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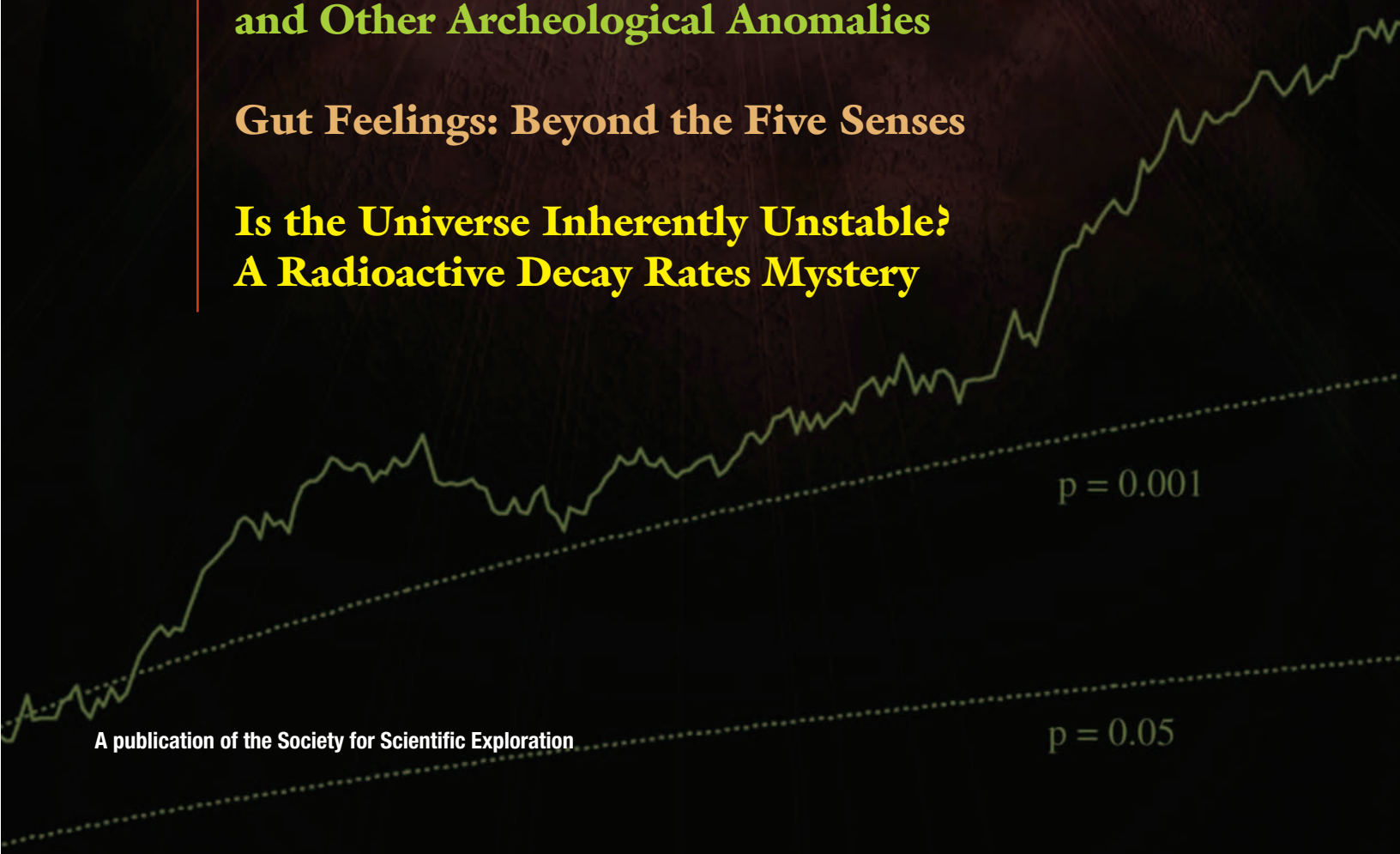
EdgeScience

Current Research and Insights

Is the Global Mind Real?

ALSO IN THIS ISSUE



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Why EdgeScience? Because, contrary to public perception, scientific knowledge is still full of unknowns. What remains to be discovered—what we don't know—very likely dwarfs what we do know. And what we think we know may not be entirely correct or fully understood. Anomalies, which researchers tend to sweep under the rug, should be actively pursued as clues to potential breakthroughs and new directions in science.

