen as being caused by another event that preceded it in time and which can be correlated with it statistically, without necessarily justifying this correlation on the basis of any serious theoretical considerations. This notion of causality was essential to the Newtonian world-view. Indeed, in a world made up exclusively of space and motion, there was no need for anything more than this crude notion of causality – no appeal to serious explanation was required.

As shown elsewhere, it was necessary too that the cause should precede the effect (see Principle 22). Though the Newtonian paradigm has been abandoned, in theory at least, the notion of cause has been retained because it fits in so well with the present paradigm of science. Its retention, however, prevents us, among other things, from understanding pathological – i.e. heterotelic (see Principle 65) – events occurring within natural systems.

Infectious diseases, for instance, are not 'caused' by microbes as modern medicine continues to assure us – an interpretation that is very convenient to the pharmaceutical industry that churns out vast amounts of poisons for killing off the microbes. On the contrary, as René Dubos, the founder of the ecological approach to health, pointed out: infectious diseases are caused by a break-down in the balance between man and the microbial population that inhabits him and indeed must inhabit him, if

his metabolism is to function properly.

The true 'cause' of an infectious disease is thereby not the microbe that triggered it off but the circumstances that led to the breakdown in this critical balance – or, more precisely, the local reduction in the critical order of Gala (see Principle 21).

Like all other discontinuities, infections can also, and perhaps more usefully, be seen to have been 'caused' by a diversion from the optimum behaviour pattern, from the 'Path' or 'Way' (see Principle 49), which leads to the preservation of that critical order – a principle that was fully understood by vernacular peoples (see Principle 53).

But then the term 'cause' is rarely used to refer to such general changes and theoretically cannot be, since the very notion of an optimum behaviour pattern to which behaviour must be geared, smacks of teleology (see Principle 22), hence of that ultimate scientific taboo – the final cause.

For that reason it is best to abandon the use of the term 'cause' altogether and use instead the term 'explanation'. An ecological explanation, of course, is one that examines the process in the light of an ecological model of the ecosphere as a total spatio-temporal system (see Principle 16).

### **10. Ecology studies natural Systems in their natural Gaian context.**

Life processes can only occur normally within a certain range of environmental conditions (see Principle 35), those that bear some relationship to those in which the systems evolved and grew up (see Principle 34). It is only by studying life processes in these conditions that they can be understood and, in particular, that normal processes can be identified, and thereby distinguished, from abnormal processes – the physiological from the pathological and hence the homeotelic (see Principle 49) from the heterotelic (see Principle 65).

Life processes occurring in 'controlled laboratory conditions' – that is, in totally artificial conditions which have *no counterpart in the real world* – can provide little information on the role these processes play in assuring the critical order or stability of the ecosphere (see Principle 50) and cannot thereby serve as a basis for the understanding of the real world.

### **11. Ecology is qualitative.**

In the 1940s, ecology was transformed into an 'exact' science. This meant, above, all expressing it in the medium of mathematics. The Oxford ecologist Arthur Tansley played an important role in this transformation. He denied the existence of anything in ecology that could not be strictly quantified and examined by the reductionistic (analytic) method of science. In this way, in the words of Worster, he sought to rescue ecology

“from the status of a vaguely mysterious moralising point of view and make it instead a hard-edged, mechanistic, nothing-but discipline, marching in closed ranks with the other sciences.” [18]

As the result of the work of Juday, Lindeman and also of Odum, the functioning of ecosystems came to be explained in terms of the energy that flowed through it from one trophic level to the next, and in terms of laws of classical thermodynamics. This had disastrous consequences. As Worster notes:

“By reducing the living world to ingredients that could be easily measured and graphed, the ecologist was in danger of removing all the residual emotional impediments to unrestrained manipulation.” [19]

This approach is, in any case, unjustified on purely scientific grounds, in that it means that the factors and the relationship between the factors that were now taken into account in ecological explanations, are no longer those that are relevant but instead those that happen to be quantifiable. Unfortunately, however, the most important features of ecosystems, indeed of natural systems in general, such as organisation, hierarchy, stability, creativity and so on, are not easily quantifiable. As Sibatani notes, “systems in which the elements characteristically interact. are notoriously intractable to mathematical analysis.” [20]

What makes the enterprise even more futile, is that the scientific concepts that are routinely quantified have never even been properly defined. In biology, for instance, as Woodger notes, “nothing is more striking. . . than the contrast between the brilliant skill, ingenuity and care bestowed upon observation and experiment, and the almost complete neglect of caution in regard to the definition and use of the concepts in terms of which its results are expressed.” [21]

An example is competition. Merrell [22] lists no fewer than 28 different ways in which the term is used. Clearly to quantify concepts that have never been defined is to endow them with an air of spurious accuracy, [23] when they are in reality vague and misleading.



The truth is that mathematics is not the language of nature. Nor, of course, it might be argued, is English, or any other man-made language. But then qualitative language is more flexible and can be used to express vivid metaphors that provide a more accurate picture of the ecosphere than can the more precise language of mathematics.

### **12. The ‘truth’ of an ecological proposition is the extent to which it fits in with the world-view of ecology.**

All attempts to establish a rigid dichotomy between scientific (and hence supposedly valid) and non-scientific (and hence supposedly invalid) propositions have now been discredited.

The notion that ‘empirical verification’ provides such a criterion – the underlying principle of Logical Positivism, – was discredited long ago by Karl Popper. The criterion of ‘falsifiability’, which Popper proposed to replace verification, has now also been shown to be unacceptable. Even ‘operational verification’ is no criterion, since the effects of any act or operation in which one has a strong psychological stake are still judged subjectively – its failure, for instance, being invariably attributed to various technical factors, rather than to the basic validity of the operation and of the principles that rationalise it.

Thus, in spite of the terrible failure of economic development in the Third World, its ‘desirability’ remains unquestioned. Instead, slight changes in the way development policies are implemented are proposed, to eliminate its worst abuses, hence ‘rural development’, ‘ecodevelopment’, ‘appropriate development’ and now ‘sustainable development’ – all of which are basically euphemisms adopted by the Development Industry to placate its critics.

The myth that a scientific proposition is radically different from other propositions has been exploded by enlightened epistemologists such as Alfred Kuhn, Paul Feyerabend and others. From their writings, it emerges that a scientific proposition is no more than one that conforms to the reigning scientific paradigm or world view.

One must thereby conclude that the validity of an ecological proposition can only be judged by the extent to which it fits in with the largely subconscious and subjective world-view of ecology. To ask more of it is to ask the impossible.

### **13. Ecology serves to rationalise the world-view of ecology.**

Ecology reflects and serves to rationalise a specific world-view, one which we can refer to as ‘the world-view of ecology’, in the same way that science, economics and the other disciplines into which our modern knowledge of the world is divided, reflect and serve to rationalise the world view of modernism.

This means that in terms of the former world-view, man’s welfare and prosperity are seen as maximised by adopting that Path or Way (see Principle 51) that best serves to achieve and maintain the critical order (see Principle 21) of the ecosphere: by contrast, in terms of the latter world-view, welfare and prosperity are seen as being maximised by adopting that path that best serves to favour the development and preservation of the technosphere.

Since the biosphere and the technosphere are in direct competition with each other, the expansion of the latter necessarily leads to a corresponding degradation and contraction of the former. The two world-views are thus diametrically opposed to each other.

### **14. Gaia is One.**

Deep Ecologists refer to this principle as ‘the central intuition’. It is well-named. The unity of the world has been intuited by all known vernacular societies. As Father Placide Tempels writes, *“for primitive man the supreme wisdom consists in seeing the universe, as reflecting the unity of the order of living things”*. [24] This intuition has been confirmed by Jim Lovelock in his seminal book *Gaia: A New Look at Life on Earth*.

### **15. Gaia is a spatio-temporal system.**

Gaia, like all natural systems, exists in time as well as in space. There can be no atemporal system any more than there can be a non-spatial process. Julian Huxley noted how this is true of a social system: “We are beginning to grasp that societies, like the individuals which compose them, and like life in general, have a time-dimension. They are process, and their direction in time is as important a part of

their nature as their organisation at any particular time.” [25]

To see Gaia and her constituent natural systems (see Principle 24) as both entities and processes, is for us very difficult. Among other things, our language distinguishes clearly between the spatial and the temporal as if they were totally distinct. I shall thus continue to use the term ‘system’ or ‘natural system’ when I wish to accentuate the spatial aspect of a spatio-temporal ‘entity-process’, and ‘process’ or ‘life-process’ when I wish to accentuate its temporal aspect. This is far from satisfactory, but the alternative is worse.

### **16. Gaia is a total spatio-temporal system.**

The visible living thing which we take to be the biosphere is but an ‘evolutionary stratum’ – the tip of an evolutionary iceberg, so to speak, for its past is still present, in the sense that the information transmitted from generation to generation, from one ‘evolutionary stratum’ to another, reflects the experience of the whole spatio-temporal system, stretching back into the mists of time. This means that the past still controls the present as indeed it does the future, and, from the cybernetic point of view, still exists.

This must be true since the most general and hence the most fundamental information (see Principle 46) is non-plastic, that is it is modifiable only over a very long period of time. This general information reflects the system’s total experience, while it is only the more particular information into which the former is differentiated that is plastic, and whose modification serves to adapt the general information to changing environmental conditions so that it may serve to adapt the total spatio-temporal system to such conditions, rather than merely the contemporaneous ‘evolutionary stratum’.

This is quite clearly so in a vernacular tribal society. Its pattern of behaviour conforms with the traditional laws, which coincide with the laws governing the Gaian hierarchy of which it is part (see Principle 18). These laws are seen as having been enacted by the original ancestors at what Radcliffe Brown calls “*the Dawn period*” [26] and are thereby regarded as sacred and inviolable. They thereby reflect the experience of the society as a total spatio-temporal system.

A tribal society has been referred to as a ‘gerontocracy’, in that it is governed by its elders. It would be more appropriate to refer to it as a ‘necrocracy’ in that it is really governed by its dead, or more precisely, by its physically dead, for the ancestors still control the behaviour of their descendants and, cybernetically speaking, still exist.

It is only by viewing Gaia and her constituent subsystems in this way, that one can understand evolution (see Principle 17) and its constituent life processes.

### **17. Gaia is evolution seen as a total spatio-temporal system.**

More precisely, evolution is the process whereby the Gaian total spatio-temporal system achieves and maintains its maximum stability by adapting to its changing environment. Evolution involves life processes, both ontogenetic and behavioural, and occurring at each level in the Gaian hierarchy. These life processes are highly co-ordinated, which means that they are interconnected by ‘feedback loops’.

The Gaian total spatio-temporal system, as it evolves, is best seen as throwing out ‘feelers’. The feelers are individual generations or ontogenetic processes and they themselves throw out further feelers in the form of behaviour.

Information is fed back by the behavioural feelers to the ontogenetic feelers and is further fed back to the Gaian total spatio-temporal system.

The notion that behaviour provides the information required to help mediate ontogeny – and indeed evolution itself – is one that serious students of evolution have found hard to avoid, in spite of it having been tabooed by William Bateson and August Weissmann and more recently by Francis Crick. Lamarck’s original formulation offended neo-Darwinist susceptibilities, but the notion was reformulated by Baldwin and Lloyd Morgan and later by Waddington, Schmallhausen and, still more recently, by Piaget.

