

## SYSTEMS HUMANECOLOGY: TOWARDS A NEW PARADIGM

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In her call to this conference, Dr. Agni Vlavianos-Arvanitis, President of the Biopolitics International Organisation, uses the following diagram to illustrate the urgent need that brings us together. In the words that I would use to express it, the need is for conceptual and material changes conducive to bringing about a more sustainable future mode of human existence in the biosphere.

figure



As a specific means toward that general end, Dr. Arvanitis proposes for our consideration the establishment of an International University for the Bio-Environment (I.U.B.E.) and further invites us to join with her in defining some of the goals and priorities to which the policies and programs of such an institution might best be dedicated.

Let me confess at the outset that my own interests in this connection are mainly those of a scientist and teacher. To be more precise, humanecology is the principal focus of my current activities as a researcher and educator. In this connection, my work generally involves the advancement of what my friends and colleagues at Tufts University in Medford, Massachusetts, call environmental literacy (Cortese, 1990).

What this means in theory and practice is rather complex and might well be the subject of quite another talk. Suffice for present purposes to say that most of my present scholarly and professional activities are concerned with the development and implementation of educational policies and programs in which various 'images of humanity and nature' are explored (Chorover, 1990a) via a 'problem-posing' pedagogy (Freire, 1984). My work in this connection grows out of my experience as a laboratory scientist and seeks to provide both a 'general audience' and students at all levels of formal instruction with increased opportunities to learn about human/ecological relations. By the latter, I mean mainly relations obtaining both within and among human systems neuro-biopsychosocioculturally considered and between human and ecological systems.

For present purposes, let me therefore merely express it as my view that work of the kind I am trying to do can best be done in an organizational context that is assiduously non-governmental and otherwise as independent as can possibly be of traditionally established geopolitical arrangements. As I see it, such a context is essential for enabling the participants to adopt a problem-posing orientation that is not so much international as it is both bioregional and global (or intercontinental).

### **Paradigms defined**

The term paradigm is to be understood in this context in a sense that both follows from and goes somewhat beyond the usage first introduced by Kuhn (1962). To be more precise, it refers to "the particularly, conceptually and materially compound and complex, systematically interrelated, set of scientific beliefs, values and practices prevailing within a given scientific community at a given moment of its development. By extension, and with respect to any given moment or series of moments, the term 'prevailing paradigm' denotes the overall epistemological, axiological and methodological framework within which the membership of the community in question pursues and evaluates what passes among them for 'normal science'." (Kuhn, 1962; Chorover, 1990b; Chorover & Kildow, 1991).

According to Kuhn (1962), crises in science and hence the potential for a paradigm shift are characteristically marked by the emergence, within a given scientific community, at a given moment in its development, of serious and sustained disagreements regarding the

theoretical and practical sufficiency of the prevailing paradigm. Since that is what is presently happening, the point is worth pursuing further.

Let me therefore pursue it in relation to the foregoing diagram. In introducing his version of it into our discussion last year, Dr. Mayur invited us to reflect on the following fact: the emergence of our present human/ecological predicament has coincided with the rise to conceptual and theoretical pre-eminence among us of a particular scientific paradigm.

The paradigm in question is, of course, the one known to us as the modern scientific paradigm. Let me not be misunderstood. It was not Dr. Mayur's contention then (nor is it mine now) that the evidence of the involvement of the modern scientific paradigm in the genesis of our present human/ecological predicament constitutes a persuasive argument against its validity. Rather, what is at issue is the proposition that sole reliance upon it is both a necessary and sufficient basis for 'bridging the gap' between our presently unsustainable mode of existence and the more humanecologically sustainable future that we would like to see for ourselves and our children.

### **Changing environments; shifting paradigms; differing perspectives; conflicting perceptions**

Before proceeding with any further discussion along these lines, it is useful to bear in mind two interrelated facts of great importance. The first is that both the present human/ecological crisis and the division of scientific opinion that attends to it, arise in a context where "everything that is said is said by someone" (Maturana & Varela, 1988, p. 28). The second is that all of our perceptions, descriptions and depictions of the world and its contents—including our perceptions of ourselves, each other, and our present environmental predicament—are incurably perspectively conditioned and constrained.

