

# A NEW VISION FROM SCIENCE

**Ervin Laszlo**

In the minds of the general public there is no question that science has become a major - perhaps *the* major - force shaping the world. This is true. Breakthroughs in biotechnologies enlarge our food supply, extend our life span, and provide fresh cures to the many diseases that inflict the human condition; innovations in microelectronics open the information superhighway to global traffic and place more information at the fingertip of the average household than was stored in the entire Vatican library in the Middle Ages. The applications of communication and control technologies enable people to reduce working hours and increase leisure-time and convey ideas and images on practically everything in every conceivable field of interest from local gossip to global crises; transport technologies make for massive streams of tourists, allowing people to travel anywhere on the six continents in a matter of hours in considerable comfort and safety; high energy technologies defy gravity, harness the power of the atom, and explore outer space and the domain of the atom. Paradoxically, even the absence of all-out war is due in some measure to advances in high-energy physics: today's weapons have become so powerful that they endanger the potential victors themselves, reducing the spoils of war to heaps of rubble that may be poisoned and radioactive to boot.

Atomic power, intercontinental and space travel, miracle drugs, and instant communication are technological spin-offs of science, and they do shape the world in which we live. But science itself shapes our world, and in more subtle ways than these. Science is more than technology: it is also meaning and knowledge - at its best, genuine insight into the nature of things. These elements shape the world through the vision we have of ourselves, of society, and of nature. Whether we know it or not, this influences our perceptions, colors our feelings, and impacts on our assessment of individual worth and social merit. It enters into the set of ideas, emotions, values, ambitions that makes up our consciousness.

At the end of this century, the world-concept of science is changing. It is changing just as profoundly as it did at its beginning when Einstein substituted the relativistic universe in place of Newton's harmonious but mechanistic clockwork universe. But the concept that is now emerging at the cutting edge of the natural sciences - in the new physics, the new biology, the new psychology and psychotherapy - is not generally known. The picture most people call „scientific“ is obsolete. In the popular view science gives a dehumanized picture of the world, dry and abstract, reduced to numbers and formulae. The universe appears as a soulless mechanism, and life in it as a random accident. The specific features of living species seem to result from a succession of accidental events in the history of biological evolution on Earth; and the features of human beings appear to be due to a fortuitous combination of the genes with which they were born. The psyche, in turn, seems to be dominated by elemental drives for self-gratification, so that if people were not afraid of societal repercussions they would steal and kill, commit incest and engage in promiscuous sex.

This is not the concept of the new sciences. The popular ideas of Newton, Darwin, and Freud, the basic sources of today's purportedly scientific views of man and universe, have been overtaken by new discoveries. In light of the emerging insights the universe is not a lifeless, soulless aggregate of inert chunks of matter; it resembles a living organism more than a dead rock. Life is not a random accident, and the basic drives of the human psyche include far more than drives for sex and self-gratification.

### *A new concept of matter and space*

The shift in science's view of the world is reflected already in the most fundamental notions we have of reality: matter and space. The Western commonsense view has always held that matter and space coexist: they are the ultimate furnishings of reality. Matter occupies space and moves about in it ; and space is a backdrop or container. This classical concept has been radically revised in Einstein's relativistic universe - where spacetime became an integrated four-dimensional manifold - and also in Bohr's and Heisenberg's quantum world. Now it is rethought again. In light of what scientists are beginning to glimpse regarding the nature of the quantum vacuum, the energy sea that underlies all of spacetime, it is no longer warranted to view matter as primary and space as secondary. It is to space - or rather, to the cosmically extended „zero-point field“ of the quantum vacuum - that we must grant primary reality.

The reason for the shift from matter to energy as the primary reality lies in the discovery that, notwithstanding its name, the quantum vacuum is not an empty space - a vacuum - but filled space: a plenum. It is the locus of the zero-point field, so named because the energies of this field become manifest when all other energies vanish in a particle or system: at the zero point.