A life process mediated by blind, one-way instructions that cannot be monitored and which are thereby unamenable to correction when they stray from the optimum course or Way (see Principle 51), is unknown in the natural world, and indeed inconceivable. The neo-Darwinist contention that genetic instructions proceed in this manner to dictate the course of evolutionary change, cannot thereby be taken seriously.

### **18. Man is an integral part of Gaia.**

Man, when organised into a vernacular society and when observing the traditional laws of his society, as they have been observed by untold generations of his ancestors, is an integral part of Gaia. Such societies have co-evolved with the ecosphere so as to fulfil their differentiated functions within its hierarchy. They thereby contribute to her overall stability, and are subject to all the basic laws (see Principle 2) governing life processes on this planet.

Man when organised into the institutions that are the essential constituents of the technosphere (see Principle 52) is no longer a differentiated member of a vernacular society, nor indeed of the Gaian hierarchy. However, both he and the technosphere of which he is now part, still depend on Gaia for their survival, since it is from the biosphere that they must extract the vast bulk of the resources that they require and it is to the biosphere that they must consign their wastes.

Attempts to show that man is qualitatively distinct from other living things, and is thereby not subject to the laws governing other forms of life within the Gaian hierarchy, are simply not serious. If man has a soul, or is endowed with 'consciousness', 'reason', 'intelligence', the ability to predict the future etc. then so are other forms of life. The notion that non-human living things are all mere robots reacting blindly to external stimuli, which trigger off responses like a light-switch triggers off an electric light, is demonstrably false.

To believe, as mainstream Neo-Darwinists do today, that the evolutionary process that has brought into existence the incredibly complex and sophisticated biosphere of which man himself is part, can be explained in these terms – or, more precisely, in terms of the functioning of a generator of randomness, in conjunction with that of a sorting-machine – while man's misguided and paltry achievements – the production of computers, electric toothbrushes and atom bombs – are the product of intelligence, reason, consciousness and so on, is simply laughable.

If it requires intelligence and reason to produce these crude artefacts, then it requires incomparably greater intelligence and reason to create the biosphere and its constituent systems. Indeed, if man is intelligent and rational, then the evolutionary process must be incomparably more intelligent and rational.

### **19. Vernacular man plays only a minor role in the workings of Gaia.**

Being humans, we are understandably more concerned with the fate of man than of that of other forms of life. Deep Ecology, however, regards man as no more important than other animals, the 'Principle of ecological egalitarianism' being a lynchpin of Deep Ecology.

Jim Lovelock and Lynn Margulis consider that, from the Gaian point of view, man is of little importance. It is bacteria that are mainly responsible for developing the biosphere and its atmospheric environment, and for assuring the stable relationship between the two. It may be truer to say that it is Gaia herself, not just her microbial constituents, that by her own efforts has evolved (see Principle 23) to her pre-industrial climax state and that, in this process, man had a very much smaller role to play than did the bacteria – but he did still have a role.

In ecological terms, man is a carnivore and a herbivore, and his principle ecological function – though there are many others – is to maintain qualitative and quantitative controls on herbivore populations and on those of primary producers (vegetation). If he were eliminated, the populations on which he preyed would become less viable qualitatively and might indeed expand in an uncontrolled way. This would to a certain extent disrupt the critical order of the ecosphere (see Principle 21) and hence the latter's stability, even though the human role would probably soon be assumed by other carnivores and herbivores.

Man and other carnivores and herbivores are thus necessary constituents of the ecosphere, for without them, the living world would be far less stable. Primary producers, who alone can harness the energy of the sun, are even more important, since without them there would be no herbivores or carnivores. Bacteria can be considered still more essential, since without them the world would not be capable of supporting any of these forms of life.

This is not an anti-human position to adopt, as critics of Deep Ecology would undoubtedly maintain. Man is an integral part of the ecosphere. It is only by maintaining the latter's critical order or stability (see Principle 21) that man can maintain his own stability and that his real needs (see Principle 37) can thereby best be satisfied. Man's interest and Gaia's interests are one. It is the fundamental flaw of

the world-view of modernism to ignore this perennial truth.

## **20. Gaia displays order.**

The ecosphere is not a random assortment of living things, but, on the contrary, it displays order (see Principle 21 and Principle 22). It is hierarchically organised (see Principle 31) and is a highly differentiated and functional organisation of natural systems whose constituent parts, rather than being random, have specific roles to play, either as contributing to its homeotelic complexity (see Principle 26) or to its homeotelic diversity.

The ecosphere is equally orderly when seen as a life process. Indeed, its temporal order closely reflects its spatial order. More precisely, they are but different ways of looking at the same spatio-temporal order (see Principle 15).

Thus evolution, the Gaian life-process and its constituent life-processes (ontogeny and behaviour), are arranged in an ordered and correspondingly predictable manner. They proceed, for instance, in a hierarchical manner from the general to the particular (see Principle 46) and by the process of differentiation; they are cumulative in the sense that the different phases do not merge with the preceding ones, but rather supplement them; and they are sequential (see Principle 47) in that they occur in a specific order.

They also move by jumps from one level of organisation to another (see Principle 30), and they are highly co-ordinated, goal-directed or purposive, the goal being the achievement of overall Gaian stability (see Principle 37).

There is of course an element of randomness in all organisations or natural systems, but Gaia strives (see Principle 23) to reduce randomness to a minimum. This occurs as her constituent ecosystems develop from their pioneer state to their climax state (see Principle 39). As this occurs, Gaia evolves to achieve the maximum possible stability that her internal and external environments (see Principle 37) render possible.

To suggest, as do the neo-Darwinists, that randomness provides the basis for Gaian evolutionary change, is grossly to underestimate the sophistication of the evolutionary process and of its constituent life-processes (see Principle 17). It is also to mistake disorganised redundancy or randomness (see Principle 22) with the organised redundancy or diversity (see Principle 26) which provides the basis for genetic recombinations and the other informational (cybernetic) reorganisations that play a key role in important adaptive changes (corrections) at different levels in the Gaian hierarchy (see Principle 66).

## **21. Gaian order is critical.**

There is an infinity of possible orders, corresponding to an infinity of possible ways in which Gaian resources could be organised so as to achieve an infinity of possible purposes. A mad giant could possibly reorganise Gaian resources on the planet to suit his specific purpose. It would display his order and life processes within it would be governed by his laws – those that prevented them from diverting from the achievement of his purpose.

The order of the ecosphere is also a special sort of order. What is more this order is *critical*. It is only if it is maintained that the ecosphere can achieve its overall goal, that of maintaining its stability (see Principle 37), thereby providing the optimum environment (see Principle 34) for its constituent natural systems at all levels in the hierarchy (see Principle 31), and thus of dispensing its unique and indispensable benefits.

This critical order is referred to in the early ecological literature as ‘the balance of nature’. Frank Egerton refers to it as “*ecology’s first paradigm*” [27] but this paradigm has been rejected, along with all other holistic ecological concepts, by modern ecologists seeking to reconcile ecology with the paradigm of reductionist science. This is largely because it cannot be reconciled with the principle of progress, which is fundamental both to reductionist science and to the paradigm of modernism which it reflects.

The order of Gaia when seen temporally as a life-process is also critical. When reductionist scientists insist on the random-ness of life processes, they imply that the latter are geared to the achievement of an unlimited number of possible end-states. This notion is irreconcilable with the spatio-temporal aspect of natural systems. A digestive system is indissociable from the process of digestion, a reproductive system from that of reproduction, an organism from the associated life processes that it

was designed to fulfil. Indeed if the physical structures display order, so must the associated life-processes. It is the order of the total spatio-temporal system that displays the requisite order, and it is this order which it is the overriding goal of Gaia to Preserve.

## **22. Gaian processes are teleological.**

If the order of Gaia, seen as a spatio-temporal process, is critical, this means that it must necessarily tend in a very specific direction: in other words, it must be purposive or teleological, in that it seeks to achieve a goal or end-state.

For a number of reasons, this notion is irreconcilable with the world-view of reductionist science and that of modernism which it so faithfully reflects:

- The argument that the world is highly ordered and purposeful has always been one of the main arguments for the existence of God, the divine intelligence that alone could have created it. Paley, one of the chief proponents of natural theology, carefully studied science so as *“to show that the universe was in all its details redolent of God’s purpose”*. [28]
- Nineteenth century scientists were particularly keen to eliminate God from the emerging paradigm of science. ‘Naturalistic’ explanations were what they sought and that was one of the chief attractions of Darwinism.
- As Sir Peter Medawar writes, it is upon the notion of randomness *“that geneticists have based their case against a benevolent or malevolent deity and against there being any overall purpose or design in nature”*. [29]
- The postulate of randomness is also a defence against various vitalistic explanations, such as the entelechy of Dreisch and the elan vital of Bergson.
- Teleology also implies the perfect adaptation of the constituents of the biosphere. This had antievolutionary implications, and as Ospovat notes *“made it attractive to the guardians of religion, morality and order”* [38], and correspondingly less attractive to social reformers, and those who believed in progress.
- For the same reason, it is necessary to postulate a random world in order to legitimise the enterprise of global development. If the world were highly orderly – if its structure were critical – then how could one justify economic development which inevitably involves changing, indeed transforming, the way things are organised on this planet?
- Another essential reason for randomness, is that it is essential to the mechanistic concept of life processes and to one of its key components, the idea of physical causality.
- Teleology as a final cause – one that succeeds rather than precedes the effect – is thus unacceptable to mainstream science. The notion of a living thing *“striving after a future goal retained as some kind of image or idea”*, as Ernst Mayr puts it, is incompatible with the mechanistic view of the world.

Indeed teleology is taboo. Only man, because of his ‘intelligence’, his ‘consciousness’, and his ‘reason’ (see Principle 17) is seen to be capable of purposive behaviour. Other living things are, at best, seen as behaving ‘as if’ they were purposeful or teleological, or else they are said (even by such great thinkers as Waddington and Monod) to be *“teleonomic”* a euphemism, as Medawar notes, for teleological – which implies that their goal-directedness is exclusively the result of having been programmed, like cybernetic machines, with the appropriate instructions. To suggest that natural systems are teleonomic instead of teleological means ignoring all the vital information organised by developing systems on the basis of data derived from the larger systems within which they develop. More precisely, it ignores the way the instructions are directed or orientated (see Principle 46) by the larger systems, so as to assure that they help mediate homeotelic behaviour (see Principle 49), namely that behaviour which will assure the stability of the Gaian hierarchy as a whole – the ultimate goal of vernacular living things. It ignores too the fact that programming is not a random process. Who did the programming and why? If living things are endowed with instructions, it is because these instructions were developed over hundreds of millions of years, along with all the other adaptive features of Gaia, as part of a teleological strategy for achieving Gaia’s overriding goal of maximising her stability.

## **23. Gaia and her constituent life processes assure by their own efforts the development and maintenance of Gaian order.**

Lamarck realised that evolution was the work of living things. He saw them as active, dynamic and creative. However, the Darwinian view of living things as passive and robot-like and as responding slavishly to the dictates of an unnamed external manager (selection by an undefined external environment) has unfortunately come to prevail. There is no evidence of any kind for the Darwinian view, but it is more in keeping with the paradigm of reductionist science and the world-view of modernism that it reflects.

Jim Lovelock, Lynn Margulis and their colleagues have now shown that it is to the dynamic, creative, co-operative and co-ordinated activities of living things (in particular, bacteria) that we must attribute the development or evolution of Gaia.