Thus when it comes to entertaining questions about the adequacy of the prevailing paradigm—or, for that matter questions, of virtually any comparable kind - everyone who entertains them, in any context, inevitably does so from a particular personal and professional perspective. And we and the present context are no exceptions.

This means, in part, that precisely because we are, as the old saying has it, 'merely human', we cannot help but have all sorts of specifically and generically human neurobiopsychosociocultural limitations. Hence, even our best aimed and intended efforts to discover and assert what actually is the case are inescapably subject to various perspectival limitations and are inevitably bound to lead us to conclusions that are, at best, somewhat partial. It is thus an ineluctable 'boundary condition' for what follows that our perceptions and descriptions of the world and its contents cannot help but be influenced by various conclusions to which we have come in the course of our own prior personal and professional experience.

These points being accepted, let me now try to articulate my own view that, precisely, the prevailing paradigm entails, how it has risen to its presently pre-eminent theoretical and practical position, and why it has lately come under attack as insufficient.

Needless to add, it will be impossible for me to give a single, simple and unequivocal answer. Indeed, in accordance with what has previously been said, I want to acknowledge that the answers I am in a position to give are conditioned and constrained by my admittedly very limited personal and professional perspective. Accordingly, what follows is not at all intended to cast doubt on others or challenge their equipotential legitimacy.

### **The classical paradigm**

Once upon a time, when *scientia* was just another word for 'knowledge,' and paradigm meant generally both 'pattern' and 'exemplar', a world view and value system prevailed within which humanity and nature were seen as comprising two essentially interrelated aspects of an organic and purposeful whole.

A pertinent example is the version of this paradigm which prevailed among the ancient Greeks. According to it, all of what we would today call human and ecological systems were regarded as essentially interrelated parts of the terrestrial portion of the aforementioned whole. The Greeks called this terrestrial portion the *oikoumene* - a term closely akin to our word 'ecosphere' (Glacken, 1967, pp. 17-18; 23-24).

However, within its more vitalistic versions, the then prevailing classical paradigm - and the world view, value system and lifestyle associated with it - permitted, indeed encouraged, metaphorical ways of thinking. Hence, likeness tended to be drawn between the *oikoumene* and the living body of the organism. Further to the point, within the animistic conceptual and material content of the classical paradigm, this living world system was often further anthropomorphized and personified. Among the ancient Greeks, for example, it took the human-like supernatural form of the dancing pagan mother goddess, Gaia, or Gaea, or Ge, whose lingering etymological traces may still be found in such terms as geometry, geography, geology, etc.

As Carolyn Merchant has so persuasively argued, this classical paradigm has clear moral and ethical implications. Thus, from olden through medieval times, it served as "a cultural constraint restricting the actions of human beings .... As long as the earth was considered to be alive

and sensitive, it could be considered a breach of human ethical behavior to carry out destructive acts against it" (Merchant, 1980, p. 3).

### **The modern world and world view**

But, as everybody knows, the reorganization of western society during the 16th and 17th centuries had as its epistemological, axiological and methodological corollary a decisive paradigm shift, sometimes somewhat imprecisely termed the scientific revolution.

The so-called modern scientific paradigm that engendered and emerged from this shift was predicated upon a radical conceptual and material divorcement of humanity from nature. It also eschewed animistic vitalism in favor of mechanistic reductionism and, far from standing in opposition to interference by humans in the natural order of things, took as its avowed goal the domination by humans of nature (Liess, 1972).

Meanwhile, in continental Europe and later in the New World, the multifaceted social and cultural reorganization that the emergence of the modern scientific paradigm coincided with and helped to promote, brought with it many changes, including a great commercial expansion, fierce domestic and international economic competition, an escalation in the scope and violence of military conflict, widespread industrialization, urbanization and colonization, chattel slavery, genocidal conquest, and the rapacious exploitation of natural resources on a previously unprecedented scale.

It is not at all my intention to suggest or imply that the adoption of the modern scientific world view and value system created these conditions or that its subsequent rise to pre-eminence is the simple linear cause of our presently increasing and unsustainably exploitative and destructive lifestyle. No doubt the conceptual and material roots of our present predicament are much older and go far deeper.

