EAST AND WEST: ANCIENT WISDOM AND MODERN SCIENCE*

Stanislav Grof
Big Sur, California

an overview of Western science and philosophy

In modern times, science and technology have become dominant forces in the world, and Western civilization with its pioneering role in technological development is commonly seen as a symbol of progress and enlightenment. This has been associated with a strong tendency to glorify progress and evolution and to look down upon the past as a time of infancy and immaturity. It has also been repeatedly emphasized that the ideological and cultural differences between East and West are absolute and unbridgeable. This was most succinctly expressed by Rudyard Kipling in his famous: "East is East and West is West and never the twain shall meet." A large international conference that has as its main theme the convergence of the ancient and the modem and the synthesis of the Eastern and the Western requires, therefore. a special introduction. It seems necessary to review and describe briefly the dramatic developments in Western science and philosophy of the last few decades that inspired this meeting and made it possible.

One of the major issues for the incompatibility of the ancient and the modern, as well as the Eastern and the Western, has been the fundamental difference between their dominant world-views and philosophies. Western scientific disciplines have described the universe as an infinitely complex mechanical system of interacting discrete particles and separate objects. In this context, matter appears to be solid, inert, passive and unconscious; life, consciousness and creative intelligence are seen as insignificant accidents and

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epiphenomena of material development. They emerged after billions of years of random mechanical evolution of matter and only in a negligibly small section of an immense universe.

the Eastern view of consciousness and creative intelligence

In contrast. the spiritual philosophies of the great ancient and Eastern cultures--or "perennial philosophy" as Aldous Huxley (1958) referred to them-e-describe consciousness and creative intelligence as primary attributes of existence, both immanent and transcendent in regard to the phenomenal world. Western science recognizes as real only those phenomena that can be objectively observed and measured; perennial philosophy acknowledges an entire hierarchy of realities-some of them manifest. others hidden under ordinary circumstances and directly observable only in certain special states of consciousness.

differences between materialistic science and perennial philosophy

The most critical difference between materialistic science and perennial philosophy can be found in regard to the image of human nature. Western science portrays human beings as highly developed animals and thinking biological machines who have a fleeting and insignificant role in the overall scheme of things. Perennial philosophy sees humans as essentially commensurate with the entire universe and ultimately divine. Western science offers psychological and psychopharmacological assistance to those individuals who have difficulties in adjusting to the miserable predicament of human life. Sigmund Freud (1959), the founder of psychoanalysis, described the goal of successful psychotherapy as •'changing the extreme suffering of the neurotic into the normal misery of human existence." Perennial philosophy offers a rich spectrum of spiritual techniques through which it is possible to recognize and experience one' s own divinity and achieve liberation from suffering.

advantages and drawbacks of each system

As far as practical consequences are concerned, materialistic science has developed effective means of alleviating the most obvious forms of suffering - diseases, poverty and starvation-but has done very little for inner fulfillment and genuine emotional satisfaction. As a matter of fact, against all expectations, increase of material affluence has been characteristically associated with a dramatic increase of mental disorders, alcoholism. suicidal rate. crime, violence, and social disintegration. Perennial philosophy has offered inner liberation to a select few, but has failed in offering solutions for the urgent practical problems of everyday existence and improving the external conditions of human life. This fact has been frequently mentioned by the pragmatic opponents of perennial philosophy as an argument denying

its value. In view of the above situation, the obvious question arises: Would it be possible to reconcile these differences and create a synthesis of Western science and perennial wisdom that would combine the advantages of both extreme approaches and avoid their drawbacks?

Since it is not possible to change the ancient and the "perennial," any attempt at such synthesis must involve changes in the philosophy of Western science. But is it possible to change the basic assumptions of science so drastically as to bridge the seemingly abysmal gap described above? And, more importantly, how can this be accomplished while preserving its formidable pragmatic power? Do not the everyday triumphs of mechanistic science constitute a clear proof of the accuracy of its basic philosophical assumptions?

limitations of scientific theory and attempts to define objective reality

One of the most important achievements of Western philosophy of science is the recognition that scientific theories are nothing but conceptual models organizing the data about reality available at the time. They are only useful approximations to reality and should not be mistaken for a correct description of reality itself. The relationship between theory and the reality which it describes is that of map and territory in Korzybski's sense (1933); to confuse the two represents a violation of scientific thinking-a serious error in what is called logical typing. Gregory Bateson, the famous American anthropologist and generalist, used to say that a person commiting logical errors of this kind may one day eat the menu instead of the meal. Since it is always possible to formulate more than one theory accounting for the available data, the problem in question is to find a theory that would be broad enough to incorporate some important aspects of perennial philosophy and yet preserve the pragmatic power of mechanistic science.

An extremely useful modern concept in this respect is that of a "paradigm." It is a word coined by the Amerian physicist and historian of science, Thomas Kuhn (1962), author of the ground-breaking book, *The Structure of Scientific Revolutions.* In the handbooks of various scientific disciplines, the history of science is usually presented as a linear development-a gradual, ever-increasing approximation to accurate description of "objective reality." This creates the impression that scientists of all ages have worked with greater and greater success on the same set of problems. In this context, scientific revolutions are described as particularly significant additions to the edifice of science.

the evolution of science dominated by changing paradigms

Thomas Kuhn subjected the history of science to detailed analysis and found this picture to be far from truth. He discovered that the history of science involves discrete consecutive periods each of which is dominated by an entirely different belief system or even world-view. These periods are separated from each other by episodes of conceptual cataclysms and chaos. Kuhn coined the term "paradigm" for conceptual systems that dominate the thinking of scientific communities during certain specific periods of the evolution of science.