It is also to the sustained efforts of living things that we must attribute the maintenance of the critical Gaian order. If it were not for their co-ordinated efforts, Gaia would revert to her original randomness – to that state of chemical and thermodynamic equilibrium from which she sprang.

Vernacular people knew that it was by their efforts that the order of the Cosmos could be maintained. Indeed this was their most fundamental belief and their cultural behaviour pattern was geared to the achievement of this overriding goal (see Principle 51).

#### **24. Gaia is made up of natural Systems.**

Gaia is made up of natural systems such as cells, organisms, vernacular societies and ecosystems. These are, in many respects, very different from each other, living as they do at different levels in the Gaian hierarchy, but their basic generalities are very similar. This so impressed Ludwig von Bertalanffy, one of the two founders of 'General Systems Theory', that he regarded them as 'isomorphic' (from the Greek 'iso' = 'same' and 'morphos' = 'form'), although they could equally well be referred to as 'isotelic' (from the Greek 'iso' and 'telos' = 'goal'). Paul Weiss defines a natural system as "a complex unit in space and in time, whose sub-units co-operate to preserve its integrity and its structure and its behaviour, and tend to restore them after a non-destructive disturbance." [32] This is a valuable definition. It states what must be the fundamental features of all natural systems if they are to preserve the critical order of Gaia. Significantly Lovelock defines Gaia in very similar terms.

#### **25. Gaia is the source of all benefits.**

It is only through the normal vernacular workings of Gaia that it is possible to derive those benefits that are alone capable of satisfying the real needs developed by all natural systems, including man, during the course of their evolution – namely, their biological, ecological, social, aesthetic and spiritual needs. Nonetheless, it remains fundamental to the world-view of modernism, that needs can best be satisfied through the functioning of the technosphere. This, of course, serves to rationalise the goal that modern societies have set themselves – that of economic development or 'progress', which involves the systematic substitution of the technosphere or surrogate world, for the biosphere, or real world (see Principle 40).

The surrogate world, however, mainly satisfies material needs and also generates money – the currency of the surrogate world. But there is no evidence that, in normal conditions, man has any real need for either of these commodities. He has lived for perhaps as much as 95 percent of his tenancy of this planet without them – primitive money fulfilling a largely social rather than economic purpose. If we need material goods and money today, it is only because we have created aberrant, and necessarily short-lived, socio-economic conditions in which these commodities are required to gratify our real biological, ecological, social, aesthetic and spiritual needs, which, hitherto could be satisfied without them. Money, in fact, is not the currency of nature.

That the Cosmos is the source of all benefits is a fundamental belief of all vernacular peoples.

#### **26. Gaia displays the maximum 'complexity' compatible with the maintenance of the requisite diversity.**

The distinction between complexity and diversity is not normally made by modern mainstream ecologists, yet it is an essential one. Complexity and diversity, as I propose to use the terms, are in competition with each other.

A complex system is one whose structure is highly differentiated, so as to permit correspondingly differentiated life processes which achieve a correspondingly high degree of homeostasis, or

homeorhesos, in specific environmental conditions. Julian Huxley referred to the development of complexity, used in this sense of the word, as “*anagenesis*”. [33]

By complexity, I mean ‘organised complexity’, not the ‘random complexity’ of mainstream ecologists, such as Robert May, [34] who see complexity as leading to increased instability or reduced homeostasis. This would be so, if by complexity they mean random complexity, for one cannot increase the stability of a system by introducing random elements into it (the rabbit into the Australian ecosystem, for instance). Systems in fact strive to prevent the development of randomness (i.e. of random complexity) and will seek to eliminate random elements.

Complexity is one of the means of enabling a system to increase its stability within a specific range of environmental conditions. This is only justified if the system can predict that such conditions will be maintained, since there must be a physical limit beyond which it cannot expand; one too that cannot be exceeded without adversely affecting Gaia’s critical order. To increase complexity must mean reducing diversity.

Diversity is organised, as opposed to random, redundancy. It is a measure of all the slightly different, but structurally and functionally, similar sub-systems of which it is composed, but which, rather than contributing to the complexity of the life processes it mediates, contributes instead to the number of slightly different life processes that the system is capable of mediating. Diversity is not thereby a measure of what the system does but rather of all the things it could do, if it were necessary to do them. It is a measure, too, of the improbability of the environmental conditions to which the system can adapt. The development of diversity in the sense in which I am using the term was referred to by Julian Huxley as “*cladogenesis*”. [35]

As controls become internalised (see Principle 48), systemic complexity and diversity are complemented by cybernismic complexity and diversity.

## **27. Co-operation is the primary Gaian relationship.**

Co-operation (whether of the type referred to as ‘commensalism’, ‘symbiosis’, or ‘mutualism’) is the most fundamental interrelationship between natural systems both at the same and at different levels in the Gaian hierarchy.

Without co-operation between the parts of a natural system, be it a biological organism, a family, a community or even an ecosystem, the system could not hold together or exist as a unit of adaptive life processes – still less could it compete with other systems.

Jim Lovelock, as already noted, accentuates the essential co-operation between the constituents of Gaia, without which she could not maintain her homeostasis in the face of change (see Principle 24).

Paul Weiss takes co-operation between the parts of a natural system to be one of its fundamental features (see Principle 24).

Unfortunately with the breakdown of social, economic and ecological systems under the impact of economic development, the level of co-operation in all these systems has drastically declined. Worse still, in taking the disintegrating biosphere as the norm, sociologists, economists, and ecologists have mistaken the tumour for the healthy organism and have thereby lost sight of the essential co-operative nature of the climax biosphere, their attention being monopolised instead by the radically increased level of pathological or heterotelic (see Principle 65) competition that is a necessary feature of disintegrating, atomised, competitive, neo-pioneer systems.

Kropotkin’s attempt to redress the balance in his famous book *Mutual Aid*, [36] written as a reaction to T. H. Huxley’s Romanes Lecture, fell on deaf ears. There was little room in the world-view of modernism for co-operation and by that time the paradigm was already firmly entrenched.

In the late 1970s, ecologists began to rediscover co-operation, or ‘mutualism’ as they prefer to call it. Douglas Boucher’s recent *Biology of Mutualism* sums up changing attitudes in this field. The mutualism of today’s mainstream ecologists, however, is still of a reductionistic and mechanistic variety, as Boucher himself admits. [37]

## **28. Competition is a secondary Gaian relationship.**

Competition – an external type of control – is a secondary Gaian interrelationship. Co-operation is a primary interrelationship, since without it, there would be no living things capable of competing with each other, and indeed no ecosphere (see Principle 24); whereas without competition there would only

be a reduction in the order of the ecosphere resulting from the elimination of the external quantitative and qualitative controls which it provides. It is to be noted that, in any case, these external controls play a greater role in a pioneer system (see Principle 40) than in a climax system (see Principle 39), where they are largely replaced by internal controls.

Unfortunately, mainstream scientists are members of a disintegrated neo-pioneer society (see Principle 40) which they misguidedly take to be the norm, and which provide a model of the biosphere as a whole. As it happens, in a neo-pioneer society the level of competition is very much higher than in a normal or climax society. Much of this competition is thereby heterotelic (see Principle 61).

However, in the light of the world-view of modernism, this heterotelic competition is regarded not only as normal but also as indispensable to the functioning of society, its economy, its ecosystem and of the ecosphere itself. Indeed, Herbert Spencer went so far as to decree that the “*struggle for survival*”, which leads to the “*survival of the fittest*”, provides the very basis for progress. Adam Smith transferred this notion to economics, Darwin to biology (his natural selection being but a biological version of the invisible hand), and modern mainstream ecologists to ecology.

More recently, the Nobel Laureate Ilya Prigogine and his many disciples have formulated the principle in a new language – that of ‘non-linear thermodynamics’ – which glorifies discontinuities or ‘fluctuations’, such as wars, famines and epidemics, which are seen as the basic conditions of progress, through the creation of ‘dissipative structures’, and hence as the best means of assuring our welfare and prosperity. [38]

What they have all failed to realise is that as a system moves towards its climax, and hence ‘progresses’ in the biospheric or Gaian sense of the term, its parts become more highly integrated, controls become internalised, and life processes become less competitive and more co-operative. In such conditions, those who prevail are not those who are ‘fit’ in the Darwinian sense of the term, but rather those who fit-in – that is, those who have learned to fulfil their differentiated functions within their social system, and who are thus properly socialised.

Far from being admired in vernacular society, the ‘fit’ – in the Darwinian sense of the most individualist and aggressive, the Rambos in fact – are, on the contrary, eliminated by society’s ‘immune system’, or ostracised for failing to observe its traditional laws and, hence, for behaving in a random way that threatens the critical order of their society and ecosystem – very much as a tumour is random to, and threatens, the critical order of a biological organism.

The Rambos, the tumours, the ecological intruders, such as the rabbit in Australia and the imported elm-bark beetle mutant in the United Kingdom, are, in fact, engaged in heterotelic (see Principle 65) competition with the normal differentiated members of the system on which they prey.

Today, the technosphere itself, or the surrogate world that is being systematically built up through economic development, is engaged in a similar heterotelic competition on a global scale with the biosphere or real world.

## **29. In vernacular systems competition and co-operation are homeotelic.**

Within each natural system – and, hence at every level in the Gaian hierarchy – there is an optimum ratio of co-operation to competition, a state of affairs which is reflected in the homeotelic behaviour pattern of a vernacular society.

In a vernacular human family, co-operation predominates, as it does (but to a far lesser degree) in a lineage group and, again (to a still lesser degree) in a community, while in the society at large there is considerable competition, which increases as we move to the ecosystem in which it lives and that may be inhabited by rival social groups.

One could possibly draw a gradient to show the optimum rate at which co-operation gives rise to competition as we move from the family to the ecosystem. Co-operation and competition which is below or equal to the optimum required at a particular level in the hierarchy or along the optimum gradient, is homeotelic; that which occurs below the optimum is homeotelic but insufficient; and that which is above the optimum is heterotelic. The gradient would also measure the degree of order in the environment and hence in the larger system that provides this environment. It could thus be referred to as the ‘competition co-operation gradient’ or the ‘order gradient’. It also measures the proportion of complexity to diversity (see Principle 26) and could thus be referred to as the ‘complexity-diversity gradient’.



### **30. Gaian order is not homogeneous but varies at each level of organization with the type of organization that is achievable at that level.**

Biological organisms display order but cannot expand to create Gaian-sized organisms. There is a limit to the size of organisms, determined, among other things, by the limit to the extendibility of the bonds that hold together their constituent parts.

In a social system, the bonds in question are the family bonds and they will not extend very far. There is thus a limit to the size of a society capable of acting as a unit of homeotelic behaviour. A monolithic nation state does not satisfy these conditions in any way, for it is not a vernacular, self-regulating homeotelic system but one that is asystematically controlled by an alien agent – the State. It is thereby tending in a biospherically random (heterotelic) direction – and does not display biospheric order. This principle was not understood by the holistic ecologists of the Chicago School, which flourished in the 1940s under the direction of Warder Allee. They saw that co-operation and integration increased with ecological development, and assumed that this process could occur at a global level, giving rise to a vast co-operative and highly integrated global community from which war would be eliminated. They ignored, however, the factors that must limit the size of co-operative and integrated societies, and failed to distinguish the latter from the nation states, whose expansion is only limited by bureaucratic inefficiency, and the costs of the armaments required to control their alienated inhabitants.