Nevertheless, it is important to understand that the widespread acceptance of beliefs, values and practices associated with the modern world view, value system and lifestyle did signal and help to promote a decisive shift toward a self-consciously intrusive, humanecologically insensitive, and self-avowedly masculine science. And while many of its "seminal thinkers conceived of themselves as doing neither more nor less than God's work, one notable effect of the theoretical development and practical deployment of their version of science was to bring about what a poet (Schiller) saw as the 'disgoddling of nature', a sociologist (Weber) termed 'the disenchantment of the world' and a feminist historian of science (Merchant) calls the 'death of nature'."

### **Modern science as "the death of nature"**

Lest the impression be left that this is an exaggeration, let me quite briefly recall some of the frankly violent and explicitly male sexual terms in which at least two of its more influential 'founding fathers' expressed some of the aims and objectives of what was to become modern science.

Francis Bacon is often recalled for having equated knowledge with power: *Nam et ipsa scientia potestas est*. In his view, there were laid up in the womb of nature many secrets of excellent use. In his vision of avowedly masculine modern science, human knowledge and human power meet as one with the effect of forcing feminine nature to yield up her secrets. Through science, nature was to be probed and hounded in her wanderings ... forced out of her natural state and squeezed and moulded ... put in constraint ... bound into service (and made a) slave.

Rene Descartes was of similar mind. As he saw his new method, it provided a clear, sure, unambiguous and certain means by which a proudly individualistic and cavalierly exploitative male intellect might rationally lay claim to worldly omnipotence thereby achieving the masculine domination of nature. Thus, in 1637, Descartes described himself as having discovered a way of reaching

*"knowledge that will be of much utility in this life; and ... by which, knowing the nature and behavior of fire, water, air, stars, the heavens and all the other bodies which surround us as well as we understand the different skills of our workers, we can employ these entities for all the purposes for which they are suited, and so make ourselves masters and possessors of nature."*

Cartesian rationalism - characterized by one commentator as "a pure masculinization of thought" (Stern, 1966, quoted in Easlea, 1981, p. 65) - provides the modern scientific paradigm with its principal intellectual foundations and the logical underpinnings of its monistic, mechanistic, reductionistic and deterministic conception of the world and its contents.

Thus, from a cartesian perspective there is one and only one fully creditable way to look at the material world as a whole, namely as a vast and insensate clocklike machine operating according to strictly deterministic laws that are, in principle at least, completely amenable to discovery through the rigorous application of the conceptual and material tools and techniques of mechanistic reductionism (i.e. analytical atomism; Lasswitz, 1890). Accordingly, in the eyes of Descartes and his many credulous followers, all living organisms were likewise machines and likewise analyzable for purposes of domination and control.

### **A question of values**

Given that its explicitly avowed goal from the outset was the domination of nature and that its mechanistic and reductionistic methods of procedure involve a persistent and recurrent 'divide and rule' approach to the study of world and its contents, it is perhaps not surprising that the modern scientific paradigm has risen to theoretical and practical pre-eminence. Indeed, modern science has been so successful in this regard that the beliefs, values and practices associated with it have achieved the scientific equivalent of what in the broader socio-cultural sphere might best be characterized as ideological and political hegemony.

Since the modern paradigm has no place within it for values intended to restrict or constrain the abuse of humanity or the destruction of nature for frankly exploitative ends, it is perhaps not surprising that the putatively purely rational power of modern science and technology have so often been developed and deployed for destructive and exploitative purposes.

But what is duly remarkable, is that while the powers of modern science and technology have sometimes been used for good and sometimes for ill, so many credulous adherents of the modern scientific paradigm have persisted so doggedly in the claim that its core conceptual and material entailments are devoid of any axiological (value-oriented) dimensions whatsoever.

To be more precise, it is virtually universally held among its proponents that the modern scientific paradigm provides a uniquely clear, certain, and objectively true view of the world. And the credit for this capability is commonly attributed to the allegedly value-free and morally and ethically neutral nature of the approach that it affords.

### **The alleged Archimedean point**

This is not the place to discuss in detail how this strange, purportedly simultaneously both virtuous and value-free posture of complete moral and ethical detachment is attained. Suffice it merely to say that in Descartes' case, it was attained by making our rational thinking itself an ostensibly Archimedean Point. Let me briefly explain.