Initially, each new paradigm has a positive and progressive role. It identifies what are legitimate scientific problems, offers methodology for conducting scientific experiments, and describes criteria for evaluating the data. A paradigm clearly defines not only what reality is, but also what it *is* not and cannot possibly be. Once the paradigm is accepted, its basic philosophical assumptions are not questioned and scientists focus their attention and efforts on its further elaboration and articulation. However, quite lawfully, sooner or later continued research will produce data that are incompatible with the leading paradigm, since reality is always much more complicated than any scientific theory, even the most sophisticated and complex one.

a paradigm crisis encourages .'abnormal science"

At first. all research challenging the dominant paradigm tends to be suppressed, because the current theories are mistaken for a true and exhaustive description of reality. Scientists who are under the spell of the leading paradigm have a strong conviction about the nature of reality. They typically refuse to believe anything that seriously contradicts the established ways of looking at things. There is a tendency to insist that the events in question could not have happened, that something must have gone wrong. The scientist who generates controversial data is discounted as inept, accused of cheating, or even labeled as mentally ill. When the new data hold in subsequent experiments and are further confirmed by independent research, the discipline in question moves into a serious paradigm crisis that Kuhn calls a period of abnormal science. After numerous attempts to create *ad hoc* hypotheses and conceptual adjustments fail, more and more courageous and fantastic theories are generated, and out of this chaos finally one of these alternatives emerges victorious as the new paradigm. In the history of science, this sequence of events is repeated again and again.

The old and the new paradigm typically represent entirely different and mutually incompatible world-views. Yet, all

leading paradigms tend to be considered at the time of their conceptual hegemony to be accurate and authoritative descriptions of reality. Historical examples of major paradigm shifts are the transition from the geocentric astronomy of Ptolemaius to the heliocentric system of Copernicus and Galilee, from the phlogiston theory to modern chemistry of Lavoisier, and most recently from the Newtonian mechanics to quantum-relativistic physics.

the Newtonian-Cartesian paradigm

In the past 300 years, Western science has been dominated by the Newtonian-Cartesian paradigm. As Fritjof Capra (1975) so clearly outlined in his book, *The Tao of Physics,* the basic philosophical assumptions of this system of thought are derived from the ideas of Isaac Newton and Rene Descartes. Newton's mechanistic universe is a universe of solid matter made offundamental building blocks or atoms, which are by definition indestructible. (The Greek *a-tomos* is composed of the negative prefix *a-* and the verb *temnein-to* cut; it means that which cannot be cut or divided any further.) They influence each other by forces of gravitation and interact according to fixed and unchangeable laws. Their interaction occurs in absolute space which is three-dimensional, homogeneous, and independent of the presence of matter. Time in the Newtonian universe is unidimensional, flowing evenly from the past through the present to the future.

Newton's deterministic universe

Newton's universe resembles a gigantic supermachine governed by linear chains of causes and effects. As a result of this, it is strictly deterministic. If we knew all the factors operating at present, we should be able to reconstruct accurately any situation in the past or predict any event in the future. Although this assumption cannot be scientifically proven and the complexity of the universe prevents its practical testing, it constitutes one of the cornerstones of mechanistic science.

Descartes' dichotomy between matter and mind

The French philosopher Rene Descartes contributed to this model absolute dichotomy between matter *(res extensa)* and mind *(res cogitans).* According to him, the universe exists objectively in the form in which a human observer would perceive it, but its existence is entirely independent of the process of observation.

These ideas of Isaac Newton and Rene Descartes became the foundations of Western mechanistic science combined with philosophical materialism and atheism. The latter aspect was not part of the philosophy of either of the two great thinkers and represents a major distortion of their systems

of thought. To talk about the resulting system of mechanistic materialism as Newtonian-Cartesian paradigm is thus not accurate and does not do justice to either Newton or Descartes. Newton was a deeply spiritual person and had great interest in astrology, occultism and alchemy. In John Maynard Keynes' (1951) words, he was the last of the great magicians rather than the first great scientist. Newton never believed that the origin of the universe could be explained mechanically. According to him, it was God who created the material world and gave it its laws. Once this was done, the universe continued to function as a mechanical system and could be understood as such. Similarly, the concept of God was very critical in Descartes' philosophy. According to him, the world exists objectively and independently of the human observer; however, this is due to the fact that it is constantly perceived by God. Materialistic science left out conveniently the existence of God from Newtonian and Cartesian thinking as an embarrassing leftover from the Dark Ages.

spiritual basis of Newton's and Descarte's philosophies

The mechanistic model of the universe proved to be an extremely powerful conceptual tool and became the driving force behind the Scientific and Industrial Revolutions. It was so successful in its pragmatic technological applications that it became the ideal prototype of all scientific thinking, and was emulated by all the other disciplines which quite consciously modeled themselves after it. Generally, the more complex and less advanced were these disciplines, the harder they were trying to demonstrate their solid foundations in Newtonian mechanics. This was true particularly for psychology, psychiatry, sociology, anthropology and related fields. It is well known that Freud was a member of the so-called Helmholtz Society whose explicit goal was to introduce into science the principles of Newtonian mechanics. While formulating psychoanalysis, Freud quite consciously and rigorously used the criteria of Newtonian thinking. The extreme example is behaviorism-an attempt to eliminate the element of consciousness as a legitimate object of scientific interest and research and to develop scientific psychology without the use of subjective introspective data *(see* Capra, 1975; 1982).