### **31. Gaian Systems are organised to form a hierarchy or homearchy.**

Gaia is organised to form a hierarchy. Thus, molecules are organised to form cells, cells to form organs and tissues, the latter to form biological organisms which, in turn, are organised to form families, vernacular communities, ecosystems and so on. Each system, as both Paul Weiss and Arthur Koestler, in particular, have pointed out, is at once part of a bigger system and at the same time composed of smaller systems. That is why Koestler chose as the symbol of the system, or of the “*holon*” as he called it, the double-faced Roman God, Janus, who looks at once in both directions. [39]

Since the relationship of the smaller systems to the larger systems, and eventually to Gaia herself, is one of homeotely, the term homearchy could be used to replace hierarchy, a much abused term that has never been properly defined. (Even in the two main symposia held on this subject, one organised by Lancelot Law Whyte and one by Howard Pattee, the term ‘hierarchy’ was used by the participants in a number of different and conflicting ways).

Koestler suggested that the term ‘hierarchy’ be replaced by ‘holarchy’. Gaia, when seen as a life process, is also organised to form a hierarchy or homearchy or holarchy. Thus behavioural processes must be seen as the spatio-temporally differentiated constituents of ontogenetic processes, and ontogenies as the spatio-temporally differentiated constituents of the Gaian evolutionary process (see Principle 17). This is rendered possible by the functioning of informational feedback, interrelationships within the hierarchy of life processes (see Principle 17).

### **32. The environment is the larger system.**

The environment is a term that is largely undefined. Darwinists and Neo-Darwinists see it as somehow capable of displaying discriminatory and highly teleological behaviour in ‘selecting’ from among the members of a population those that are the ‘fittest’. Once one sees Gaia as a hierarchy, however, then it becomes clear that, at each level in the hierarchy, the larger system provides its constituent sub-systems with their immediate external environment, their less immediate external environment being provided by the systems higher up in the hierarchy.

It is thus not an undefined environment that ‘selects’, but the larger system itself, which like all natural systems, is capable of discriminatory and teleological behaviour (see Principle 22). In the same way, at each level in the hierarchy, a system’s internal environment (to use a term coined by Claude Bernard) is provided by the smaller systems lower down in the hierarchy. The ecosphere itself provides its constituent systems with their total internal and external environments.

### **33. The hierarchy is the field.**

Natural systems are arranged to form a spatio-temporal ‘field’. Each system is, on the one hand, made up of the hierarchy of smaller systems that comprise it – its internal environment – and is, at the same time, part of the hierarchy of larger systems – its external environment. The ecosphere is its total field.

**34. Systems are most stable when living within the internal-external environment; in other words, when situated in the field within which they evolved and grew up.**

A natural system is designed by its evolution, and hence its ontogenetic development (see Principle 17), to live within a specific field, or limited range of internal-external environments. It is when doing so that a natural system is best able to contribute to the stability of the Gaian hierarchy and, hence, best to maintain its own stability and ensure that both Gaian needs and its own needs are best satisfied.

**35. Adaptive homeotelic behaviour is only possible within specific ‘environmental parameters’**

A system can only be maintained along its course or Way (see Principle 51) in an internal and external spatio-temporal environment or field that has not diverted too far from the optimum, i.e. that to which it has been adapted by its evolution and upbringing.

The range of environmental conditions to which a natural system can adapt is contained within its ‘environmental parameters’.

It is significant that vernacular societies have only been able to preserve their structure and culture in relatively unchanging or slowly changing environments. Few have been able to withstand the dramatic changes induced by contact with industrial man.

Modern economic development inevitably causes the internal and external environments of vernacular peoples to diverge beyond the limits of their environmental parameters. Once this point has been achieved, their cybernetic mechanisms break down. Others may take over, but then they can only maintain a lower level of stability, involving greater discontinuities. If this process continues, then eventually, only the most rudimentary external controls are operative; those, in fact, that are provided by the ‘Four Horsemen of the Apocalypse’. The rapid degradation of the global environment under the impact of our economic activities has reached a point where this state of affairs is beginning to obtain globally and at almost all levels in the Gaian hierarchy.

**36. Systems at different levels in the Gaian hierarchy are homeotelically mutualistic.**

If the climax state is the optimum for an ecosystem, and indeed for the ecosphere, the overall ecosystem and, if such a system provides its sub-systems with their optimum environment – that in which their stability is maximised – it must follow that their ‘interests’ coincide and that life processes, that satisfy the needs of the climax whole (the ecosphere) must also be those that also satisfy the needs of its differentiated parts. Such life processes are thereby homeotelically mutualistic (whether co-operative or competitive) all the way up the Gaian hierarchy.

**37. The goal of Gaian life processes is the achievement and maintenance of stability.**

The goal of Gaian life processes is to achieve and then maintain the basic features of Gaian order in the face of environmental challenges. This is the same as saying that their goal is the achievement and maintenance of Gaian stability – defined, in a dynamic context, as the reduction to a minimum of discontinuities.

A stable developing biological system is said to be ‘homeorhetic’, a term coined by C. H. Waddington (from the Greek words ‘*homeo*’ = same and ‘*rhesos*’ = flow). Such a system maintains itself on its critical path or ‘chreod’ (from the Greek for ‘necessary course’), that which will enable it both to attain its optimum end state or goal, and, at the same time, (though Waddington does not say this), to contribute to the stability of Gaia, that is, to behave homeotelically to her. Waddington’s chreod is thereby ‘the Way’ (see Principle 51) of a developing biological system.

A homeorhetic system will be capable of correcting divergences from the central chreod, and hence of maintaining its stability in the face of environmental challenges, so long as these occur within its environmental parameters (see Principle 35).

Once a stable system has achieved its climax state, it becomes ‘homeostatic’, a term coined by the physiologist Walter Cannon (from the Greek words ‘*homeo*’ = same, and ‘*statis*’ = state). A homeostatic system is one that maintains its basic order – and (though this was not noted by Cannon) that of the hierarchy of larger systems of which it is part. i.e. the Gaian hierarchy that is homeotelic to it – in the face of environmental challenges, and is capable of correcting any divergences from it,

again, so long as these occur within the system's environmental parameters.

Jim Lovelock has shown how Gaia herself is a stable system in this sense of the term. Paul Weiss regarded the achievement of stability as a basic feature of all natural systems, at all levels of organisation.

A stable system can also be regarded as one that is under control. An unstable system, on the other hand, is one that is out of control; its self-regulatory mechanisms (which are essential to control and to the maintenance of stability) having broken down – as is the case with our modern industrialised society. Such a society can only be kept functioning, very precariously, and at the cost of moving in the direction of ever greater instability, by such asystemic controls as the state bureaucracy, and market institutions.

Hollings distinguishes between stability and resilience, [40] a distinction that Waddington rejected. [41] The former is simply stability achieved by increasing complexity, the latter stability achieved by increasing diversity – as is adaptive to a disordered environment.

### **38. Gaian changes occur for the purpose of preventing more general and more disruptive changes.**

Orderly or controlled change from a pre-established path or chreod (see Principle 37), leading to the establishment of modified chreods or Way, and a modified climax, occurs not *per se* nor as a means of achieving some anti-Gaian end-state (progress), but rather as a means of avoiding bigger and more disruptive changes that would adversely affect the generalities rather than the particularities of Gaia's critical order.

The goal of evolution is thus what Julian Huxley called "*stasigenesis*" as opposed to "*anagenesis*". Evolutionary change ceases to occur once an evolutionary climax is achieved. This explains the very long periods during which species underwent no change at all, and the very rapid and concentrated changes that occurred when conditions favoured the achievement of new climaxes – situations in which it could be predicted that stability would be increased; that is in which the probability of the occurrence of discontinuities, as well as the seriousness of such discontinuities, would be further reduced (see Principle 37).

### **39. When developing Gaian systems achieve their most stable state – their climax – they cease developing.**

As vernacular systems evolve or develop, their relationship with their internal and external environments is marked by ever smaller and less frequent discontinuities until an end state is achieved, at which point stability can no longer be increased. When this point is reached, systems, at all levels in the Gaian hierarchy, can be said to be as well adapted as possible to their respective environments and hence to Gaia as a whole, which is thereby as stable as is possible in the circumstances.

This must be the ideal situation. At the level of the ecosystem, it is referred to as the 'climax' – the adult state, so to speak. Once achieved, the system becomes homeostatic rather than homeorhetic (see Principle 37). It then changes minimally since there is no need for further change and energy and resources are only used for maintenance and repair (see Principle 58). Because this principle makes nonsense of the idea of progress, which is fundamental to the world-view of modernism (see Principle 40), the principle has been abandoned by modern mainstream ecologists.

The first ecologist to do so was Arthur Tansley at Oxford. He decreed that man, with the aid of science and technology, could outdo nature and achieve a different, and better, climax which he called the "*anthropogenic climax*", seeking thereby to rationalise and legitimise the idea of progress. This is very much the position of today's mainstream ecologists.

### **40. Progress is anti-evolutionary.**

If evolution is seen as random – as neo-Darwinists and reductionist scientists in general see it – then there can be no anti-evolutionary process. However, once evolution is seen as a teleological (see Principle 22) and homeotelic process, tending towards the achievement and maintenance of maximum Gaian order and stability – the climax – then if it is misdirected (see Principle 65) and tends, instead, in the direction of reduced Gaian order and stability – the disclimax – or its neo-pioneer state, then it must be regarded as heterotelic, pathological and indeed as anti-evolutionary.

A climax social system is one which is designed to fulfil its functions within a climax ecosystem – or, more precisely, within the climax ecosphere. That is why the tribal vernacular society is the most highly developed and why a modern institutionalised society, which can only subsist in a neo-pioneer or disclimax ecosystem, is a ‘neo-pioneer’ or ‘disclimax society’. This explains why what our scientists, sociologists and economists have taken to be social or economic development, or social evolution, is in fact regression to a lower state of evolutionary and hence of social development.

That the climax biosphere which man inherited cannot be improved by man and hence that any notion of progress is an illusion, was clear to vernacular man. Lao Tsu, for example, asks:

Do you think you can take the world and improve it?

I do not think it can be done.

The world is sacred.

You cannot improve it.

If you try to change it, you will ruin it

If you try to help it, you will lose it. [42]

Progress is regressive and anti-evolutionary. It involves, in effect, reversing three thousand million years of evolution, by systematically substituting a biospherically random (see Principle 22), atomised, low-complexity (see Principle 37), low diversity (see Principle 26), predominantly competitive (see Principle 28), externally and asystemically controlled (see Principle 48), heterotelically organised (see Principle 65), and hence immensely unstable (see Principle 65) organization of resources – the technosphere – for a biospherically ordered (see Principle 20), teleological (see Principle 22), organised, high-complexity (see Principle 26), high diversity (see Principle 26), predominantly co-operative (see Principle 27), internally and systemically controlled (see Principle 48) and homeotelically organised (see Principle 49), and hence highly stable, organisation of resources (see Principle 37) – the biosphere – with its associated atmospheric environment (Gaia, the Ecosphere).

#### **41. Natural systems are self-regulating.**

If natural Systems, by their own vernacular efforts, have succeeded in maintaining the critical order and stability of the biosphere for hundreds of millions of years, it can only be that they can function as cybernetic systems.