The Sicilian scientist and wonder-maker, Archimedes of Syracuse (287-212 B.C.) is famous in part for having struggled, without success, to find for himself a single, absolutely fixed, completely immovable and unshakable position of rest - i.e. a vantage point - to serve as a firm and secure point of departure for all theoretical and practical purposes. Given such a place to stand, he believed that he would be in a position, both figuratively and literally, to 'move the world.' As a matter of fact, it was with explicit acknowledgment of Archimedes' quest and in self-avowed emulation of it that Descartes, having embarked on the path of radical doubt, was duly led, as he tells it, to the famous Cogito.

By what right, one might reasonably ask, does Descartes presume thus to allow supposedly purely rational thinking to predicate itself as the inconcussible foundation and basis for its own attempt "to master and possess" nature? On what grounds can this single aspect of human mental life be isolated and used to define itself in this way? Indeed, is it rational to thus reduce the fulsome complexity of mental life to this one aspect of cognitive activity and to further reify and concretize it, as Descartes did, into what he called the "thinking thing", *Res Cogitans*? Or is Cartesian rationalism just a cleverly concocted concatenation of the fallacies of reduction, reification and misplaced concreteness?

### **The need for new ways of thinking**

Whatever the answers, there is no denying that modern science in its cartesian form has succeeded in turning nature rationally to account. But that, as I see it, is only the beginning of the problem. Perhaps the best way of putting the issue that most immediately concerns me here is by juxtaposing two facts. The first is that what presently passes among us for modern science reflects beliefs, values and practices that have remained largely unchanged for centuries. The second is that we are presently living in the nuclear age.

A remark by Albert Einstein may help to put the latter fact in perspective. It was his view that: "the unleashed power of the atom has changed everything, save our ways of thinking and we thus drift toward unparalleled catastrophes. We need a new way of thinking if humanity is to survive."

My own experience inclines me to take Einstein's plea for a conceptual re-orientation quite seriously. Accordingly, I will try, in what follows, to offer some hopefully constructive suggestions regarding the development and implementation of a humanecologically more sustainable, post-modern scientific paradigm.

### **Problematic aspect of the prevailing paradigm**

For present purposes, perhaps the first and foremost things to be noticed about it are its absolute monism and the singular extremity of its

commitment to complete and uncompromising rationality. As already noted, adherents to the paradigm in question commonly regard it as providing the one and only fully creditable approach to take for all serious scientific intents and purposes. Moreover, that approach is predicated solely and entirely upon scrupulously rational methods of procedure in which large, complex and interrelated aspects of the world and its content are persistently and recurrently divided up and broken down into their ostensibly 'simpler' and more 'fundamental' constituent elements or parts. These, in turn, are then subjected to 'objective' study by putatively detached observers trained, as I myself was, in one of many different fields of specialization, each of which tends to be regarded as essentially separate and distinct.

By taking this monistically and monolithically rationalistic approach, the modern scientific paradigm has provided, throughout the 350-year long history of its development, an exceptionally powerful way of approaching a wide array of problems. Understandably, therefore, its many credulous adherents are inclined to regard the rise to hegemony of the prevailing paradigm as an unqualified blessing. In my own view, however, such uncritical 'boosterism' is both scientifically unwarranted and seriously problematical from the point of view of human survival.

### **A crisis of conceptualization**

A review of the history of the quintessentially modern 20th century clearly reveals that the paradigm in question has played a decisive role in shaping the development and deployment of the myriad modern industrial technologies and agricultural practices that today figure so prominently in our evidently unsustainable human/ecological predicament.

That being accepted, it is difficult to disagree with what Albert Einstein said in a message addressed specifically to intellectuals: "By painful experience, we have learned that rational thinking does not suffice to solve the problems of our social life." (Einstein 1948)

Taken together with his previously quoted remark about the need for new ways of thinking, Einstein, it seems to me, has provided us with a diagnosis and a prescription whose applicability extends well beyond the effects of the unleashing of atomic power. Indeed, the same need is evident with respect to many other developments that have resulted from an uncritical adherence to the modern scientific world view and value system and whose overall impact upon the course of human events have been comparably world-shaking.

And here we return to Dr. Arvanitis' central point as related by Dr. Mayur: there are many areas in which past and present patterns of human activity and inactivity predicated on the dictates of the modern scientific paradigm have brought humanity to a point of crisis. And once we become aware that the myriad signs and symptoms of the present crisis cannot be adequately defined and dealt with within the framework of the prevailing paradigm, we cannot help but see that nothing less than a decisive paradigm shift is needed to define and deal with our present environmental predicament in a scientifically and humanecologically sustainable way.