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EDITOR: Patrick Huyghe
CONTRIBUTORS: Henry Bauer, Dick Blasband, William Corliss, Adam Curry, Thomas Dykstra, Kathleen Erickson, P. D. Moncrief, Roger Nelson, Peter Sturrock
DESIGN: Smythtype Design
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The Society for Scientific Exploration (SSE) is a professional organization of scientists and scholars who study unusual and unexplained phenomena. The primary goal of the Society is to provide a professional forum for presentations, criticism, and debate concerning topics which are for various reasons ignored or studied inadequately within mainstream science. A secondary goal is to promote improved understanding of those factors that unnecessarily limit the scope of scientific inquiry, such as sociological constraints, restrictive world views, hidden theoretical assumptions, and the temptation to convert prevailing theory into prevailing dogma. Topics under investigation cover a wide spectrum. At one end are apparent anomalies in well established disciplines. At the other, we find paradoxical phenomena that belong to no established discipline and therefore may offer the greatest potential for scientific advance and the expansion of human knowledge. The SSE was founded in 1982 and has approximately 800 members in 45 countries worldwide. The Society also publishes the peer-reviewed *Journal of Scientific Exploration,* and holds annual meetings in the U.S. and biennial meetings in Europe. Associate and student memberships are available to the public.To join the Society, or for more information, visit the website at scientificexploration.org.

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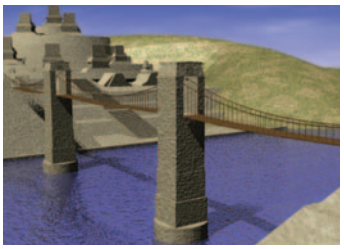


Cover image by Sebastian Kaulitzki

Henry Bauer

Doing Science Means Exploring

The University of Virginia was the site of the 2009 annual meeting of the Society for Scientific Exploration.
Photo Credit: Terren Peterson

The Society for Scientific Exploration, which is publishing this magazine, was founded initially by distinguished astronomers, engineers, physicists and others to provide a disciplined forum for topics that the scientific mainstream ignored totally: UFOs, psychic phenomena, cryptozoology (Bigfoot, Loch Ness monsters) were the Big Three, but of course there are many others as well. The determination that the discussions be rigorously scientific led to stringent requirements for membership: PhD or equivalent, tenured university position or equivalent, respectable record of peer-reviewed publications in a mainstream field. I liked to joke that these requirements were supposed to keep out the kooks, when I knew quite a few kooks with all these qualifications. But in practice the respect for and insistence on evidence and logic has been very high. And membership has actually been opened to anyone who is interested in exploring topics that mainstream science tends to shove under the carpet, for the original restrictive criteria have been limited essentially to voting rights, and there are now about three times as many Associate and Student members as there are voting ones.

As the years have passed, the Society has been discovered by scientists and others working in mainstream occupations who happened in some way to be so "out-of-the-box" that they could not get useful critiques from the usual mainstream sources. So we heard from Thomas Gold, the distinguished astrophysicist, about his at-last-accepted-after-much-rejection idea that the sense of hearing depends on an active and not a passive process; and about his not-yet-accepted ideas about the non-biological origin of the Earth's oil and the suggestion that life on Earth started deep down, not in the mainstream-accepted warm soupy pools at the surface.

This year at the annual conference held at the University of Virginia, in Charlottesville, we heard from another Cornell scientist, Colin Campbell, author of *The China Study,* who presented stunning evidence of the health benefits of eating less than the amounts of animal protein that are typical in current American diets. It was also interesting to learn that he had successfully received grants throughout his career for cancer-related nutritional studies, when his actual interests and studies and findings had far wider significance for diets and nutrition in general; but "nutrition" is not a highly regarded field by those who distribute research funds.

Other fascinating topics at the Society's conferences and in the *Journal of Scientific Exploration* include ball lightning, correlations of birth dates with subsequent professional success, biological rhythms, and many more. There have also been discussions of the history and sociology and philosophy of science, especially the role of unorthodox ventures in the progress of science.

Of course there have also been many discussions of evidence relating to extrasensory perception, survival after death, the basis for UFO accounts, possibly artificial objects on Mars, and others where my own personal inclination has been to regard the evidence as in some way misleading or misinterpreted. Nevertheless, it has been enlightening, mind-expanding, a wonderful learning experience to find intelligent, sensible people of high conventional accomplishment who take a serious interest in matters that I would never have looked at, had I not come to know and respect these people.