In itself, this vast field is not electromagnetic, gravitational, or nuclear. Instead, it is the originating source of the known electromagnetic, gravitational, and nuclear forces and fields. It is also the originating source of the matter particles themselves. By stimulating the zero-point field of the vacuum with sufficient energy-of the order of  $10^{27}$  erg/cm<sup>3</sup> - a particular region of it is "kicked" from the state of negative into the state of positive energy. This makes for „pair-creation“: out of the vacuum emerges a positive energy (real) particle, with a negative energy (virtual) particle twin remaining in it.

The energy density of the zero-point field is well-nigh inconceivable. According to physicist John Wheeler, it works out (in light of Einstein's mass-energy equation  $E = mc^2$ ) to  $10^{94}$  gram/cm<sup>3</sup>. But a density of  $10^{94}$  gram per cubic centimeter is greater than the total matter-density of the universe: the latter is merely  $10^{-29}$  gram/cm<sup>3</sup>. It is fortunate, then, that the energies of the vacuum are „virtual.“ Otherwise - since energy is equivalent to mass and mass always carries gravitation - this superdense universe would instantly collapse to a size smaller than the radius of an atom.

The observable universe is not a *solidification* of vacuum energies, but a *thinning* of it - a onehundred and eighty degree shift from the idea that matter is dense, autonomous, and moving in passive and empty space.

Matter is an emergent in a nearly infinite virtual energy field. The matter that furnishes the observable universe was „created“ when the vacuum became destabilized in the explosion known as the Big Bang. The enormous energies liberated by it brought forth pairs of particles from the vacuum, and those that did not annihilate each other made up the matter-content of the universe. Scientists now know that not only in its origins, but also in its behavior, matter conserves close connections with the vacuum field. Already the inertial force may be due to interactions with it. In a pathbreaking study published in 1994, Bernhard Haisch, Alfonso Rueda and Harold Puthoff gave a mathematical demonstration that inertia can be considered a vacuum-based Lorentz-force.<sup>1</sup> The force originates at the subparticle level and produces opposition to the acceleration of material objects. The accelerated motion of objects through the vacuum produces a magnetic field, and the particles that constitute the objects are deflected by this field. The larger the object the more particles it contains, hence the stronger the deflection - and greater the inertia. Inertia is thus a form of electromagnetic resistance arising in accelerated frames from the distortion of the virtual-particle gas of the vacuum.

More than inertia, also mass appears to be a product of vacuum inter-action. If Haisch and collaborators are right, the concept of mass is neither fundamental nor even necessary in physics. When the massless electric charges of the vacuum (the bosons that make up the superfluid zero-point field) interact with the electromagnetic field, beyond the threshold of  $10^{27}$  erg/cm<sup>3</sup> of energy, mass is effectively "created." Thus mass may be a structure condensed from vacuum energy, rather than a fundamental given in the universe.

If mass is a product of vacuum energy, then so is gravitation. Gravity, as we know, is always associated with mass, obeying the inverse square law (it drops off proportionately to the square of the distance between the gravitating masses). Hence if mass is produced in interaction with the vacuum, then also the force that is associated with mass must be so produced. This, however, means that *all* the fundamental characteristics we normally associate with matter are vacuum interaction products: inertia, mass, as well as gravity.

Is now reasonable to view matter as a product of the vacuum's zero-point field. In the emerging concept there is no "absolute matter," only an absolute matter-generating energy field.

Although this view of matter and space seems to stand commonsense on its head, on closer scrutiny it turns out to be closer to everyday assumptions about the nature of reality than the standard conceptions of 20th century physics. The abstraction that boggles the mind of students in introductory physics classes is no longer a problem: light and gravitation are not phantom-like waves travelling in empty space. Spacetime has not only a geometry, *à la* Einstein, but a physical reality. It is a plenum, a filled virtual-energy medium that can be perturbed - one that

can create patterns and waves. Light and sound are travelling waves in this continuous energy field, and tables and trees, rocks and swallows, and other seemingly solid objects are standing waves in it.