### **The human sciences**

I am a neuropsychologist by training, and neuropsychology, as its name implies, is a hybrid biological/psychological subdiscipline centrally concerned with the scientific study of relations between the organisation and development of the nervous system, and most especially the human brain, on the one hand, and the organisation and development of human mental life—e.g. cognition of thinking and effect or feeling—and behavior, on the other.

In its hybrid nature, neuropsychology may be usefully compared with social psychology, where, by contrast, the central concern is relation between the thoughts, feelings or attitudes and actions of individuals and the beliefs, values and practice of the various human social groups to which we belong. But in noticing that neuropsychology and social psychology differ from each other and from various other fields of human inquiry in respect to the particular human systems with which they are centrally concerned, we should not overlook the no less pertinent fact that they share much in common. In particular, they share with each other, and with all other contemporary academic disciplines that are centrally concerned with the scientific study of 'human systems', be they human organisms, individuals, groups or institutions, a common connection with one and the same modern scientific tradition.

To be more precise, all of the 'human sciences' are predicated upon the epistemological, axiological and methodological dictates of the modern scientific paradigm.

One of the main tenets of this paradigm, as already noted, and as further described below, is that it provides the one and only fully creditable approach to take for all serious scientific intents and purposes. It is thus a matter of some interest that recent developments have begun quite seriously to challenge its sufficiency. Needless to say, my own search for a sustainable alternative to the prevailing paradigm has been stimulated, at least in part, by experiences that I have had in my own field of scientific specialization; experiences in which approaches predicated upon the prevailing paradigm have proven themselves insufficient to deal with specific situations and issues of some theoretical and practical significance.

However, as I see them, the insufficiencies of the prevailing paradigm become particularly relevant to present and future work in the human

sciences when it is recognized that the conceptual and material aspects of our present human/ecological predicament are systematically interrelated. Thus, an unswerving commitment to the analytical atomism, mechanistic reductionism and monism of the prevailing scientific paradigm is at least partly responsible for at least some of the egregious failures as well as the notable successes of modern industrial society and the lifestyle that goes with it.

Stated in still more specific terms, my contention is that the air, water and soil pollution so commonly associated with our increasingly unsustainable, hyperactively exploitative, compulsively consumptive, excessively commodified, energy-intensive, high-tech lifestyle - together with myriad other material signs and symptoms that characterize the present 'environmental crisis' - have their conceptual counterparts in certain of the beliefs, values and practices fostered by the modern scientific paradigm.

Seen in this light, the aforementioned signs and symptoms of 'environmental crisis' appear as nothing so much as so many different outwardly-visible material manifestations of what is essentially an underlying crisis of conceptualization.

Lynton K. Caldwell has made this important point in the following words: "there could be no greater misconception of its meaning than to believe [the environmental crisis] to be concerned only with endangered wildlife, human-made ugliness and pollution. These are part of it, but more importantly, the crisis is concerned with the kind of creatures that we are and what we must become in order to survive." (quoted in Miller, 1988, p. iii)

What kind of creature are we? What must we become in order to survive?

If our chances for survival ultimately depend, as Einstein, for example, maintained, upon our readiness, willingness and ability to change our ways of thinking, and if our present ways of thinking about the world and its contents, including ourselves, derive - as they so clearly seem to us to do - from the dictates of the prevailing scientific paradigm, then it follows that in order to survive we need to develop and to apply an alternative scientific paradigm.

### **The emerging alternative**

As I see it, a fundamental transformation of prevailing scientific beliefs, values and practices is already underway, with implications that are profound for those of us who work in the human sciences. Among the developments on many fronts that have served to challenge the general sufficiency of the prevailing paradigm as a basis for defining and dealing with "the problems of our social life", none is more important than the challenge that has been raised against its doctrine of rational objectivity.