mechanistic model of universe influenced psychology and related fields

The various scientific disciplines based on the mechanistic model have created an image of the universe as an infinitely complex assembly of passive, inert and unconscious matter, developing without any participation of creative intelligence. From the Big Bang through the initial expansion of the galaxies to the creation of the solar system and Earth, the cosmic processes were allegedly governed by blind me-

chanical forces. Organic matter and life originated in the primeval ocean by accident through random chemical reactions. Similarly, the cellular organization of organic matter and the Darwinian evolution to higher life forms occurred quite mechanically without the participation of an intelligent principle-through genetic mutations and natural selection guaranteeing survival of the fittest.

the emergence of consciousness

Then somewhere very high in the evolutionary pedigree, consciousness emerged as a product and epiphenomenon of highly developed and organized matter, the central nervous system or brain. At a certain point of its development-not clearly and unanimously identified by mechanistic science-matter, previously blind and inert, suddenly became aware of itself. Although the mechanism involved in this miraculous event entirely escapes even the crudest attempts at speculation, the correctness of this assumption is taken for granted and represents a fundamental postulate of the materialistic and mechanistic world-view.

the belief that consciousness is a product of mutter

The belief that consciousness is a product of matter is not, of course, entirely arbitrary. It reflects a vast mass of observations, particularly from clinical and experimental neurology, showing clear connections between various conscious processes and physiological or pathological processes in the brain, such as traumas, tumors or infections. Thus brain contusions, anaesthesia or restriction of blood supply will lead to loss of consciousness. A temporal tumor is associated with changes of consciousness that are quite specific and different from those accompanying, for example, a prefrontal tumor. These connections are so consistent and predictable that they can be used in establishing neurological diagnosis. In some instances, the distortions of conscious processes can even be corrected by neurosurgery, pharmacotherapy, or other medical interventions.

Although close correlations between consciousness and cerebral structures or processes have been established beyond any reasonable doubt, the interpretation of such observations offered by mechanistic science is highly problematic and open to discussion. The logical inconsistency of its conclusions can be illustrated by such a simple example as television. The quality of the picture and sound is critically dependent on structural and functional integrity of the television set. Malfunctioning or destruction of some of the components will lead to specific distortions of the program. A knowledgeable TV mechanic can diagnose the problem on the basis of the nature of the distortion and correct it by repairing the hardware. Yet, since television is a human-

made invention and its functioning well-known, none of us would see this as a scientific proof that the program must be, therefore, generated by the equipment. It simply means that the integrity of the set is a necessary prerequisite for the integrity of sound and picture. Yet, this is exactly the conclusion that mechanistic science offers as an authoritative and only possible interpretation of the neurological findings. It is interesting to mention in this context that Wilder Penfield (1976), the world-famous neurosurgeon who has conducted ground-breaking research of the brain and has made fundamental contributions to modern neuroscience, expressed in his last book, *The Mystery of The Mind,* summarizing his life's work, a deep disbelief that consciousness is a product of the brain and can be explained in terms of neurophysiology.

consciousness not necessarily a product of the brain

Materialistic psychology explains mental processes as reactions of the organism to the environment andlor recombinations of previous sensory input stored in the brain in the form of engrams. In this it adheres firmly to the credo of British empiricists formulated by John Locke (1823): *"Nihil est in intellectu quod non anteafuerat in sensu."* ("Nothing comes into the mind without first entering through the senses.") Memories of any kind then have to have a specific material substrate-the cells of the central nervous system or the physiochemical code of the genes. Access to any new information is possible only through direct sensory input or by combining old data with each other and with the newly acquired ones. Mechanistic science is trying to explain even such phenomena as human intelligence, creativity, art, religion, ethics, and science itself as products of material processes in the brain. This assumption is purely metaphysical in nature and cannot be proven by the existing scientific methods. Far from being a solid piece of scientific information, it can best be described as one of the leading myths of mechanistic science. The probability of human intelligence developing all the way from the chemical ooze in the primeval ocean to its present stage solely through random mechanical processes has been recently aptly compared to the probability of a tornado blowing through a gigantic junkyard and assembling by accident a 747 Jumbo-jet.

mechanistic myths

In the reductionistic world-view of mechanistic and materialistic science, there is no place for mysticism and religion. In this context, spirituality is seen as a sign of primitive superstition, intellectual and emotional immaturity, or even severe psychopathology that science will one day explain in terms of deviant biochemical processes in the brain. This attitude can be illustrated by several examples. Mainstream

mechanistic view of spirituality

psychoanalysis, following Freud's example, interprets unitive and oceanic states of the mystics as a regression to primary narcissism and infantile helplessness (Freud, 1962) and religion as obsessive-compulsive neurosis of humanity (Freud, 1924). Franz Alexander (1931), a world-known psychoanalyst, wrote a special paper reporting on the states achieved by Buddhist meditation as self-induced catatonia. Western anthropologists see shamans as mentally ill individuals suffering either from schizophrenia or epilepsy, and refer to the initiatory experiences that mark the onset of the career of many shamans as "shamanic illness." The report of the Group for the Advancement of Psychiatry (1976) interpreted mysticism as an intermediate phenomenon between normality and psychosis.

psychoanalytic view of spirituality

Newtonian-Cartesian science has acquired great prestige through its pragmatic successes that have transformed our world and life on this planet. In the light of its triumphs, the correctness of its basic philosophical assumptions and the accuracy of its model of the universe have been taken for granted. In the past, countless observations and data from various fields have been systematically suppressed or even ridiculed on the basis of their incompatibility with mechanistic thinking. Most Newtonian-Cartesian scientists are so thoroughly programmed by their education or so impressed by their pragmatic successes that they tend to take their model literally, as an exhaustive and authoritative description of reality. In this way, the Newtonian-Cartesian paradigm, once a progressive and powerful tool for science, has become a strait-jacket, seriously impeding further evolution of human knowledge.