### *Emerging insights into the nature of life and mind*

The subtle relationship between matter and the energy field that underlies it in the depth of the universe also transforms our view of life. It appears that interactions with the quantum vacuum are not limited to micro-particles: they may also involve living systems.

In regard to the full scale of interactions between the vacuum and the micro- as well as the macro-world, the work of a group of Russian physicists is of particular significance. According to Akimov and his co-workers' „torsion-field theory of the physical vacuum“ all objects, from quanta to galaxies, create vortices in the vacuum - spins in the cosmic ether. These torsion waves are enduring: they may persist even in the absence of the objects that generated them. The existence of such „torsion-wave phantoms“ in regard to living tissue has been confirmed in the experiments of Vladimir Poponin and his team at the Institute of Biochemical Physics of the Russian Academy of Sciences.<sup>2</sup> Poponin, who has since repeated the experiment at the Heartmath Institute in the US, placed a sample of a DNA molecule into a temperature controlled chamber and subjected it to a laser beam. He found that the electromagnetic field around the chamber exhibits a specific structure, more or less as expected. But he also found that this structure persists long after the DNA itself has been removed from the laser-irradiated chamber: the DNA's imprint in the field continues to be present when the DNA is no longer there. Poponin and his collaborators concluded that the experiment shows that a new field structure has been triggered from the physical vacuum. The phantom effect is a manifestation, they claim, of a hitherto overlooked vacuum substructure.

Through interactions with the zero-point field of the quantum vacuum, the organism is subtly yet effectively interconnected with its environment. Life evolves, as does the universe itself, in a „sacred dance“ with an underlying field. This means that living organisms are not skin-enclosed entities, and the living world is not the harsh domain of classical Darwinism, where each struggles against all, with every species, every organism and every gene competing for advantage against every other. Living beings are elements in a vast network of intimate relations that embraces the biosphere - itself an interconnected element within the wider connections that reach out into the cosmos.

Mind and consciousness, an aspect of the human organism, are embedded in this web of relations. The emerging insight is that the information conveyed by our brain regarding some features of the world beyond our cranium is not limited to the visible spectrum of electromagnetic waves and the audible spectrum of sonic waves: it extends to wave-propagations in the vacuum's zero-point field. Traffic between our consciousness and the rest of the world is constant and it flows in both directions. Everything that goes on in our mind

leaves its wave-traces in the embedding vacuum field, and the subtle patterns that propagate there can be received in the appropriate states of consciousness.

Evidence for this remarkable tenet is furnished by the experience of children, of people in so-called primitive cultures, and those in altered states of consciousness. The latter states include dreaming, day-dreaming, creative trance, mystical rapture, deep meditation or prayer, hypnosis, and the states of brain and mind that occur at or near the portals of death.

Since Elisabeth K bler-Ross' classic studies, near-death experiences (NDEs) have been systematically investigated by clinical psychologists and specialized researchers. It appears that people who come close to death undergo a remarkable experience that has a distinct memory component. Raymond Moody, Jr. concluded that it is now "clearly established" that the experience of a significant proportion of the people who are revived following close calls with death is quite similar from case to case, regardless of the patient's age, sex, religious, cultural, educational or socioeconomic background.<sup>3</sup> The experience - which includes a panoramic re-play of the experiences of one's entire life - is more widespread than is generally recognized: a 1982 survey conducted by George Gallup, Jr. found that some eight million adults in the US alone have undergone them. Thirty-two percent of the people surveyed reported that "life-reviews" were a part of their near-death experience.