Walter Cannon has shown how biological organisms are capable of maintaining their homeostasis. Eugene Odum also sees ecosystems as cybernetic systems. Roy Rappoport, and Gerardo Reichel-Dolmatoff and his colleagues have shown how this is also true of tribal societies in New Guinea and Amazonia respectively, and Jim Lovelock and his colleagues have shown that this is true of Gaia herself.

As systems disintegrate under the impact of economic development, they become less stable (see Principle 65): this implies that environmental challenges are less effectively countered and corrected, and that discontinuities correspondingly increase. As this occurs, sophisticated internalised controls become inoperative, and the only controls that remain are crude external controls.

#### **42. A cybernetic system is endowed with a set of instructions, whose implementation, in the light of its total experience, enables it to achieve its goal of maintaining overall Gaian stability.**

These instructions are organised hierarchically, with the more general, non-plastic instructions (see Principle 44 – those that reflect the experience of the total Gaian spatio-temporal system and which reflect the system’s basic features – being differentiated into the more particular and more plastic instructions (see Principle 44) which reflect the system’s most recent experience, that of the sub-system in the latest evolutionary stratum, and which determine the system’s less basic features.

As the system disintegrates, so is the continuity of the instructions with which it is endowed, disrupted. It is then endowed instead with a new set of instructions that reflect no more than its most recent experience within the technosphere, whose implementation enables it to achieve the heterotelic goal of contributing to the technosphere’s continued expansion and, hence, to the further degradation of the biosphere on which it is (heterotelically) parasitical (see Principle 65).

#### **43. The instructions with which a system is endowed are non-plastic.**

General instructions, which reflect the experience of the total spatio-temporal system, as opposed to

that of its most recently developed spatio-temporal parts, are non-plastic and hence immutable in the short-term at least. This is the only way in which continuity and hence stability can be maintained. That is why genetic information is non-plastic. If it were plastic, then there would be nothing to prevent zebras from engendering baby wildebeasts and vice-versa.

That is also why cultural information – that which serves to mediate the behaviour of climax societies – must also be non-plastic. If it were plastic, then it would display no continuity or stability, nor would the societies involved; each generation being forced, as it is today, to develop *ad hoc* heterotelic (see Principle 65) expedients for dealing, ever less successfully, with its growing problems.

#### **44. A self-regulating system is endowed with a model of its relationship with its environment.**

Kenneth Craik was perhaps the first to show the role of the mental model in the mediation of human behaviour. Enlightened anthropologists, such as Reichel Dolmatoff, are now making it clear that the cybernetic behaviour of vernacular societies (see Principle 41) is based on a cultural model, formulated in the language of mythology.

The model, however, is indissociable from the instructions (see Principle 42) with which the system is also endowed, and is thereby subjective.

It provides a picture, not of the environment itself, but of that relationship between a system and its environment that seems relevant to the achievement of the former's goal. In other words, it is not just an academic model but a teleological model – the one that best serves to guide the mediation of an adaptive (homeotelic) behaviour pattern. More precisely, it provides the system with the information required to implement its non-plastic instructions by enabling it to adapt its less plastic instructions to changing environmental conditions.

Such an instruction-model complex, I refer to as a 'cybernism' (see Principle 45 and Principle 46). A genome falls within this category, as does a gene-pool, a brain and the cultural pattern of a vernacular society.

#### **45. All information within the biosphere is organised into a cybernism.**

The normal scientific concept of information, as developed by Shannon and Weaver, is undoubtedly of use to communications engineers, but it plays no role in the strategy of the biosphere. [43] Biospheric information is not divided up into atomised and isolated 'bits', but is organised instead into a cybernism. In fact, it is best defined as a cybernismic organisation, to which both cybernismic complexity (see Principle 48) and cybernismic diversity (see Principle 48) contribute.

It is in the light of the information organised in a cybernism that data relevant to the achievement of a system's goal are detected, interpreted and transformed into information that is used for mediating adaptive (homeotelic) life processes. This must be true at all levels in the Gaian hierarchy, including that of the vernacular human society.

As such a society breaks down, the model, like the instructions, and hence the cybernism itself, ceases to reflect the system's total spatio-temporal experience, and comes instead to reflect the recent short-term experience of its cognitively maladjusted parts (see Principle 64). Under such conditions, the cybernism serves to mediate heterotelic, as opposed to homeotelic, behaviour.

#### **46. The generalities of the cybernism with which a system is endowed are non-plastic.**

The generalities of a system's cybernism are also non-plastic, in line with the instructions that govern it. The particularities, in terms of which these generalities are differentiated, are, on the other hand plastic, so that they can be adapted to new environmental conditions in that way that will permit the preservation of the generalities, and hence of the cybernism's basic features.

The cybernism thus maintains its own homeostasis in the face of environmental change. Lerner has shown how this applies to the genome and has formulated the principle of "*genetic homeostasis*". [44] A F C Wallace has shown how societies will do everything in their power to preserve their world-view, or social cybernism, in the face of information that might cast doubt on the validity of its basic axioms. He referred to this as the principle of "*cognitive preservation*". [45]

Significantly people can rarely be induced to abandon an obviously unadaptive world-view by rational arguments. Something approaching a religious conversion is required, as pointed out by William Sargent in his well-known book, *The Battle for the Mind*. [46] The process involved is isotelic (see

Principle 24) to 'genetic recombination', which must be seen as the basic mechanism of radical evolutionary change. This religious conversion could be referred to as a 'neural-recombination', though it is, more specifically, the information organised in the neurons of the brain that is reorganised, or that is recombined, to give rise to a new world view or cybernism.

The vast literature on messianic or "*revivalist*" movements, as Wallace refers to them, is of particular relevance to this issue. These give rise to cultural transformations that are occasionally adaptive to new conditions.

The world-view of modernism, which rationalises and validates present suicidal policies, is, still firmly entrenched, and misguided efforts are being made to preserve it in the face of all the mounting evidence that it is both false and destructive. It is nevertheless under assault and must eventually lose all credibility and collapse. Revivalist movements – hopefully inspired by ecological ideas – may play a critical role in achieving this end, and may eventually give rise to homeotelic societies which would seek to recreate the order of the biosphere, in so far as this is now possible.

#### **47. Instructions are provided sequentially.**

If life processes are sequential, it is because they are mediated on the basis of a specific sequence of instructions that are interpreted in the light of the cybernism and hence differentiated from, and adapted to, existing conditions.

Each stage in a life process must be triggered off by the occurrence – or, as control becomes internalised, by the prediction of the occurrence – of a situation which will be influenced by the preceding stage. The more orderly the process (as in the development of an embryo), the more essential it is that the informational sequence be respected.

The information, what is more, must be derived from the appropriate source, that to which the system is called upon to adapt at each stage in the sequence. Thus a child in a vernacular society derives its earliest and most general cultural information from the family. Subsequently, it is subjected to the influence of its peer group, and it later emerges into the community as a whole, from which it will then derive the complementary information that is required at that stage in its upbringing. If the child is to be properly socialised, the information from the appropriate source must thereby be made available in the correct order.

Information from sources extraneous to the system (asystemic), or made available in the wrong order, is random to the developing system and can only interfere with socialisation and give rise to heterotelic behaviour.

The idea of subjecting a child to a massive barrage of random data in no particular order, simply on the principle that the more knowledge the better, is indefensible and an educational policy, such as ours, that is based on such a notion can only give rise to increasing social and ecological disorder.

#### **48. The internalisation of control involves development of cybernismic complexity diversity.**

The complexity of any life process not only depends on systemic complexity but also on the associated cybernismic complexity, which provides the instructions (see Principle 42) and the associated model – that is, the cybernism (see Principle 45) – in the light of which, the instructions are directed or orientated, and hence the information required to assure the mediation of those life processes that are adaptive to specific environmental conditions, and that are thereby homeotelic to the larger system.

In the same way, cybernismic diversity is required to ensure the mediation of a diversity of life processes that are adaptive to a wide range of possible environmental conditions (see Principle 26).

For more sophisticated organisms, there ceases to be the trade-off between complexity and diversity; in the development of the neo-cortex for example, both cybernismic complexity and diversity are correspondingly built-up. Were it not for this, individuals would have to sacrifice an increasing measure of systemic diversity in order to achieve a similar degree of adaptiveness to a specific range of conditions, and thereby correspondingly reduce their ability to adapt to the requisite range of possible challenges that they might encounter in a disorderly environment.

#### **49. Natural Systems are homeotelic to Gaia.**

All vernacular life-processes are geared to the achievement and maintenance of Gaian order and stability. I refer to such life-processes as *homeotelic* (from the Greek '*homeo*' = same, and '*telos*' =

goal) . Life processes, on the other hand, which are purely egotistic, and that do not contribute to Gaian order, I refer to as 'heterotelic' (from the Greek word *'hetero'* = different, and *'telos'* = goal). Such life-processes are abnormal and indeed aberrant.

This view is diametrically opposed to that now in vogue in mainstream scientific, sociological and ecological circles. In such circles, living things are seen as seeking exclusively to maximise the random proliferation of their own genes – the ultimate goal of life within the biosphere – a principle clearly formulated by Richard Dawkins in his book, *The Selfish Gene*.

On the other hand, behaviour that is not altogether egotistic is referred to as 'altruistic'. It is regarded as a special case, and explained away in a highly contrived way, so that it should not appear to invalidate the preposterous thesis of the 'selfish gene'.

This is but a means of rationalising, and hence legitimising, the atomisation of modern society, and the competition and aggression that characterise it.

### **50. Homeotelic life processes are designed to satisfy the needs of the Gaian hierarchy as a whole, not just those of a constituent part.**

Natural systems are all in dynamic interrelationship, not only at the same level in the Gaian hierarchy but also at different levels. A change occurring to one system will thus have a 'ripple effect', which will affect, to a different degree, all the other systems in the Gaian hierarchy. As Garrett Hardin put it, "You can't do only one thing".

What is important is that the 'ripple effect' should be beneficial – in other words, that it should contribute to Gaian stability. A homeotelic act does just this. It seeks to satisfy the needs of all the systems that make up the Gaian hierarchy, and hence those of the ecosphere itself. It is thus a solution multiplier.

A heterotelic act, on the other hand, is only designed to have an effect on one system – at most a few – without regard for its effects on all the others, and will thereby create a veritable wave of maladjustments, that will themselves create further and further waves of maladjustment, especially among cognitively maladjusted systems (see Principle 65), thus correspondingly reducing the stability of the Gaian hierarchy. It is thus a problem multiplier.

### **51. Vernacular man follows the Way.**

The Way may best be defined as the behaviour pattern that conforms to the laws of the Cosmos (the ecosphere or Gaia) and is thereby homeotelic to it.

The socialised members of a vernacular society abide by the traditional law because that law has been enacted by the ancestors 'in the Dawn Period'. They also observe the traditional law because they see it as being the law of the Cosmos, and hence of the whole cosmic hierarchy.