However, in recent years this situation started to change rather rapidly. A paradigm is more than just a useful theoretical model for science; its philosophy has a powerful indirect influence on society. The Newtonian-Cartesian science has created a very negative image of human beings, depicting them as biological machines driven by instinctual impulses of a bestial nature. This image endorses competition and the principle of "survival of the fittest" as natural and essentially healthy tendencies. Contemporary science, blinded by its model of the world as a conglomerate of mechanically interacting separate units, has been unable to recognize the value and vital importance of cooperation, synergy, and ecological concerns. Its technological achievements that have the potential to solve most of the problems plaguing humanity have backfired and created a world in which its greatest triumphs-nuclear energy, lasers, space age rocketry, cybernetics, and the miracles of modern chemistry

infiuence of paradigm on society

and bacteriology-have turned into a menace and vital danger. As a result. we are living in a world divided politically and ideologically, which is constantly threatened by economic crises, industrial pollution, and the specter of nuclear war. More and more people are questioning the usefulness of precipitous technological progress which is not harnessed and controlled by emotionally mature individuals and a species sufficiently evolved to handle constructively the powerful tools it has created.

developments in 20th century physics

In the last decades, the authority of mechanistic science has also been seriously undermined from within. As Fritjof Capra so beautifully demonstrated in his pioneering books *The Tao of Physics* (1975) and *The Turning Point* (1982), the developments in twentieth-century physics have questioned and transcended every single postulate of the Newtonian-Cartesian model. Astonishing explorations of both the macro-world and the micro-world have created an image of reality which is entirely different from the seventeenth-century model of Newton and Descartes used by mechanistic science. The myth of solid and indestructible matter, its central dogma, disintegrated under the impact of experimental and theoretical evidence. The fundamental building blocks of the universe-the atoms-were found to be essentially empty. At first, they were reduced to protons, neutrons and electrons, and later dissolved into hundreds of subatomic particles of high energy physics. These particles, in addition, showed the same paradoxical nature as light, manifesting either particle properties or wave properties, depending on the arrangement of the experiment. The world of substance was replaced by that of process, event, relation. In this subatomic analysis, solid Newtonian matter disappeared and what remained was activity, form, abstract order, pattern. In the words of the famous mathematician and physicist Sir James Jeans (1930), the universe looks less and less like a machine and increasingly resembles a thought system.

a unified network of events and relations

Newton's three-dimensional space and unidimensional time were replaced by Einstein's four-dimensional continuum of space-time. The objective world cannot be separated any more from the observer, and linear causality lost its role as the only and mandatory connecting principle in the universe. The universe of modern physics is not the gigantic mechanical clockwork of Newton, but a unified network of events and relations. There exist prominent modern physicists who believe that mind, intelligence and possibly consciousness are woven into the fabric of the universe as integral parts of existence rather than being just insignificant

epiphenomena of matter. Eugene Wigner (1967), David Bohm (1980), Geoffrey Chew (1968), Edward Walker (1970), Gregory Bateson (1972; 1979), Fritjof Capra (1975; 1982), and Arthur Young (1976a;b) can be mentioned here as important examples.

Although quantum-relativistic physics provides the most convincing and radical critique of the mechanistic world-view, important revisions have been inspired by various avenues of research in other hard sciences. Drastic changes of a similar kind have been introduced into scientific thinking by the developments in cybernetics, information theory, systems theory and the theory of logical types. One of the major representatives of this critical trend in modern science has been Gregory Bateson, author of *Steps to an Ecology of Mind* (1972) and *Mind and Nature: A Necessary Unity* (1979). According to him, thinking in terms of substance and discrete objects represents a serious epistemological mistake-error in logical typing. In everyday life, we never deal with objects but with their sensory transforms or messages about differences; in Korzybski's (1933) sense, we have access to maps, not the territory. Information, difference, form and pattern that constitute our knowledge of the world are dimensionless entities that cannot be located in space or time. The information flows in circuits that transcend the conventional boundaries of the individual and include the environment. This way of scientific thinking makes it absurd to treat the world in terms of separate objects and entities, see the individual, family or species as the Darwinian units of survival, to draw distinctions between mind and body, or to identify with the ego-body unit (Alan Watts' "skin-encapsulated ego"). As in quantum-relativistic physics, the emphasis has shifted from substance and object to form, pattern and process. This conceptual conflict between mechanistic science and the modern revolutionary developments represents a replica of the ancient conflict between major schools of Greek philosophy. The Ionic school-Thales of Miletos, Anaximenes, Anaximandros and others--considered the basic philosophical question to be, "What is the world made of?." "What is its basic substance?" In contrast, Plato and Pythagoras believed that the critical issue is its form, patterning and order. Modern science is distinctly neo-Platonic and nee-Pythagorean.

developments in related fields

shift from matter to form, pattern, and process

Systems theory has made it possible to formulate a new definition of the mind. According to it, any constellation of events that has the appropriate complexity of closed causal circuits and the appropriate energy relations will show mental characteristics: respond to difference, process informa-

systems theory

tion, and be self-corrective. In this sense, it is possible to talk about mental characteristics of various cells, tissues and organs of the body, of a cultural group or nation, of an ecological system, or even the entire planet (Gaia theory, *see* Lovelock, 1979). And when we consider a larger mind that integrates all the hierarchies of the lower ones, even a critical and skeptical scientist like Gregory Bateson (1972) has to admit that this concept comes close to that of an immanent God.