NDE researcher David Lorimer noted that recall is especially vivid in what he calls panoramic memory, where there is a remarkable speed, reality and accuracy in the images that flash across the mind. The time-sequence of the memories may vary: some start in early childhood and move towards the present; others start in the present and move backwards to childhood. Still others come superposed, as if in a holographic clump. To the subjects it appears that everything they have ever experienced in their lifetime is being recalled; no thought or incident appears to have been lost.<sup>4</sup>

NDEs pose the possibility of a quasi-total recall of a person's prior experiences. Such recall would be staggering: John von Neumann calculated that the amount of information an individual accumulates during his or her lifetime comes to about  $2.8 \times 10^{20}$  "bits".

A related phenomenon of human consciousness is that which comes to light in the experience of psychotherapists who place their patients in an altered state of consciousness and "regress" them to early childhood. The therapists often find that they can proceed still further back in time, to experiences of the womb and of birth. And sometimes they can go back further still, apparently to prior lifetimes. They note that many patients can recall several past lives that together cover a vast time span. Regressed patients tell stories of prior life-experiences associated with present problems and neuroses. Thorwald Dethlefsen's case histories include the story of a patient who could not see in an otherwise functional eye; he came up with the memory of being a medieval soldier whose eye was pierced by an arrow. A patient of Morris Netherton, suffering from ulcerative colitis, re-lived the sensations of an eight-year-old girl

shot at a mass grave by Nazi soldiers. And Roger Woolger's patient, who complained of rigid neck and shoulders, recalled committing suicide by hanging as a Dutch painter.<sup>5</sup>

Ian Stevenson had scores of children recount past-life experiences, many of which proved to refer to the lives of actual personages. The cases most difficult to account for were those in which the subjects began to speak a foreign tongue that was unknown to them. The phenomenon, known as xenoglossy, cannot be explained by assuming a chance acquaintance with some elements of the given language; in several recorded cases hypnotized and regressed subjects engaged in prolonged and fluent conversations with native speakers in a language they themselves never knew.<sup>6</sup>

Another hitherto anomalous datum of consciousness is telepathic contact and communication. Traditionally, scientists have assumed that people can communicate only through gestures, facial expressions and by means of language, that is, in the "standard mode." There is evidence, however, that communication can take place also in the telepathic mode.

Telepathy may have been widespread in so-called primitive cultures. It appears that in many tribal societies shamans were able to communicate telepathically, using a variety of techniques to enter the altered states of consciousness that seem required for it, including solitude, concentration, fasting, as well as chanting, dancing, drumming, and the use of psychedelic herbs. Not only shamans, but entire tribes seem to have possessed the gift of telepathy. To this day, Australian aborigines are informed of the fate of family and friends, even when out of sensory communication range with them. Anthropologist A.P. Elkin noted that a man, far from his homeland, "will suddenly announce one day that his father is dead, that his wife has given birth to a child, or that there is some trouble in his country. He is so sure of his facts that he would return at once if he could."<sup>7</sup>

Aside from anthropological data, largely anecdotal and unrepeatably, scientific evidence for various kinds of telepathy comes from laboratory research based on controlled experiments. These date from J.B. Rhine's pioneering card- and die-guessing experiments at Duke University in the 1930s. In recent years experimental controls became rigorous as physicists and engineers have joined in the design and supervision of the tests. Explanations in terms of hidden sensory cues, machine bias, cheating by subjects, and experimenter error or incompetence have all been considered, but they were found unable to account for a number of statistically significant results.

In the 1970s Russell Targ and Harold Puthoff carried out some of the best known work on telepathic thought and image transference. They wished to ascertain the reality of spontaneous signal transmission between different individuals, one of whom would act as "sender" and the other as "receiver." They placed the receiver in a sealed, opaque and electrically shielded chamber, and the sender in another room where he or she was subjected to bright flashes of light at regular intervals. Electroencephalograph (EEG) machines were used to register the

brain-wave patterns of both. As expected, the sender exhibited the rhythmic brain waves that normally accompany exposure to bright flashes of light. But, after a brief interval the receiver also began to produce the same patterns, although he or she was not exposed to the flashes and had not received sense-perceivable signals from the sender.<sup>8</sup>