The idea that it takes a mentally and behaviorally detached and reflective 'objective' observer to do 'real' or 'serious' science has long been a key leitmotif of the modern scientific outlook. "We used to think of the universe as 'out there,'" writes the physicist John A. Wheeler, "to be observed as it were from behind the screen of a foot-thick slab plate of glass, safely, without personal involvement. The truth .... is quite different." As Wheeler goes on to note, it is a common consequence of Einstein's principles of relativity, Bohr's principle of complementarity, Heisenberg's principle of uncertainty, and other revolutionary developments, that "the observer is inescapably promoted to participator. In some strange sense, this is a participatory universe." (Wheeler, 1982, pp. 17-18)

Indeed, with respect to the archimedean pretensions of the modern scientific paradigm, it deserves recalling that Einstein initiated the discussion of what became his special theory of relativity with the trenchant observation that: "It is impossible by any experiment whatsoever to determine absolute rest." And this is not an isolated instance of the insufficiency of the modern scientific world view. On the contrary, it is but one among many 20th century scientific developments that point in the same general direction. As a result, in the words of one noted philosopher of science, "we are now moving into a phase of scientific thinking that differs from the science of the 18th and 19th centuries quite as significantly as the 'new philosophy' of the 17th century differed from the scholastic science of pre-Renaissance Europe" (Toulmin, 1982, p. 231).

Figure 1 compares and contrasts some key features of the prevailing and emerging scientific paradigms. As already noted, a salient feature of the latter is its replacement of the image of the scientist as 'detached observer' with the image of the scientist as 'participant' in as well as an 'observer' of the system(s) with which he/she is endeavoring to deal. The result of this and other changes is, in my view, an alternative paradigm that is both scientifically and humanecologically more sustainable than the prevailing one.

### **Envisioning a better world**

As already noted, the paradigm shift that is presently underway has many important implications for students of human systems. For example, insofar as our personal and professional commitment to changing our ways of thinking is framed in terms of the search for a more humanecologically sustainable scientific paradigm, and insofar as the latter requires us to acknowledge our inescapable involvement with the human systems we are trying to comprehend, it becomes incumbent upon us to give up our pretensions to moral and ethical 'detachment' and,

in the words of the report alluded to previously, to begin to acknowledge the need for us as scientists, engineers and scholars more generally to place greater "emphasis on high ethical values for science, its integration with social purpose, and on social responsibility and environmental sensitivity in its application."

In order for science to have a chance of being developed and used in ways that are more socially responsible and more sensitive to environmental concerns, we academic and professional specialists must also leave our 'ivory towers' and learn to cooperate with others in addressing the moral and ethical questions that the modern scientific paradigm misled us into thinking of as having no proper place in the domain of science. Indeed, as we all begin to increasingly address ourselves to the challenge of developing and implementing a new perspective that puts science and technology more sustainably in the service of both humanity and nature, we will have to learn to address ourselves more and more to questions of a kind that we have heretofore been precluded from dealing with in our conventional academic and professional capacities. One such question is: "What kind of a world do we want to live in?"

As the Nobel laureate biologist, George Wald, once observed: "All of the the really important questions in any scientific fields are the ones that an intelligent child asks and, getting no answers, learns to stop asking." Within the positivistic framework of the modern scientific paradigm, the foregoing question is quite simply 'meaningless' and therefore unaskable. But, then again, if we are committed to placing "great emphasis on high ethical values for science, its integration with social purpose, and on social responsibility and environmental sensitivity in its application," then we obviously have no alternative but to try to articulate a vision of the future that science and technology are expected to serve.

Here again, the proceedings of the 1990 Athens symposium offer some significant encouragement. For, as part of our deliberations, and notwithstanding the many and varied perspectival differences among us, we managed, through cooperative dialogue, to evolve a consensually-shared "vision of a better world," and, hence, a more sustainable future for humanity in the biosphere.

The vision itself is too detailed to permit a brief summary of its contents here. It will therefore have to suffice for present purposes simply to say that the desiderata we arrived at were generally concordant with the sentiments expressed, for example, in the concluding statement issued by the delegates to the 1981 World Council of Churches (WCC) meeting held at MIT. They are also entirely consistent with the criteria used by the United Nations Development Programme (UNDP) in defining the concept of human development upon which its Human Development Report 1990 is based. The WCC statement called upon scientists, engineers and other academic and professional specialists to work together and with others towards the development of a "more just, participatory and sustainable society." The UNDP defines human development as a "process of enlarging people's choices" including, most especially the choice to "lead a long and healthy life, to acquire knowledge, and to have access to resources needed for a decent standard of living." (UNDP, 1990, pp.10-11)

### **Getting there from here**

To those for whom this is an entirely unappealing vision, there is nothing further to say. But with those who agree that it is a vision worth pursuing, it is now pertinent to consider some questions regarding the prospects for its implementation. In effect, this means asking ourselves whether or not we believe that it is humanly possible to make significant headway toward a meaningful and effective realization of the stipulated desiderata and, if so, whether or not the presently prevailing paradigm provides a conceptually and materially sufficient theoretical and practical basis for such an undertaking.