Prigogine's research

Another profound criticism of the basic concepts of mechanistic science has emerged from the work of the Nobel laureate Ilya Prigogine (1980) and his colleagues in Brussels, Belgium, and Austin, Texas. Traditional science portrays life as a specific, rare and ultimately futile process-an insignificant and accidental anomaly involved in a Don Quixotean struggle against the absolute dictate of the second law of thermodynamics. This gloomy picture of the universe dominated by an all-powerful tendency toward increasing randomness and entropy and moving relentlessly toward a thermal death belongs now to the history of science. It was dispelled by Prigogines study of the so-called "dissipative structures" in certain chemical reactions and his discovery of a new principle underlying them-"order through fluctuation." Further research revealed that this principle is not limited to the level of chemical processes but is represented in all domains-c-from atoms to galaxies, from individual cells to human beings, and further to societies and cultures.

order through fluctuation

a unified view of evolution

As a result of these observations, it became possible to formulate a unified view of evolution in which the unifying principle is not the steady state, but the dynamic conditions of the non-equilibrium systems. Open systems on all levels and in all the domains are carriers of an over-all evolution which ensures that life will continue to ever newer dynamic regimes of complexity. In this context, life itself appears in a new light far beyond the narrow notion of organic life. Whenever systems in any domain become stifled by past entropy production, they mutate toward new regimes. The same energy and the same principles thus carry evolution on all the levels, whether it involves matter, vital forces, information, or mental processes. Micro- and macro- cosmos are two aspects of the same unified and unifying evolution. Life is not seen any longer as a phenomenon unfolding in an inanimate universe; the universe itself becomes increasingly alive.

dissipative structures

Although the simplest level on which self-organization can be studied is the level of dissipative structures which form in self-renewing chemical reaction systems, applying these principles to biological, psychological and sodo-cultural phenomena does not involve reductionistic thinking. "Dissipative structures" derive their name from the fact that they maintain continuous entropy production and dissipate the accruing entropy by exchange with the environment. The most famous example is the so-called Belousov-Zhabotinski reaction, which involves oxidation of malonic acid by bromate in a sulphuric acid solution in the presence of cerium, iron, or manganese ions. Unlike the reductionism of mechanistic science, such interpretations are based on fundamental homology, on the relatedness of the self-organizing dynamics on many levels.

humans in evolution

From this point of view, humans are not higher than other living organisms; they live simultaneously on more levels than life forms that appeared earlier in evolution. Here science has rediscovered the truth of perennial philosophy that the evolution of humanity forms an integral and meaningful part of universal evolution. Humans are important agents in this evolution; rather than being helpless subjects of evolution, they *are* evolution. Like quantum-relativistic physics, this new science of becoming, replacing the old science of being, shifts emphasis from substance to process. In this context, structure is an incidental product of interacting processes, which in Erich Jantsch's (1975, 1980) words is not more solid than a standing wave pattern in the confluence of two rivers or the grin of a Cheshire cat. Erich Jantsch's books *Design For Evolution* (1975) and *The Self-Organizing Universe* (1980) can serve as unique sources of further information about the development discussed above.

Sheldrake's formative causation

The latest serious challenge to mechanistic thinking is the theory of the British biologist and biochemist, Rupert Sheldrake (198l), expounded in his revolutionary and highly controversial book *A New Science of Life.* Sheldrake has offered a brilliant critique of the limitations of the explanatory power of mechanistic science and its inability to face problems of basic significance in the areas of morphogenesis during individual development and evolution of species, genetics, or instinctual and more complex forms of behavior. Mechanistic science is dealing only with the quantitative aspect of phenomena, with what Sheldrake calls the "energetic causation." It has nothing to say about the qualitative aspect-the development of forms or the "formative causation." According to Sheldrake, living organisms are not just complex biological machines and life cannot be

reduced to chemical reactions. Form, development and behavior of organisms are shaped by morphogenetic fields of a type that at present is not recognized by physics. These fields are moulded by the form and behavior of past organisms of the same species through direct connections across both space and time. These fields show cumulative properties; if a certain number of members of a species develop certain organismic properties or learn a specific form of behavior, these are automatically acquired by other members of the species, even if there exist no conventional forms of contact between them. The phenomenon of "rnorphic resonance," as Sheldrake calls it, is not limited to living organisms and can be demonstrated for such elementary phenomena as the growth of crystals.