This law is best referred to as 'the Way'. It is only by following the Way, as vernacular man fully realises, that nature can be induced to dispense its unique benefits and human welfare can thereby be maximised. As Hesiod wrote:

"When men do justice and do not go aside from the straight path of right, their city flourishes and they are free from war and famine. For them the Earth brings forth food in plenty, and on the hill the oak tree bears acorns at the top and bees in the middle; their sheep have heavy fleeces, their wives bear children that are like their parents." [47]

Radcliffe-Brown noted how this was also true of the world-view of the Australian aborigines:

"Man is dependent upon what we call nature; on the regular succession of the seasons, on the rain falling when it should, on the growth of plants and the continuance of animal life. But, while for us the order of nature is one thing and the social order is another, for the Australian, they are two parts of a single order. Well-being, for the individual or for the society, depends on the continuance of this order free from serious disturbance. The Australians believe that they can ensure this continuance, or at least contribute to it, by their actions, including the regular performance of the totemic rites." [48]

Many vernacular societies had a word for the Way, a word that often also referred to the order of the Cosmos. The ancient Greeks referred to it as *'Dike'*, which also referred to the order of the Cosmos that it served to maintain. The term also meant 'justice' or 'righteousness'. Significantly, it was by observing the traditional law or *'nomos'* that one also followed the Dike, and thereby helped to maintain both the order of society and that of the Cosmos.

The Chinese concept of *'Tao'* also refers to the order of the Cosmos and to the path that must be

followed in order to maintain it. As Jane Harrison writes:

“Tao is like Dike, the way, the way of nature; and man’s whole religion, his whole moral effort is to bring himself into accord with Tao.” [50]

Among the Indians, the Vedic concept of ‘*R’ta*’ was very similar. As Maurice Bloomfield tells us:

“The processes whose perpetual sameness or regular recurrence give rise to the representation of order, obey *R’ta*, or their occurrence is *R’ta*. ‘The rivers flow *R’ta*. The year is the path of *R’ta*. The Gods themselves are born of the *R’ta* or in the *R’ta*; they show by their acts that they know, observe and love the *R’ta*. In man’s activity, the *R’ta* manifests itself as the moral law.” [51]

The Vedic poet, as Krishna Chaitanya notes, knew that to obtain Nature’s bounty, man must obey *R’ta*. “For one who lives according to Eternal Law, the winds are full of sweetness, the rivers pour sweets. So may the plants be full of sweetness for us.” [52]

The Avestan concept of ‘*Asha*’ was very similar, as is the Buddhist concept of ‘*Dharma*’. De Groot described *Dharma* as “*the universal law which embraces the world in its entirety*”. [53]

The Way is that behavioural strategy which all men must follow if they are to contribute to the critical order of the Gaian hierarchy, and hence to maximise their welfare. Indeed, it is the opposite to that strategy which we are today induced to follow and which, by contributing to the ephemeral order of the technosphere (which is heterotelically parasitical on the biosphere), must correspondingly lead to Gaia’s contraction and degradation.

## **52. Institutional society abides by a heterotelic law that is the law of the technosphere. It is best referred to as the anti-way.**

If, in vernacular society, there is a clear notion of the Way – that is, of the correct path that man must take in order to maintain the order of his society and that of the Cosmos itself – there is also a notion of the *wrong Way* – that which violates the traditional law and thereby brings about a reduction in the order of the Cosmos.

Among the Greeks, the anti-Way was often referred to as ‘*ou themis*’, the opposite to ‘*themis*’ (which occasionally was used to mean ‘social order’ and occasionally to mean ‘the order of the pantheon’, as well as the path to be followed to achieve such order). Among the Indians of the Vedic period, it was referred to as ‘*an-R’ta*’, the opposite to *R’ta*, and among the Buddhists as ‘*Adharma*’, the opposite to *Dharma*.

In the language of the Melanesians, to adopt the anti-Way (and hence to divert from the traditional law) is seen as violating a taboo. As Roger Caillois writes,

“An act is taboo if it disrupts the universal order which is at once that of nature and of society. Such behaviour is the source of all disasters.”

As a result of breaking a taboo,

“the Earth might no longer yield a harvest; the cattle might be struck with infertility; the stars might no longer follow their appointed course; death and disease could stalk the land.” [54]

This notion is almost certainly common to all tribal peoples whether in Africa, Asia, America or Oceania and undoubtedly was also common to the tribal peoples of ancient Europe.

## **53. In a vernacular society, discontinuities such as epidemics, floods and droughts are seen as the inevitable consequences of diverting from the correct path or the Way.**

If to divert from the Way is to cause a reduction in the critical order of the Gaian hierarchy, then it must lead to the destabilisation of the individual’s relationship with his society and the society’s relationship with its environment. Such destabilisation can only be reflected in all sorts of maladjustments or discontinuities, such as epidemics, floods, droughts, famines and wars. The vernacular diagnosis for such disasters, however simplistic it might seem to those reared on the scientific world-view, *is in fact correct*. What is more, it is the only diagnosis that will lead to a homeotelic solution, one that consists in correcting the offending diversion from the Way, and thereby restore the critical order of the Cosmos.

By contrast, to see the discontinuity as being triggered off by a single event or cause that is antecedent in time (see Principle 9), as we do today, is to justify the adoption of technological expedients aimed at neutralising the guilty ‘cause’ (using pesticides for instance to kill off guilty pests; radiotherapy to kill off a guilty tumour etc.) but which are thoroughly heterotelic (see Principle 65) and which only succeed in masking the real ‘cause’ of the problem.



To interpret the problem in terms of single causes is thus to be guilty of the Great Misinterpretation (see Principle 66).

**54. Economic life processes in a vernacular system are homeotelic and follow the Way.**

All natural systems, whether organisms, societies or ecosystems make use of resources and the distribution of those resources within them, must be governed by the same general laws (see Principle 2) – those that assure that it contributes to, and is thereby homeotelic to, the achievement and maintenance of the Cosmic hierarchy.

It must be obvious that resources are so distributed within that highly integrated system which is a biological organism. Food is digested and nutrients distributed to where they are required in order to keep the organism as a whole functioning as effectively as possible.

Starvation triggers off a highly homeotelic rationing system, assuring that nutrients are first provided to essential organs, such as the brain, the heart and respiratory system and only after that to less critical organs and tissues.

That the same principles apply at the social level among vernacular societies has been well documented by the more enlightened economic anthropologists and economic historians, such as Marcel Mauss, Karl Polanyi, George Dalton, Raymond Firth and others. In such societies, there is no formal economy, the units of economic activity corresponding to the basic social units – namely the family and the community – both of which are integral parts of the Gaian hierarchy. The economic activities undertaken by these social groups are, to use Polanyi's term, "*embedded in social relations*". [55] They thereby serve social rather than purely economic ends and are thus under social control and that of the Gaian hierarchy.

In a modern economy, such control has broken down. Institutional (economic and political) groupings, which have replaced social groupings, are an integral part of the technosphere and are thereby parasitical on the biosphere.

The goal of those who lead these institutions is the satisfaction of their own individual interests, regardless of the consequences on the biological, social and ecological systems that make up the Gaian hierarchy ('politics are politics' and 'business is business').

Indeed, instead of serving to maintain the critical order of the biosphere, which is the goal of homeotelic economic activities, the modern economy serves, on the contrary, to transform the biosphere so that it may serve to accommodate the maximum throughput (extraction, transformation, distribution, consumption) of resources.

Economic activity thereby comes to serve the opposite function from that for which it was designed. Not being subjected to the sophisticated internal controls of a climax biosphere – but only to the very much less sophisticated external controls of an increasingly degraded and pioneer-like biosphere – economic activity expands anarchically, as does a malignant growth, until such time as the biosphere becomes so degraded that it can no longer accommodate it.

Since in a truly vernacular society, economic activity is homeotelic and self-motivating (see Principle 23), no financial incentive is required to assure the homeotelic distribution of resources. Financial transactions are minimal, and hence Gross National Product (GNP) is zero, or near zero. As a society disintegrates, however, and as more functions previously fulfilled by vernacular processes must be paid for, so GNP increases. GNP thus provides a vague measure of the extent to which heterotelic economic processes have replaced homeotelic ones and hence, by implication, a measure of biospheric disintegration.

**55. In a vernacular ecosystem, the consumption of resources is homeotelic.**

If production in a vernacular ecosystem is homeotelic to the Ecosphere, so is consumption. This not only serves the interests of the consumer, but those of the Gaian hierarchy as a whole. Indeed, from the Gaian point of view, consumers, at each level in the food cycle (see Principle 56), must consume, since it is by doing so that they apply quantitative and qualitative controls on the populations on which they live, and thereby contribute to maintaining the critical order of the Ecosphere.

Under such conditions, 'there is no free fast', since failure to consume what must be regarded as the optimum resources would relax these controls, leading to a disruption of the biosphere's critical order. It is only once this disruption is under way and consumers start consuming more than the optimum, that Barry Commoner's principle that "*there is no free lunch*" becomes applicable. [56]

## **56. In a homeotelic economy all resources must be recycled.**

All life processes require material resources. The biosphere, however, though it may be an open system from the point of view of energy, is a closed system from the point of view of materials. This means that in order to prevent the running down of the biosphere, and to permit the increase in order that has characterised the last few thousand million years, the raw materials of life are exploited in an extremely subtle way, each of them being recycled via complex social and ecological processes, thus permitting their constant re-use and avoiding their accumulation as waste.

The most basic of such processes is the 'food chain', which should really be referred to as the 'food cycle', whereby the primary producers (grass, algae, phytoplankton) which alone can harness the energy of the sun, are eaten by herbivores, who in turn are preyed on by carnivores, while their dead bodies, together with other dead matter, are eaten by scavengers and what remains is broken down by micro-organisms into the nutrients required by the primary producers.

All living things (including vernacular man) co-operate in assuring the success of this key cycle, without which life could not be sustained. Vernacular man believes that what is taken from the Earth has to be returned to it, often as a reparation for what they see as a crime.

This seems to have been the case among the ancient Greeks, as is implied in the sole surviving fragment of the writings of Anaximander:

"Things perish into those things out of which they have their birth, according to that which is ordained; for they give reparation to one another and pay the penalty of their injustice according to the disposition of time." [57]

Gerardo Reichel Dolmatoff shows how this attitude is also held by the Kogi Indians of Colombia. [58]

The anthropological literature on the subject is in fact considerable.

This principle is also clearly reflected in the moving grace repeated before each meal by those who follow the teachings of the British philosopher John Bennett:

All life is One,

And everything that lives is Holy.

Plants, animals and men,

All must eat to live and nourish one another.

We bless the lives that have died to give us food:

Let us eat consciously,

Resolving by our Work

To pay the debt of our existence. [59]

Unfortunately, few in the modern world see things that way any longer. Our industrial society ignores this critical constraint. Economic growth is a one-way process, the biosphere being systematically transformed into the technosphere and technospheric waste, both of which, from the point of view of the biosphere, constitute waste or randomness – a process that cannot continue indefinitely.

## **57. In a homeotelic economy, no wastes can be generated which cannot serve as the resources for other life processes.**

As Barry Commoner points out, nature does not generate a chemical substance for which it does not also generate the appropriate enzyme for breaking it down into those elements required as the resources for other life-processes.

Our modern science-based society, however, generates an increasing number of materials (synthetic organic chemicals, for instance, in which category we must include most modern pesticides) which have played no part in the strategy of nature and which must simply accumulate in some form, which, because of their toxicity, must seriously interfere with Gaian life processes.

Today, our ground water supplies are increasingly contaminated. Pollution is rapidly reducing the capacity of the seas – in particular the North Sea, the Mediterranean, the Baltic, and the Adriatic – to sustain complex forms of life. Forty percent of the flatfish in many parts of the North Sea suffer from tumours; the seal population is dying off, having been in an increasingly diseased state for many years; sea bird populations are ever less capable of reproducing themselves, with ever worse breeding failures; and vast algal blooms are invading the North Sea and the Baltic, depriving the infested areas of oxygen.