It has been a rare and salutary education to recognize that everyone, myself included, may turn out to be mistaken even on something about which they have been very sure. Human beings are fallible, gaining new and deeper understanding of the world is difficult, and science can only proceed by trial and error. But unless we explore beyond the boundaries of what is currently believed, we can only remain stuck with what we now understand—which no one, I trust, regards as eternally satisfactory.

Henry Bauer is Professor Emeritus of Chemistry & Science Studies and Dean Emeritus of Arts & Sciences at Virginia Tech. Bauer has served as the editor of the *Journal of Scientific Exploration.* His latest book is *The Origin, Persistence and Failings of HIV/AIDS Theory.*

NEWS NOTEBOOK

"Surely there's nothing left to discover."

Don't tell that to Iain Woxvold, a zoologist at the University of Melbourne, though he hears those words from his friends all too often.

Woxvold, along with scientists from the Wildlife Conservation Society, discovered a songbird à la Yul Brynner last December while conducting a survey at Pha Lom, a limestone outcrop in Laos. The find, just announced in the latest issue of *Forktail,* is a bald-headed songbird with a pink, nearly featherless face and distinctive calls. The bald-headed bulbul, which has been named *Pycnonotus hualon* ("hualon" being the Lao word for "bald-headed"), is a thrush-sized bird with a greenish-olive body, light-colored breast, and bluish skin from its eyes to its bill.

What so special about this new songbird discovery, you ask? For one thing, it's the first new Asian species of bulbul described in more than a century. Even more remarkable, it's the only known bald songbird in Asia.

Pycnonotus hualon represents the tip of the proverbial unknown. Scientists estimate that at least half of the world's species remain to be discovered, which means there are at least 1.5 million species left to be discovered.

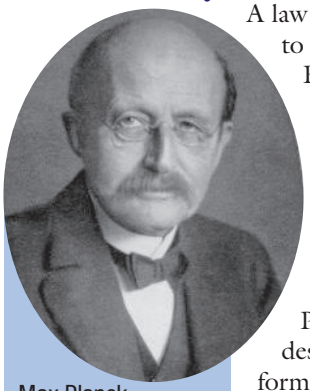
"Nothing left to discover" are words "never uttered among members of the biodiversity teams I have the privilege of working with," notes Woxvold. "In New Guinea, Borneo and Indochina I've worked with herpetologists, mammalogists and botanists who have discovered, between them, literally hundreds of new species, including a number of frogs, lizards, rats, bats, trees and ferns. New birds are much harder to come by, so the bulbul was definitely an unexpected treat. Very exciting."

—PH

A surprise discovery in Laos: the bald-headed bulbul

Photo Credit: Iain Woxvold

Just Off By a Factor of 1,000



Max Planck

Photo Credit: Courtesy of the Clendening History of Medicine Library, University of Kansas Medical Center

A law is a law, especially when it comes to scientific laws, and that's that. But then again, maybe not. Take Planck's Law, a well established physical law that describes the dependence on temperature of heat radiated from an object. Formulated more than a century ago by German physicist Max Planck, the law, known as Planck's blackbody radiation law, describes how thermal energy in the form of different wavelengths of radiation is emitted from a non-reflective black object. The emission from such a "blackbody" is considered the maximum that an object can radiate.

Planck knew the law worked well for large systems, but he wasn't sure it applied when objects are very close together. But most people don't know this. Now Gang Chen, director of MIT's Pappalardo Micro and Nano Engineering Laboratories, and colleagues have managed the very difficult task of measuring temperature difference when objects are very close together, 10 nanometers close in fact, and discovered that heat transfer can be a thousand times greater than the law predicts. So much for Planck's Law being a "fundamental limitation."

—PH

A Mysterious Variation in Radioactive Decay Rates

Radioactive elements like radium decay into other elements, for instance radium into radon. It is generally believed that the decay rate of any element is a fixed quantity that is unaffected by any environmental effects. For instance, radium is said to have a "half-life" of about 1,600 years. This means that if one begins with 100,000 atoms of radium, only about 50,000 will be left after that time.

However, there is evidence that this well known fact may not be true. A laboratory in Germany (The Physikalisch-Technische Bundesanstalt) monitored the rate of decay of radium atoms for 15 years. They discovered that the rate varies with an annual cycle, with amplitude of about 0.15 percent. It seemed likely that there was some instrumental malfunction, due for instance to the winter-summer temperature cycle. But the experimenters were unable to find a valid explanation along these lines.