morphic resonance

However implausible and absurd this theory might appear to a mechanistically oriented mind, it is testable, unlike the basic metaphysical assumptions of the materialistic world-view. Even at present, in its early stages, it is supported by experiments in rats and observations in monkeys. The most famous example is the anecdotal observation reported by Lyall Watson (1980) in *Lifetide*, and referred to as the "hundredth monkey phenomenon." When a young female Japanese monkey *(Macaca fuscata)* on the island Koshima learnt an entirely new behavior-washing raw sweet potatoes covered with sand and grit-this behavior was not only transmitted to her immediate peers, but appeared in monkeys on neighboring islands when the number of monkeys reached a certain critical number. Sheldrake is well aware of the fact that his theory has far-reaching implications for psychology and has himself discussed its relationship to Jung's concept of the collective unconscious.

the hundredth monkey

One of the most dramatic and revolutionary revisions of the mechanistic world-view is the holonomic theory of the universe formulated by David Bohm, former co-worker of Albert Einstein and author of basic texts on both relativity theory and quantum physics. According to Bohm (980), the phenomenal world that we observe in our ordinary states of consciousness represents only one partial aspect of reality-the explicate or unfolded order. Its generative matrix-the implicate or enfolded order-s-exists on another level of reality and cannot be directly observed, except possibly in episodes of non-ordinary consciousness, such as deep meditative, mystical or psychedelic states. Like many other famousphysicists-Niels Bohr, Erwin Schroedinger, Robert Oppenheimer, Albert Einstein, and others, Bohm finds modern physics compatible with the mystical world-view.

Bohm's holonomic theory

The well-known neurosurgeon Karl Pribram (1971; 1981) has developed a new model of the brain that in the future might converge with Bohm's theory of holomovement. He was able to demonstrate that-in addition to digital processing-the brain also performs parallel processing and involves holographic principles. Pribram's model not only explains a number of otherwise puzzling aspects of the brain function, but opens entirely new perspectives for speculations about mystical and psychedelic states, parapsychological phenomena, spiritual healing, and many other problem areas that were previously excluded from serious scientific inquiry. Although it is at this point premature to talk about an integrated holonomic theory of the universe and of the brain, as it has been done in the past, it is very exciting that both approaches are using quite similar and compatible explanatory principles.

Pribram's model of the brain

The discussion of new and promising developments in science would not be complete without mentioning the work of Arthur Young (l976a:b). His theory of process is a serious candidate for a scientific metaparadigm of the future. It organizes and interprets in a most comprehensive way the data from a variety of disciplines-geometry, quantum theory, theories of relativity, chemistry, biology, botany, zoology, history, psychology, and mythology-and integrates them into an all-encompassing cosmological vision. Young's model of the universe has four levels defined by degrees of freedom and of restraint and seven consecutive stages: light, nuclear particles, atoms, molecules, plants, animals, and humans. Young was able to discover a basic pattern of the universal process that repeats itself again and again on different levels of evolution in nature. The explanatory power of this metaparadigm is complemented by its predictive power. Like Mendeleyev's periodic table of elements, it is capable of predicting natural phenomena and their specific aspects.

Young's theory of process

By assigning a critical role in the universe to light and the purposeful influence of the quantum action, Young made it possible to bridge the gap between science, mythology and perennial philosophy. His metaparadigm is not only consistent with the best of science, but also capable of dealing with non-objective and non-definable aspects of reality far beyond accepted limits of science. Since it is not possible to do justice to Young's theory without detailed excursions into a variety of disciplines, those who are interested in this approach have to be referred to his original writings.

At present, it is clearly not possible to integrate the various revolutionary developments in modern science discussed in this paper into a cohesive and comprehensive new paradigm. However, they all seem to have one thing in common: their proponents share a deep belief that the mechanistic image of the universe created by Newtonian-Cartesian science should not be considered any longer an accurate and mandatory description of reality.

consciousness research

By far the most far-reaching challenges to the Newtonian-Cartesian paradigm have emerged in the fields of depth psychology and modern consciousness research. As the authority of mechanistic science is collapsing, serious researchers are rediscovering and re-evaluating a broad spectra of data that in the past have been suppressed or even ridiculed because of their incompatibility with the old paradigm. At the same time, vast amounts of new revolutionary observations are being generated by laboratory consciousness research, psychedelic therapy, experiential psychotherapies, field anthropology, parapsychology and thanatology.

The academic credentials and meticulous scientific methodology of modern parapsychological researchers of the stature of J. B. Rhine, Gardner Murphy, Stanley Krippner, Jules Eisenbud, Charles Tart, Elmer and Alyce Green, Arthur Hastings, Russell Targ, or Harold Puthoff, make it difficult to ignore or discard their work suggesting the existence of telepathy, remote viewing, psychic diagnosis and healing, Poltergeist, or psychokinesis. This avenue of research has now attracted serious attention of modern physicists, and it has become a serious theoretical challenge to incorporate its findings into the new paradigm.