Chemical waste disposal on the land is increasingly difficult. About \$100 billion (some say \$300

billion) are required to clean up America's 40,000 or so known waste dumps – a sum that will never be made available. Not surprisingly, more and more chemical wastes are now being dumped in the Third World with the connivance of crooked politicians. The problem is, in fact, completely out of control and the biosphere becomes ever less capable of supporting complex forms of life.

**58. As a developing homeotelic system approaches its climax, and thereby ceases to grow, so does it make use of less resources, which are now only required for maintenance and repair.**

As this process occurs, so the system becomes correspondingly less dependent on the availability of such resources. In addition, it has a lower impact on its environment, whilst its consumption of resources and its generation of wastes (which will serve as the resources for other processes (see Principle 56) reach their optimum, that which will prevent any shortages and at the same time prevent the accumulation of wastes, and thereby any in-crease in randomness.

By contrast, our modern society, committed as it is to the uncontrolled, or runaway, process of economic growth, (which multiplies problems rather than solving them, and which interprets these problems in such a way as to rationalise expedients that require further economic growth and hence the use of further resources) will, as it develops, make use of ever more resources, which will still further increase its impact on its environment; thus causing ever greater resource shortages and the accumulation of ever greater amounts of wastes or biospheric randomness – further increasing overall instability.

**59. As a system develops towards a climax state, so it comes to generate an increasing proportion of the resources that it requires.**

In order to ensure its necessary supplies, a system will not allow itself to become dependent on external sources of nutrients and other resources unless it can predict that supplies can be maintained. This is most likely when they are generated by the system itself; hence systems will tend to generate more and more of the resources they require as they develop towards their climax state – and reduce their consumption of resources that they cannot generate. Eugene Odum notes that this applies to ecosystems as they develop towards their climax. [61]

Our industrial society, on the other hand, in order to exploit the so-called 'economies of scale', and in order to specialise in the production of those products that it is best capable of producing (the principle of comparative advantage), increases its consumption of those resources that it does not itself produce (the components of the products it manufactures and those products which are produced most 'economically' by other societies) thus increasing rather than reducing instability.

**60. The technology made use of by vernacular societies is homeotelic and thus follows the Way.**

In a vernacular society, all technological activities like all the economic activities that they serve are 'embedded in social relations'. They fit into the society's cultural behaviour pattern, playing a differentiated role within it. Technology is thus under social and ecological control and is homeotelic to Gaia.

This being so, technology transfer is very difficult in a vernacular society and indeed rarely occurs. Mary Douglas describes, for instance, how the Lele, who live on one bank of the Congo River, persist in making use of their own relatively simple technologies, although they are well acquainted with the more sophisticated technologies made use of by the Bushong who live on the opposite bank of the river. It does not occur to the Lele to make use of Bushong technology, since the latter does not fit in with their own cultural pattern, nor is its use rationalised (and hence validated) by their metaphysical beliefs and mythology. [62]

As a society disintegrates, however, these controls become less effective and technology, like the economic activities that it renders possible, gets out of control and comes exclusively to serve the interests of one or more interest groups, at increasingly intolerable social and ecological costs.

**61. In a vernacular society, political activities are homeotelic and thus follow the Way.**

In a homeotelic society, the units of political activity, like those of economic and technological activities coincide with the natural social groupings; the family; the community; the society itself.

There are no formal institutions or governments. The elders, and in some cases the chiefs, are first and foremost citizens – that is, differentiated or properly socialised members of the social system, rather than professional members of a socially heterotelic institution. Nor do they gain financially from their political activities, although these provide them with social prestige. Nor do they really govern in the sense in which the government of a modern nation state governs, their role being limited to enforcing the traditional law – that which assures social homeotely, and that which thereby best helps to maintain the critical order of the Cosmos.

This does not mean that all changes are avoided, only that changes are measured or controlled and occur only as a means of preventing bigger and more disruptive changes (see Principle 38)

The modern state is alien to society and to the Gaian hierarchy. It is under no effective social or ecological control. It is, in effect, just another interest group, concerned with little more than its own petty interests, which almost invariably conflict with those of the society it is supposed to serve. [63] Unfortunately, this particular interest group also controls the police, the army, and to a large extent the media and the law-courts. For that reason, and there are many others, the policies that serve its petty interests, and which largely coincide (in both capitalist and socialist nation states) with those of the most powerful economic interest groups, are very difficult to bring back under Gaian control.

### **62. In a vernacular society, education is homeotelic and thus follows the Way.**

Margaret Mead defines education as “*the cultural process, the way in which each new born individual is transformed into a full member of a specific human society, sharing with the other members a specific human culture*”. In other words, education is differentiation within a social system. It is thus the means whereby a vernacular society reproduces itself, so as to maintain its continuity or stability, and hence the preservation of its critical order and that of the Gaian hierarchy of which it is part.

As a society disintegrates and becomes heterotelic, such education becomes impossible, since if there is no society, new-born individuals cannot be socialised into it. One cannot learn to become a differentiated member of something that is no more. Education then degenerates (as it has in our modern society) into institutional, as opposed to vernacular, education: it involves no more than the communication to youth of socially random information (see Principle 47), which is designed to enable them to fulfil their heterotelic functions within the technosphere, which being (heterotelically) parasitical to the biosphere, can only contribute to the latter’s further degradation.

### **63. In a vernacular society religion is homeotelic and thus follows the Way.**

The gods of a vernacular society are the spirits of the biosphere. They are organised, what is more, in a way that reflects the society’s subjective view of its critical order. [64] In this way the organisation of the gods serves to sanctify that of the biosphere.

Reichel Dolmatoff convincingly demonstrates (with reference to the Indians of Colombian Amazonia) that the pantheon of a tribal system provides it with a model of its relationship to its natural environment, on the basis of which it can mediate an adaptive behaviour pattern, monitoring any diversions from it and correcting them. [65] With the social and economic destruction that necessarily accompanies economic development, this homeotelic religion is disrupted. The gods cease to have any relationship with society and with the biosphere of which it is a part, which become desanctified. This desanctification of the real world provides modern man with a licence to destroy it.

Religion, instead of being homeotelic, and thereby serving to maintain that behaviour pattern or Way, that leads to the preservation of the critical order of the Cosmos, becomes ‘otherworldly’. Its concerns shift to a different world and the behaviour it gives rise to, becomes purely heterotelic, as is that inspired by the mainstream religions of today. The role of such other-worldly religions is then but to provide the alienated inhabitants of the degraded world that economic development brings into being with individual succour, which may help them to accept their lot but which does not lead them to improve it.

Earthly protagonists of such religions even go to considerable lengths to rationalise economic development and the conditions it brings about, in theoretical terms, as did the nonconformists, who as Max Weber [66] pointed out, so convincingly played a decisive role in triggering off the industrial revolution. In this way, the adepts of such religions can at once serve God while systematically annihilating his creation.

We have no alternative but to recreate, along with a homeotelic society, a homeotelic religion, in which the gods are those of such a society and of the Cosmos of which it is an integral part – Gods which can only be served by restoring their creation and preserving it with religious zeal.

**64. As the environment at each level in the Gaian hierarchy diverts from the optimum, so will maladjustments at all these levels correspondingly increase.**

The more Gaian order is disrupted and the environment diverts from that to which a system has been adapted by its evolution, the less well can they satisfy the system's real needs. Stephen Boyden refers to this as the principle of "*phylogenetic maladjustment*" (more recently he has used the term "*evo-deviance*"). [67]

Boyden regards the 'diseases of civilisation' – ischaemic heart-disease, tooth-carries, most forms of cancer, diabetes, peptic ulcer, appendicitis, varicose-veins – whose incidence increases with per capita GNP, itself a measure of the rate at which the technosphere is expanding and biospheric order is being disrupted, as the symptoms of evo-deviance. [68] More precisely, they should be seen as the symptoms of evo-deviance at a biological level.

Crime, delinquency, alcoholism and drug-addiction (over and above what, in a given society, is homeotelic to it), child-abuse, schizophrenia and suicide (as Durkheim showed in his famous study *Le Suicide* [69] must also be regarded as the symptoms of growing alienation – or of evo-deviance at a social level – as experienced by people living in any anonymous mass-society in which they are deprived of their normal social environment (the family and the community) (see Principle 53).

Epidemics affecting man and non-human animals and plants are but the symptoms of evo-deviance at an ecological level, caused by the disruption of ecosystems and, hence, of the cybernetic controls that prevent population explosions among pathogens and their vectors.

Floods and droughts are also the symptoms of evo-deviance at the ecological level, since those conditions created by economic development necessarily involve deforestation, erosion and desertification and must necessarily increase the incidence and severity of floods and drought. By contrast, in a climax ecosystem, everything conspires to reduce their incidence to a minimum.

Finally, the pathetic failure of our scientists, economists and sociologists, armed with all their computers, laboratories and, sitting as they are on mountains of 'scientific knowledge', to understand the world they live in, is, above all, a symptom of ecodeviance at the *cognitive level* or of cognitive maladjustment – of which the most fatal manifestation is the 'Great Misinterpretation'. (see Principle 66).

The world they have helped create is unintelligible to man; he is simply not designed by his evolution to comprehend it. It has no meaning to him. As economic development proceeds, man is thereby condemned to living in a world to which he is ever less well adapted biologically, socially, ecologically and cognitively, and also, aesthetically and spiritually. He thereby becomes increasingly alienated from a world ever less capable of satisfying his real human needs.

**65. Instructions that are interpreted in the light of a cognitively maladjusted system will give rise to misdirected, and hence heterotelic, life processes.**

Misdirected life processes must be seen as heterotelic. Heterotelic processes may satisfy, albeit imperfectly, some specific needs of a natural system. However they are unlikely to satisfy all its needs, and will in any case do so in a way that prevents them from contributing to the overall goal of maintaining Gaian order.

Thus, by taking a mistress, a man may at least satisfy sexual and psychological needs. However, insofar as this diverts him from fulfilling his husbandly functions towards his wife, his paternal functions towards his children, and thereby prevents him from maintaining the critical order of his family – an essential component of the critical order of the Gaian hierarchy – it is a heterotelic relationship.

Technological solutions to problems caused by the disruption of natural systems are of necessity heterotelic. They are what Stephen Boyden calls 'pseudo-adaptations'. [70] Consider the present epidemic of tooth decay which is known to be largely caused by eating junk food. The homeotelic solution is to correct the diversion from the appropriate heterotelic diet by readopting the appropriate homeotelic diet, that which man has been adapted to by his evolution. Such a solution, however, would be cognitively unacceptable. It would be seen as reversing the course of scientific and

technological 'progress' that has brought the junk food into being.

It would also be politically and economically unacceptable – that is it would not be tolerated by all those asystemic institutions (political and commercial) whose very *raison d'etre* is to provide heterotelic expedients.

Hence the problem is dealt with by providing those whose teeth have decayed with false teeth – a 'pseudo-adaptation' which mainstream scientists have failed to distinguish from a real adaptation, or, in the language of this essay, a 'heterotelic adaptation' as opposed to a homeotelic one.

The principal failings of such a heterotelic adaptation are,

- firstly, that the false teeth are no real substitute for the real ones:
- secondly, that they must be paid for whereas the real ones are free; and,
- thirdly, that it only addresses one of the very many problems caused by the consumption of junk foods.