Adding to the mystery, two other laboratories have found similar annual variations. The Brookhaven National Laboratory monitored the decay rate of silicon for a period of 4 years, and the Children's Nutrition Research Center in Houston monitored the decay of plutonium for 12 years. Both laboratories found clear evidence of annual variations, of a fraction of one percent, in the decay rates.

This anomaly is now being investigated by a team of physicists at Purdue University, led by Professors Ephraim Fischbach and Jere Jenkins (with whom I am collaborating). Although some presently unknown form of radiation from the Sun may be influencing the decay rates, we are more actively considering the possibility that the decay rates of radioactive elements are influenced by neutrinos. The Sun is a huge nuclear reactor, and it emits an enormous flux of neutrinos. The standard view is that neutrinos hardly interact with any form of matter. But if it turns out that neutrinos are indeed responsible for variations in nuclear decay rates, this standard view will be proved to be incorrect.

If these results hold up, they will have huge consequences for physics and for astronomy. Neutrinos may not be as passive as we have always thought them to be. Not surprisingly, a lot of physicists are unhappy about this possibility and are trying hard to find some error either in the experiments or in the analyses—so far, without success. Curiously, the annual variation in count rates has been in the physics literature for quite a few years, but it had not been taken seriously until the Purdue group realized that the anomaly is not peculiar to just one experiment—it shows up clearly in three different experiments.

This is major challenge to physics: either neutrinos are behaving in a way that is incompatible with current theory, or there is some other mechanism at work of which we at present have no idea. This could lead to a development in physics as important as the discovery of the neutrino by Fred Reines in 1953.

If these results hold up, they will have huge consequences for physics and for astronomy.

There will also be important implications for solar physics. Neutrinos are produced by nuclear reactions occurring at the very center of the Sun. At present, physicists measure the solar neutrino flux by means of huge experiments (the Super-Kamiokande experiment in Japan contains 50,000 tons of highly purified water and about 10,000 photomultiplier tubes), which are located thousands of feet underground. If neutrinos are indeed responsible for variations in nuclear decay rates, it may prove possible to monitor the solar neutrino flux by simple equipment in a standard laboratory. This capability may lead to major, presently unforeseen, developments in solar physics.

—Peter A. Sturrock, Stanford University

Roger D. Nelson

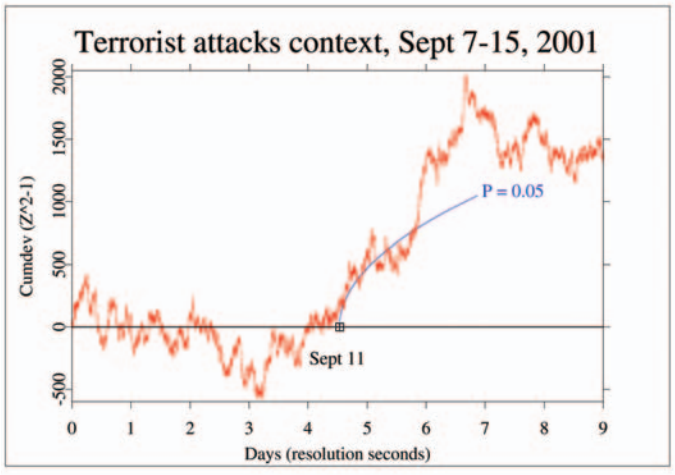
Is the Global Mind Real?

It is our duty—as men and women—to behave as though limits to our ability do not exist. We are collaborators in creation of the Universe.

Pierre Teilhard de Chardin

History changed course in late 2001, when the world watched in shock and horror as the World Trade Towers collapsed, destroyed by passenger planes turned into bombs by terrorists. It was a long moment of profound emotional sharing across the globe, with shock and fear turning to anguish and ultimately to compassion. In the midst of the tragedy many of us could see signs of humanity coming together as one. That was not to be, sadly. But for a moment, there was a powerful convergence of thought and emotion across the world that registered clearly in data from the Global Consciousness Project. Maybe this scientific instrument also picked up our coherence, the signature of a global mind startled awake by the intense synchronized activity of our local minds.