Jungian psychology

Another major area of explosive new data is Jungian psychology, that is receiving at present increasing scientific recognition. The two dominant orientations in Western psychology have quite consciously used the Cartesian-Newtonian paradigm and have created mechanistic models of the psyche. Behaviorism in its extreme form has made serious attempts to exclude consciousness from psychology and to reduce mental functioning to reflex activity and to the stimulus-response principle. Freudian psychoanalysis sees psychological phenomena as derivatives of base instincts and biological functions. Jung's epoch-making contributions include the discovery of the collective unconscious, myth-forming properties and far-reaching healing potential of the psyche, and the existence of archetypes-c-transindividual

dynamic patterns in the psyche that not only transcend the boundaries of the individual, but represent an interface between consciousness and matter (psychoids) (lung, 1960). Freud's individual unconscious is an inferno of instinctual forces and a realm of suppressed and rejected psychological tendencies. Jung's psychology (1956) returns the cosmic status to the psyche and re-introduces spirituality into psychiatry. Unlike Freud, who tried all through his life to raise the prestige of psychology by reducing it to Newtonian mechanics, Jung was aware of the fact that his findings were incompatible with the existing philosophy of science and required an entirely new paradigm. He followed with great interest the developments in quantum-relativistic physics and was deeply influenced by his personal interactions with Wolfgang Pauli (1955) and Albert Einstein (Jung, 1980).

history of psychedelic research

Several decades of psychedelic research have generated data of critical importance for the new paradigm. Since time immemorial, various cultural groups throughout the world have used plants with powerful psychedelic properties for ritual and healing purposes. The tomb of a shaman found during the excavations of the New Stone Age settlement from the sixth millenium B.C. in Catal Hiiyiik in Turkey contained plants that according to pollen analysis were specimens *with* psychedelic properties. The legendary plant and potion *soma* played a critical role in the development of Vedic religion and philosophy. The Pre-Columbian Central American cultures used a broad spectrum of psychedelic plants; the best known of these are the Mexican cactus *peyote,* the sacred mushrooms *teonanacatl,* and the morning glory seeds, or *ololiuqui.* South American Indians of the Amazon have used for centuries decoctions from the jungle lianajage or *ayahuasca.* In Africa, many tribes know the secret of the psychedelic plant *eboga* and ingest it in smaller doses as a stimulant, and in larger amounts as a sacrament in their rituals. Preparations from several varieties of hemp have been smoked and ingested under various names (hashish, charas, bhang, ganja, kif, marijuana) in the Oriental countries, in Africa, and in the Caribbean area for recreation, pleasure, healing, and for ritual purposes. They have been important sacraments for such diverse groups as the Indian Brahmans, several orders of the sufls, African natives, ancient Skythians, and the Jamaican Rastafarians. According to recent research (Wasson *et al.,* 1978), ergot alkaloids similar to LSD were used in the famous EIeusinian mysteries in ancient Greece. Both Plato (l961a;b) and Aristotle (Croissant, 1932)were initiates of these mysteries and their systems of thought were deeply influenced by their experiences in this context.

The sensational discovery of the semisynthetic psychedelic, LSD, by the Swiss chemist Albert Hofmann (1975), inspired a wave of interest in psychopharmacology. The alkaloids' responsible for the effects of most of the above sacred plants have by now been isolated in pure form by modern chemists and studied clinically and in the laboratories under the names mescaline, psilocybine, psilocin, lysergamid, bufotenin, dimethyltryptamine, tetrahydrocannabinol, harmin, ibogain, and others. [The legendary plant and potion of the Vedic literature, *soma,* has so far resisted all attempts at botanical identification that would make it possible to discover its chemical secrets. An interesting, but still controversial hypothesis formulated by Gordon Wasson (1967), equates soma with the fly agaric mushroom *(Amanita muscarla).]*

During this work it became evident that the Western model of the psyche, with its narrow biographical orientation, was painfully inadequate to account for a wide spectrum of phenomena occurring in psychedelic states. Under the catalyzing influence of these remarkable psychoactive drugs, experimental subjects experienced not only autobiographical sequences, but also powerful confrontations with birth and death, and an entire gamut of phenomena that received the name "transpersonal." The rediscovery of these experiences and the recognition of their heuristic relevance represented one of the major incentives for the development of a new movement in psychology-the transpersonal orientation (Sutich, 1976).

transpersonal psychology

Since we are just about to begin a large international transpersonal conference, I will take some time to define and describe these important phenomena. In the ordinary state of consciousness, a person is expected to identify experientially with his or her body image, to be Alan Watts' "skin-encapsulated ego." It is generally possible to experience with all the sensory qualities only the present moment and the present location. The recall of the past is devoid of the sensory vividness of the present moment and experiencing the future is considered absurd and impossible in principle. The perception of the here and now is limited by the physical and physiological characteristics of the sensory organs determining their range.

In transpersonal experiences, one, two, or more of the above limitations appear to be transcended. The sense of one's identity can expand beyond the body image and encompass other people, groups of people, or all of humanity. It can transcend the human boundaries and include animals,

plants, or even inanimate objects and processes. Events that occurred in personal, ancestral, racial, phylogenetic, geological or astronomical history, and even future events can be experienced with vividness ordinarily reserved only for the present moment and location. In the extremes, one can experientially identify with the whole planet or the entire cosmos at various points of their development.

Experiences of this kind can bring instant intuitive knowledge of the areas involved that by far exceeds the intellectual capacity and educational background of the individual. While consciously identifying with another person, one can gain access to that person's thoughts, feelings, physical sensations or memories. During episodes of animal identification, one can get detailed insights into animal psychology, instinctual dynamics, reproductive cycles or courtship dances of the species involved. Plant experiences can similarly mediate new and accurate insights into botanical processes such as photosynthesis, sprouting of seeds. growth, pollination, or exchange of minerals and water in the root system. The same is occasionally true for inorganic processes, such as birth and death of stars, subatomic events, and dynamics of cyclones or volcanic eruptions. Racial memories in the Jungian sense or past incarnation experiences are frequently associated with new information about the cultures and historical periods involved-architecture, costumes, weaponry, religious rituals, or social structure. Similarly, the content of ESP experiences, such as precognition, clairvoyance, or astral projection, can frequently be independently confirmed as accurately reflecting reality.