These tend to be considerably devitalised, containing less proteins and trace elements than fresh food, thus leading to malnutrition and hence a reduced resistance to disease. Moreover, junk foods also tend to be contaminated with pesticide residues and chemical additives of all sorts. For both these reasons, and there are others, junk foods are the main cause of such diseases of civilisation as cancer, diabetes, diverticulitis, peptic ulcer, appendicitis, ischaemic heart-disease, and indeed tooth-decay, all of whose incidence increases with per capita GNP.

In addition, the production of junk foods on the present scale has altered the character of agriculture, which is now largely geared to producing the raw materials for the food-processing industry. Such an agriculture involves large-scale monoculture and the intensive use of machinery and chemicals. It is environmentally very destructive, leading to erosion and desertification on a grand-scale. It is also socially destructive, leading to the annihilation of sound rural communities, and to the concentration of the population in vast overcrowded cities.

In other words, we are faced with the typical 'ripple-effect' or 'chain-reaction', caused by the widespread adoption of a set of associated heterotelic expedients in the food industry. Tooth decay is only a minor ripple, a small almost insignificant link in the chain reaction that must cause maladjustments throughout the Gaian hierarchy. To treat it heterotelically, by providing its victims with false teeth, will do nothing to stem the tide of the destruction. It does little more than mask one of its symptoms, rendering it correspondingly more tolerable to the public, thereby helping to perpetuate the chain reaction towards disaster.

## **66. Cognitive maladjustment in the modern world leads to the Great Misinterpretation.**

Cognitively maladjusted modern man invariably refuses to face the indisputable fact that the problems that confront him are of his own making, or, more precisely, the inevitable consequence of economic development or progress – a totally heterotelic enterprise – to which he is fully committed politically, economically, psychologically and, indeed, quasi-religiously. On the contrary, modern man will persuade himself that if these problems occur, it is because economic development, and hence 'progress' has not progressed far enough. Thus if so many Third World people suffer today from malnutrition and famine, it is, he will persuade himself, because they are underdeveloped. If their agriculture could be modernised sufficiently, if they could be induced to buy from us a sufficient number of tractors, combine-harvesters, artificial fertilisers and chemical pesticides and, of course, build more dams to provide the requisite irrigation water, then these problems would rapidly be eliminated.

If they suffer from poor health, the same principle holds; economic development would provide them with the modern hospitals, the trained doctors and the pharmaceutical preparations that would rapidly make them healthy.

I refer to this as the 'Great Misinterpretation'. It is consistent with the dogma basic to the world-view of modernism, that nature provides man with no real benefits (see Principle 25), and that all benefits are man-made (see Principle 25), the product of scientific, technological and industrial progress, which is thereby seen as providing a panacea for all man's problems.

The Great Misinterpretation is of course very convenient; it is the only interpretation in fact, that can justify progress, and by the same token, satisfy the political and economic interests of the institutions that provide these man-made 'benefits', and on whose functioning, as development proceeds, we all become increasingly dependent.

Not surprisingly, the Great Misinterpretation has become institutionalised as the fundamental dogma of the world-view of modernism.

### **67. The development of the world-view of ecology is the Great Reinterpretation.**

I have sketched very tentatively indeed what I take to be some of the more important laws or principles of the worldview of ecology. The reader will see that they are closely interrelated, relatively consistent and thereby provide at least a vague idea of the lines along which we should proceed in the development of a coherent and comprehensive ecological world-view. It is only once we are all imbued with such a world-view that it will be possible to reinterpret the nature of the terrible problems that confront us today – to undertake, in fact, the Great Reinterpretation.

These problems must be correctly identified as but the symptoms of the degradation of natural systems at all levels (biological, social and ecological) in the hierarchy of the ecosphere under the increasingly intolerable impact of our economic activities.

In the light of this world-view, it must also become clear that the impact of these activities must be systematically reduced, and that this, in effect means creating a new society that is structurally and cognitively geared to the achievement of a very different goal from that of the society we live in today. It means building up our biological, social and ecological wealth, the only wealth that can satisfy the real needs of living things including man. It means, in effect, a return to the Way – to a pattern of behaviour that recognises that the earth is sacred, and that it is only by respecting its sanctity that it will continue to dispense to us those unique blessings that must constitute the only real and lasting wealth.

### **References**

1. Eugene Odum, *Fundamentals of Ecology* Saunders, Philadelphia 1953: 1923.
2. Eugene Odum, *personal communication*.
3. Donald Worster, *Nature's Economy* Sierra Club, San Francisco, 1977.
4. Ramon Margalef, "On Certain Unifying Principles in Ecology". *The American Naturalist* No. 897, November – December 1963.
5. R. H. Peter, "From Natural History to Ecology". *Perspectives in Biology and Medicine* No. 23, 1980, pp. 191-203.
6. E. F. Haskell, "Mathematical Systemisation of 'environment', 'organism' and 'habitat' ". *Ecology* No. 21, 1940, pp.1-16.
7. C. J. Glacken, *Traces on the Rhodian Shore*. University of California Press, Berkeley 1967.
8. Eugene Odum, *Personal Communication*.
9. Ludwig von Bertalanffy, "General Systems Theory" in *Problems of General Systems Theory* Toronto, 1960.
10. See Edward Goldsmith, "Gaia: Its Implications for Theoretical Ecology". *The Ecologist* Vol. 18 No. 2/3, 1988.
11. Donald Worster, *op.cit supra 3*.
12. C. H. Waddington, *The Evolution of an Evolutionist*. Cornell University Press, Ithaca, New York 1975.
13. Karl Popper, *Objective Knowledge*. Routledge and Kegan Paul, London 1958.
14. Michael Polanyi, *Personal Knowledge*. Routledge and Kegan Paul, London 1958.
15. James Lovelock, *Gaia: A New Look at Life on Earth*. Oxford University Press, Oxford 1979.
16. Donald Worster, *op.cit. supra 3*.
17. Theodore Roszack, *Where the Wasteland Ends*. Anchor, Garden City, New York, , 1973.

18. Donald Worster, *op.cit supra* 3.
19. Ibid.
20. A. Sabatani, "Molecular Biology: A Scientific Critique". *The Ecologist* Vol. 14 No. 2, 1984.
21. J. H. Woodger, *Biological Principles*. Routledge and Kegan Paul (2nd impression), London 1948.
22. David J. Merrell *Ecological Genetics*. Longmans, Harlow 1981.
23. Robert Mann has distinguished between accuracy and precision. In many cases quantification permits greater precision at the cost of reduced accuracy, in that quantification can only be achieved by simplifying the message and reducing its ability to reflect reality.
24. Father Placide Tempels, *La Philosophie Bantoue* Presence Africaine, Paris 1948.
25. Sir Julian Huxley, *Issues in Evolution*. London 1942.
26. A. R. Radcliffe Brown, *Structure and Function in Primitive Societies*. Cohen & West, London 1965.
27. Frank Edgerton, "Changing Concepts in the balance of Nature". *Quarterly Review of Biology* No. 48, 1973, pp.322-50.
28. W. Paley, quoted by Donald Worster *op.cit. supra* 3.
29. Peter B. Medawar & J. S. Medawar *The Life Science* Wildwood House London 1977.
30. Don Ospovat, *The Extension of Darwin's Theory*.
31. Ernst Mayr, *The Growth of Ecological Thought: Diversity, Evolution and Inheritance*. Harvard University Press, Cambridge Mass. 1982.
32. Paul Weiss, "The Living System" in Arthur Koestler and J. R. Smythies, eds., *Beyond Reductionism*. Hutchinson, London 1970.
33. Sir Julian Huxley, *op.cit supra* 25.
34. Robert May, *Stability and Complexity in Model Ecosystems*. Princeton University Press, Princeton. 1973.
35. Sir Julian Huxley, *op.cit supra* 25.
36. Peter Kropotkin *Mutual Aid, a Factor of Evolution*. Horizon books, Boston, 1914.
37. D. H. Boucher, "The Idea of Mutualism" in D. H. Boucher *et al* (eds) *The Biology of Mutualism*. Croon Helm, London 1986.
38. Ilya Prigogine & Isabelle Stengers, *La Nouvelle Alliance*. Gallimard Paris, 1979.
39. Arthur Koestler, *Janus: A Summing Up*. Hutchinson, London 1977.
40. C. S. Hollings, "Resilience and Stability of Ecosystems". In Erich Jantsch & C. H. Waddington (eds) *Evolution and Consciousness*. Addison Wesley, New York 1976.
41. C. H. Waddington, *Introduction*. In Erich Jantsch and C. H. Waddington, *op.cit supra* 40.
42. Lao Tsu, *Tao Te Tching*, No. 29.
43. Claude E. Shannon & Warren Weaver, *The Mathematical Theory of Communication*. University of Illinois Press, Urbana 1967.
44. I. M. Lerner *Genetic Homeostasis*. Oliver and Boyd, Edinburgh, 1954.
45. A. F. C. Wallace, "Revitalisation Movements: Some Theoretical Considerations for their Comparative Study". *American Anthropologist* No. 58, April 1956.
46. W. Sargent, *"The Battle for the Mind"*. London 1953.



47. Hesiod, quoted by F. M. Cornford *From Religion to Philosophy*. Harper & Bros. New York 1957.
48. A. R. Radcliffe Brown, *op.cit supra* 26.
49. F. M. Cornford, *op.cit supra* 47.
50. Jane Harrison, *Themis*. London 1912.
51. Morris Blumefull, *The Religion of the Veda*. Quoted by F. M. Cornford, *op.cit supra* 47.
52. Krishna Chaitanya, "A Profounder Ecology: The Hindu view of Man and Nature". *The Ecologist* Vol. 13 No. 4, 1983.
53. Ede Groot, *The Religion of the Chinese*. New York, 1910, quoted by F. M. Cornford *op.cit supra* 47.
54. Roger Callois, *L'Homme et le Sacré*. Paris 1946.
55. Karl Polanyi, *The Great Transformation*. Beacon, New York 1957.
56. Barry Commoner, introduction to S. S. Epstein and R. Grundy (eds) *Consumer Health and Product Hazards; Cosmetics and Drugs, Pesticides, Food Additives*, Vol 2. MIT, Cambridge Mass. 1974.
57. F. M. Cornford, *op.cit supra* 47.
58. Gerardo Reichel-Dolmatoff, "Cosmology as Ecological Analysis: A View from the Rainforest" *The Ecologist* Vol. 7 No. 1, 1977.
59. Nicholas Hildyard, personal communication.
60. Barry Commoner, *op.cit supra* 47.
61. Eugene Odum, "The Strategy of Ecosystem Development". *Science* 164, pp260-270.
62. Mary Doublas, *The Lele of the Kasai*. London 1966.
63. See Pierre Clastres, *La Société contre l'Etat*. Editions de Minuit, Paris 1974.
64. See Edward Goldsmith, "The Religion of a Stable Society". In Edward Goldsmith "The Stable Society". Wadebridge Ecological Press, Wadebridge, 1978.
65. Gerardo Reichel Dolmatoff, *op.cit supra* 58.
66. M. Weber, *The Protestant Ethic and The Spirit of Capitalism*. Charles Scribener & Sons, New York 1930.
67. Stephen Boyden, "Evolution and Health". *The Ecologist* Vol. 3 No. 8, 1973.
68. *Ibid.*
69. Emile Durkheim, *Suicide*. Routledge & Kegan Paul, London 1963.
70. Stephen Boyden, *op.cit supra* 67.