Broadly shared responses to events are increasingly common because our communication networks spread the word instantly when disasters strike. The great earthquakes in Turkey and the Tsunami in the Indian Ocean created tragedies that we all saw. The internet and mobile phones and high speed travel are making the world accessible and interconnected in ways that are new, but not strange. Humans are social animals and we naturally congregate. Nowadays we gather in ever larger numbers, even though global distances may separate us physically. As the New Year arrives in each time zone, we share the celebrations in Fiji, Hong Kong, Novosibirsk, London, New York, and share the anticipation of a singular midnight moment. The internet enables organized meditations that can bring a million people around the world into synchronized focus. And bad news travels very fast in the 21st century.



A week of GCP data, with the normally random walk changing radically on September 11, 2001. Beginning a little before the terrorist attacks, the data show a persistent trend for 50 hours, correlated with the shared emotions of millions of people reacting to the tragedy.

The Global Consciousness Project, or GCP, is an international collaboration of scientists running an instrument designed to capture possible effects of shared consciousness, much in the way that laboratory experiments have shown effects of intention on sensitive electronic devices that generate random numbers. In the lab, a person tries to change the behavior of a Random Number Generator (or RNG, which is a physical device, not a computer program) to produce smaller or larger numbers—the equivalent of flipping a coin and getting an excess of heads—just by wishing or willing the change. The experiments show that human intention can induce small, but significant changes in the output of an RNG. When we take the same instruments into the field, we find they also respond to special moments of group consciousness produced by shared experience in rituals and ceremonies, or inspired by great music or intense meetings of mind.

The GCP instrument is a network of stations around the world where random data are collected. It uses the same technology as the lab and field experiments, and asks the natural question: Is there non-random structure in the data when great events occur? By implication we are asking whether the RNGs might capture evidence of a global consciousness, but it will

require years of work and thought to fully define this complex construct. For now we define research questions by describing what we do.

How it all started

The instrument and the questions both are the result of organic processes. In the early 1990s, maturing technologies made it possible to take the electronic random devices used in the lab out into the world. Brenda Dunne, Bob Jahn, and I began a series of "FieldREG" experiments at the Princeton Engineering Anomalies Research (PEAR) lab that were designed to detect something that could be conceived as a "consciousness field." (The PEAR lab's term for RNG was REG, Random Event Generator.) We asked if groups of people brought by circumstances into resonance or coherence might share a group consciousness that would register in the data from our random devices. The answer was yes, even though there was no intention on the part of the group to change the data; we were simply monitoring the group environment.

Over the next few years, a series of coincidences marked a developing vision of mass consciousness and ultimately global consciousness synchronized by engaging events. I was in the right place at precisely the right time to meet a couple who were organizing a global Gaiamind Meditation set for January 23, 1997. That was a natural test case, as was Princess Diana's funeral, which focused the attention and emotions of millions of people in September of that year. I asked friends in Europe and the U.S. to collect data from their RNG equipment during these global events. And, as in the FieldREG experiments, the composite data showed non-random structure associated with moments defined by synchronized thoughts and emotions. In the fall that same year I invited colleagues in parapsychology and psychophysiology to gather in Freiburg, Germany, to share information I hoped would benefit both fields. But there was a serendipitous outcome I had not expected: the coincidental metaphors of multi-point Electroencephalography (EEG) and multi-source RNG measurements coalesced in the notion of a "world EEG," as nicely formulated by Dean Radin.

I started talking with colleagues about making a permanent network of RNGs that would collect data at points around the globe, rather like EEG electrodes on a human head. By coincidence my son Greg had the high level programming skills and just enough free time to develop the architecture and essential programs for what would become the Global Consciousness Project. He suggested that, given the inspiration from brain studies using EEG, we might think of the new, world-spanning network as an Electro-GaiaGram, or EGG. The name stuck, of course. We call the RNG device and software at each host location around the world an egg, and the software that collects and archives all the data on the Princeton server is…the basket.

A few months later the GCP was ready to go. The universe smiled and provided the connections and funding required, and we began collecting data in August of 1998, prepared to create a history of parallel random sequences that could be correlated with the history of major events on the world stage. We knew some good questions to ask. Might there be something interconnecting us all, though we are unaware of it? Of course the sages have been saying so forever, but could we get evidence of it on paper in a scientific sense? Could the earth have some holistic response to what happens to her populations of living beings? Would we notice a global mind? In addition, there were more direct queries about the physical, social, and psychological parameters that might determine the effects.