intuitive knowledge

It is even more remarkable that the above experiences accurately portraying various aspects of the phenomenal world can alternate in unusual states of consciousness with experiences that have no basis in what is called in the West "objective reality," such as archetypal visions of deities or demons and mythological sequences from different cultures. Even these experiences can impart entirely new information; they reflect accurately and frequently in great detail the mythologies of the cultures involved. The nature and quality of this information is typically far beyond the educational level or even intellectual capacity of the individual involved. Some of the most encompassing transpersonal experiences are of a cosmic and transcendental nature; here belongs identification with the Universal Mind or Cosmic Consciousness *(Sacchidananda)* or the experience of the Supracosmic and Metacosmic Void *(Sunyata).*

experiential psychotherapies

Transpersonal experiences are not limited to psychedelic states. They occur in the new experiential psychotherapies-i-neo-Reichian approaches, primal therapy, psychosynthesis, Gestalt practice, marathon sessions, and various forms of rebirthing. They are particularly frequent in the process of holonomic integration, developed by my wife Christina and myself *(see* Grof & Grof, *Journeys beyond the Brain,* ms.), It is a technique combining controlled breathing with evocative music and focused body work. It has been known for centuries that many spiritual practices can induce transpersonal experiences; this is now being confirmed by an increasing number of Westerners who experiment with transcendental meditation, Zen practice, Tibetan psychoenergetic exercises, different forms of yoga, and other techniques.

non-ordinary states of consciusness

The new understanding of transpersonal phenomena mediated deep insights into an important subcategory of non-ordinary states of consciousness labeled and treated by Western science as psychotic and thus indicative of mental disease. These can now be interpreted as "spiritual emergencies" or "trans personal crises"; if properly treated, they can result in psychosomatic healing, personality transformation, and consciousness evolution *(see* Grof & Grof, *The Concept of Spiritual Emergency,* ms.). Ancient and Eastern cultures have not only developed elaborate cartographies for these states, but also powerful techniques to induce them. Various rites of passage of aboriginal cultures, ancient death-rebirth mysteries, spiritual healing ceremonies, sharnanic practices and secret initiations can be mentioned here as salient examples (Grof & Halifax, 1977; Grof & Grof, 1980).

biofeedback

Various transpersonal phenomena have also been described in the context of non-drug laboratory techniques of consciousness alteration, such as biofeedback developed by Elmer and Alyce Green, Barbara Brown, Joe Kamiya and others; sensory isolation and sensory overload; use of various kinaesthetic devices such as the "witches cradle"; use of non-authoritative forms of hypnosis; and the "mind games" developed by Jean Houston and Robert Masters (Masters & Houston, 1972).

Another important source of fascinating data about transpersonal experiences is the young discipline of thanatology-study of death and dying. Clinical observations of persons in near-death situations and those who have died and been resuscitated confirm essentially the descriptions

from spiritual Literature, particularly from the ancient books of the dead such as the Tibetan *Bardo Thodo),* the Egyptian *Pert em Hru,* and the European *Ars moriendi* or *Art of Dying,* (Rainer, 1957). The original data collected by Karlis Osis *(Death-Bed Observations of Physicians and Nurses,* 1961), Raymond Moody *(Life after Life,* 1975), and Elisabeth Kubler-Ross are now being confirmed by more systematic studies such as Kenneth Ring's *Life At Death* (1980) and American cardiologist Michael Sabom's *Recollections of Death* (1981). Sabom used a careful scientific approach to re-examine the claims of previous studies and of the ancient books of the dead that following clinical death many individuals have out-of-the-body experiences in which they accurately perceive near or remote events. He was able to confirm that these persons describe in many instances minute details of the circumstances following their deaths, including specific interventions and use of rather esoteric gadgets which are not commonly known to laymen. It would be difficult to come up with a more dramatic example of a critical challenge to the Newtonian-Cartesian mechanistic science and its interpretation of the relationship between consciousness and the brain than a situation involving a clinically dead person, lying on the back with the eyes closed and witnessing accurately the events in the room from the vantage point of the ceiling, or even events occurring in another room of the building, or in a remote location.

thanatology

The most exciting aspect of all the above revolutionary developments in modem Western science-astronomy, physics, biology, medicine, information and systems theory, depth psychology, parapsychology and consciousness research-is the fact that the new image of the universe and of human nature increasingly resembles that of the ancient and Eastern spiritual philosophies, such as the different systems of yoga, the Tibetan Vajrayana, Kashmir Shaivism, Zen Buddhism, Taoism, Kabbalah, Christian mysticism, or gnosticism. It seems that we are approaching a phenomenal synthesis of the ancient and the modern and a far-reaching integration of the great achievements of the East and the West that might have profound consequences for the life on this planet.

approaching a synthesis of ancient and modern

The Seventh International Transpersonal Conference brings together prominent representatives of the great spiritual traditions and scientists who have made significant contributions to the emerging paradigm. It thus offers an opportunity for an unprecedented dialogue about the most exciting and promising development of our time. I would like to thank you all for your interest and enthusiasm that helped you to

overcome all the obstacles and hardships you had to face to be here with us. The richness and relevance of the program promises that it will be a unique experience for all of us.

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Requests for reprints to Stanislav Grof, Buck Creek, Big Sur, California 93920.