A related experiment regards the spontaneous harmonization of the brain waves of the left and right brain hemispheres of a given subject. In ordinary waking consciousness the two hemispheres - the language-oriented, linearly thinking rational "left brain" and the gestalt-perceiving intuitive "right brain" - manifest uncoordinated, randomly diverging wavepatterns. Experiments show, however, that when a subject enters a meditative state of consciousness, these patterns tend to become synchronized, and in deep meditation the two hemispheres often fall into a nearly identical pattern. In experiments carried out in the laboratories of Cyber in Milan, when two subjects meditated at the same time, the same synchronization effect was observed not only between their individual left and right hemispheres, but also *between* them. In pairs of deeply meditating subjects a quasi-identical four-fold synchronization emerged (left- and right-hemisphere synchronization within, as well as between, the subjects), although the subjects did not see, hear, or otherwise sensorily experience each other. Such synchronization was observed in experiments with as many as twelve subjects.<sup>9</sup> (see Figure 1)

Altered states seem to mediate connection between the brain and almost any part of the known universe. This is the conclusion of Stanislav Grof, according to whom we need to add to the familiar "biographic-recollective" domain of the psyche a "perinatal" and a "transpersonal" domain. In these additional domains the individual seems capable of accessing information beyond the range of the sense organs, beyond even his or her actual lifetime.<sup>10</sup>

In light of the evidence now at hand, the original insight of Carl Jung is vindicated. In addition to our individual consciousnesses, there is also something like a collective consciousness. That consciousness, the new sciences suggest, is rooted in the subtle wave-patterns of the quantum vacuum: in the universe's encompassing and ever-present „whispering pond.“<sup>11</sup>

### *Conclusions*

In the emerging concept of the new sciences there is no categorical divide between the physical world, the living world, and the world of mind and consciousness. Life and mind are consistent elements within an overall process of great complexity yet harmonious design. Space and time are united as the dynamic background of the observable universe; matter is vanishing as a fundamental feature of reality, retreating before energy; and continuous fields are replacing discrete particles as the basic elements of an energy-bathed universe. The cosmos is a seamless whole, evolving over eons of time and producing conditions where life can emerge, and then mind. Life is an intimate web of relations that evolves in its own right, interfacing and integrating its myriad diverse elements. The biosphere is born within the womb of the universe, and mind and consciousness are born in the womb of the biosphere. Our body is part of the

biosphere and it resonates with the web of life on this planet. And our mind is part of our body, in touch with other minds as well as the biosphere.

Thousands of years ago, the Chinese sage Chuang Tzu wrote, „Heaven, Earth and I are living together, and all things and I form an inseparable unity.“ In their latest development the new sciences are rediscovering and confirming these perennial intuitions. To Gregory Bateson's question: „what pattern connects the crab to the lobster and the orchid to the primrose and all four of them to me? and me to you?“ they find answer after answer in observation and experiment. Their findings agree with William James' insightful metaphor: we are like islands in the sea - separate on the surface but connected in the deep.

The vision we now get from the leading-edge sciences lends our existence a new sense of significance. We may be inhabitants of a small planet on a smallish solar system at the edge of a galaxy, but with our conscious mind we are one of the truly evolved manifestations of the great trend that brought forth galaxies, stars and planets in cosmic spacetime, and life of ever more complex form on the surface of sun-bathed planets. The findings should also give us a deeper sense of responsibility. It is our role as conscious protagonists in the cosmic drama to ensure that evolution on this planet does not lead to a dead-end; that it sets forth the grand adventure of our species by creating a world where individuality, innovation, and diversity are not the source of disunity, conflict, and degradation, but a foundation for coherence, cooperation, and coevolution.

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## References

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<sup>11</sup> see Ervin Laszlo, *The Whispering Pond: A Personal Guide to the Emerging Vision of Science*, Element Books, Shaftesbury and Rockford, 1996.