I will address these two questions in turn. As might be anticipated, my answers to them are, respectively, a qualified yes and no.

### **Overcoming the barriers**

Let us not delude ourselves. As even the most casual survey of our present human/ecological predicament will suffice to attest, the prevailing conceptual and material barriers to the realization of a vision of a better world are considerable. Indeed, as Joanna Macy (1983) persuasively argues, it is just about impossible for any of us to come away from any such survey without feeling an almost overpowering sense of hopelessness regarding the prospects for human survival.

After all, in a world where war rages, in which repressive governments subjugate their peoples, in which the pursuit of corporate profits and personal affluence ravages an environment that all must share, and where the scale and scope of human problems seems overwhelmingly large in proportion to our powers to resolve them, it is extremely easy to despair and to thereupon subside into the kind of pessimism that sees an incurably flawed 'human nature' at the root of our present human/ecological predicament.

### **Pessimism regarding human nature**

I agree with Macy's view that any chances we have of overcoming the myriad threats to our survival must begin with an openly shared

acknowledgment of the powerlessness that we feel.

But I am also convinced that such an acknowledgment is only the first step. What next must be done is to reflect upon the self-fulfilling behavioral consequences that follow from pessimism and to overcome the gloomily cynical beliefs about 'human nature' that pessimism tends to elevate to the status of primal cosmic facts.

Leon Eisenberg (1972) has put well the point I am presently trying to make: "To believe that man's aggressiveness or territoriality is in the nature of the beast is to mistake some men for all men, contemporary society for all possible societies, and, by a remarkable transformation, to justify what is as what must needs be." (Eisenberg, 1972 p. 124)

The point is that pessimism about 'human nature' engenders personal and professional quietism and thus serves to maintain and perpetuate the prevailing status quo: "It is a luxury for the affluent, a sop to the guilt of the politically inactive, a comfort to those who continue to enjoy the amenities of privilege." (Ibid) Plainly, such quietism and pessimism is too costly for humanity as a whole. In my considered judgment, it is also factually unfounded, and in failing to combat it, we place our survival at great risk.

Quite a bit is actually known, by social psychologists, about the ability of expectations to shape actualities (Rosenthal, 1974). And, taken as a whole, the available evidence clearly compels the conclusion that in order to become "what we must become in order to survive" we must first of all begin to perceive ourselves as creatures capable of "changing our ways of thinking;" as people, in other words, who are ready, willing and able to believe in our capacity to at least begin to do what needs to be done to fashion a more just, sustainable and participatory mode of human existence for ourselves and future generations.

Restated, a soberly optimistic view of our potential for survival must include both a realistically attainable vision of a humanecologically more sustainable future and a commitment to its eventual attainment. And both must be based on a recognition of limitations. To paraphrase some words attributed to a wise one: "It is not required of us that we complete the task; but neither are we free to desist from it."

The emerging alternative paradigm, as I see it, is consistent with the foregoing view and vision. It also takes the aforementioned recognition and awareness properly into account. These are, in my way of looking at them, powerful additional reasons for regarding its adoption, however provisionally, as an essential precondition for the taking of future steps aimed at making actual what is humanly and ecologically both necessary and desirable.

## **Implementation**

In what respects, and to what extent, might the emerging paradigm guide us in taking such steps? Restated, the question is whether the actual 'real-world' implementation of an alternative paradigm would make any conceptually and materially meaningful difference in the movement toward the attainment of a more just, sustainable and participatory mode of human existence in the biosphere.

In order to answer this question in a scientifically sustainable way, the prevailing and emerging paradigms need to be further compared and contrasted. And precisely because "the proof is in the pudding," there simply is no sustainable substitute for conducting some real-world field tests in which the two paradigms in question can be directly compared and contrasted in terms of their relative ability to contribute to the sustainable resolution of actual human problems of significant scope and urgency.

Formal tests must therefore be planned and carried out in such a way as to provide for adequate evaluation. Unlike the prevailing paradigm, which ordinarily permits of evaluation only upon project completion, the emerging alternative invites two complementary forms of evaluation. The first, and in some ways the more important, is pro-active and formative. It entails constant attention to the problem of maintaining consonance between ends and means and ongoing, recurrent evaluation of project sub-goals and the manner in which work toward them is being carried out. The second is the final, terminal or summative evaluation in which the overall success or failure of the project is retrospectively evaluated. Unlike the formative evaluation, the summative evaluation should retrospectively endeavor to assess the successes, failures, costs and benefits of differential 'real-world' field tests of the sustainability of approaches based on the use of the 'prevailing' versus the 'emerging' or alternative paradigm.

## **Notes:**

1. Prepared for presentation at the Biopolitics International Organisation Fourth International Conference: "International University for the Bio-Environment" in Athens, Greece, January 10 to 14, 1991. Supported, in part, by a grant from the Lee and Lou Kuhn Foundation. The term humanecology (like its adjectival relative 'humanecological') is an intentionally ambiguous neologism compounded of 'human' and 'ecology' (or 'ecological') with the aim, in part, of keeping clearly in view the need - elaborated upon more fully below for 'high ethical values' to inform our ways of defining and dealing with relations obtaining both within and among

human systems and between 'humanity' and 'nature.'

2. Presented and developed by Dr. Agni Vlavianos-Arvanitis in *Biopolitics: The Bios Theory* (1989), Biopolitics International Organisation, Athens.
3. See also *Biopolitics: The Bio-Environment: Volume II - Bios in the Next Millennium*, the proceedings of the Second B.I.O. International Conference on Bios in the Next Millennium held in Athens, Greece on October 6-10 1989.
4. This and several related points regarding the influences of perspectives upon perceptions were among the main points made by me and my colleague, Judith T. Kildow, in a joint presentation at an MIT Faculty Seminar on Global Environment: An Interdisciplinary Perspective during the spring term of 1990.
5. As already noted, the initial definitive discussion of the applicability of the term/concept 'paradigm' to specifically scientific contexts is by Kuhn (1962). For a more extensive discussion of the three-fold conception of scientific paradigms presented herein and their relation to the more general cognitive, affective and expressive aspects of human systems at the neurobiological, psychological and socio-cultural levels of organisation and development, see Chorover, S.L. (1990b).
6. For a contemporary counterpart of this view, see Thomas, 1974; Margulis and Lovelock, 1975; Lovelock, 1979; 1988.
7. For an early but far from 'original' account of Ancient Greek creation methodology, see Hesiod or Homer; for a contemporary discussion, see e.g. Grant, 1962; for a relevant account of Gaian imagery and its scientific implications, see Sahtouris, 1989.
8. Lynn White, Jr., for example, locates The Historical Roots of our Ecologic Crisis in the depths of the Judaeo-Christian tradition (White, 1967).
9. These and many other equally revealing quotations may be found, together with insightful and relevant commentary on the connection between modern male attitudes towards both women and nature in the works of Liess, 1972; Merchant, 1980; Griffin, 1980; and Easlea, 1981.
10. Relevant essays by David Bohm, Cyril S. Smith and Harry Braverman deal with various aspects of the conceptual and intellectual fragmentation that results from this division of arguments to psychology and the other human sciences, see also Chorover, 1985; 1990.
11. The message was intended to be read at the organizing meeting for a peace conference of intellectuals. The context suggests to me that Einstein had at least two specific instances in mind wherein 'rational thinking' has been used to define and deal with "problems of .... social life." The one being the development and deployment of the atomic bomb by the U.S., the other, the resort to genocide in Nazi Germany between 1939 and 1945 as a "final solution of the Jewish problem." The former was also the subject of our previous quotation from Einstein. For a more detailed account of the latter and its ostensibly 'perfectly rational' rationale, see Chorover, 1979.
12. For a fuller discussion of the entailments of the emerging paradigm, see Chorover, 1990.
13. For a more extensive discussion of how beliefs about human nature relate to the actual course of human events, see Chorover, 1979.
14. Rabbi Tarfon, quoted from Pirke Avoth - "Sayings of the Fathers" by Ryan, 1982.
15. Plans for field tests along these lines at selected sites in the developing and developed world are currently in formation in collaboration with Dr. Rashmi Mayur, Director of Research and Training at the Urban Development Institute in Bombay, India.

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