The overall statistics for the project indicate odds of about 1-in-20 million that the correlation of our data with global events is merely a chance fluctuation…

Seeking answers

These are difficult but interesting questions that are not well represented in modern inquiry. They all require scientific clarity, but the ones about mind require also a zest for adventure in intellectual territories that have not been much explored. Since early in the 20th century, a small contingent of researchers in boundary areas of physics and psychology have been looking at the extraordinary capacities of human consciousness we refer to as psi. The GCP is an extension of this research, covering territory that isn't possible

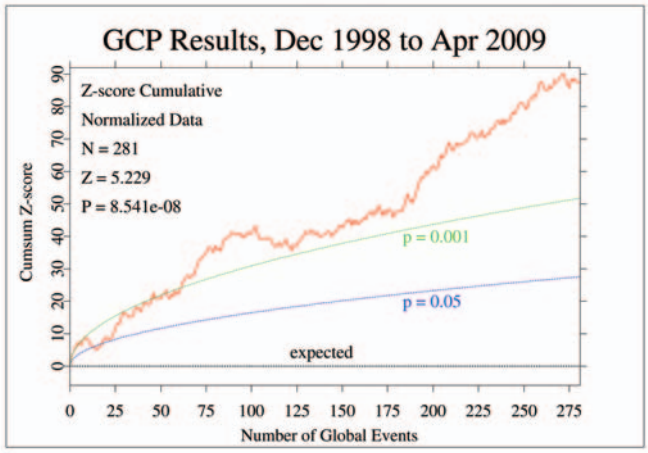
for laboratory based experiments. We can, and do, ask whether distance matters, and whether the size of the event or the number of people is important, and we ask about the time it takes for an effect to manifest. We ask about social parameters, types of events, positive and negative valence, external vs. internal sources, depth of engagement, and more.

With contributions from more than a hundred scientists, engineers, artists, and friends around the world, the project grew in a few years to about 65 sites hosting eggs, each reporting data continuously, in locations from Alaska to Fiji, on all populated continents and in nearly every time zone. The result is a research instrument built as a distributed network of devices which apparently can be affected by human consciousness under special conditions. Its purpose is to gather evidence and study indications of the subtle reach of consciousness in the physical world on a global scale.

The general hypothesis we propose is that the array of random data from the GCP instrument will become non-random during "global events." We predict departures from expectation when there is a widespread, profound sharing of mental and emotional responses. The proposition has been tested in a series of rigorously specified formal hypothesis tests. We have registered more than 280 formal experiments as of early 2009, looking at the special times described earlier. Our standard analysis measures the variability of data across the whole network during the event. This quantity is determined for each second, and then summed across the event's duration. The resulting event score is compared with expectation to determine its significance. Combined across events, the GCP effect implies that the behavior of RNGs separated by global distances becomes correlated during events of importance to humans. This is a profoundly mysterious outcome that stretches our scientific imaginations.

Something remarkable

The results confirm our hypothesis in about $^{2}/_{3}$ of the cases and show significance for about 20% of the events (5% would be expected by chance). The composite result over 280 formal tests gives highly significant evidence that something remarkable happens when we all are drawn into a community of interest and emotion. A bottom line for the 10-year experiment can



Composite result for 280 independent tests of the hypothesis that structure will be found in the array of random data correlated with major global events. The results are well beyond expectations (black line).

be visualized in a chronological graph that shows the steady accumulation of differences of the formal data from expectation up to early 2009. If there were no effect, the jagged line representing the results would have a level trend, wandering randomly up and down. As the figure shows, the actual data have a steady upward trend. The overall statistics for the project indicate odds of about 1 in 20 million that the correlation of our data with global events is merely a chance fluctuation, and we can exclude mundane explanations such as electromagnetic radiation, excessive strain on the power grid, or mobile phone use. Though this can't be taken as proof of an awakening global consciousness, it is suggestive. In any case the results definitely present challenging conundrums for physics and psychology.

We don't yet know how to explain the correlations between events of importance to humans and the GCP data, but they are quite clear. They suggest something akin to the image held in almost all cultures of a unity or oneness, an interconnection that is fundamental to life. Our efforts to understand these complex data may contribute insight into the role of mind as a creative force in the world, able to manifest intentions and capable of conscious evolution. Perhaps it is possible to hurry the development of Teilhard de Chardin's elegant vision for the future of man. ■

The Global Consciousness Project hosts a website at http://noosphere.princeton.edu, with complete information about the history, technology, and methods of the project, as well as free public access to the database.

About Roger Nelson and Science at the Edges

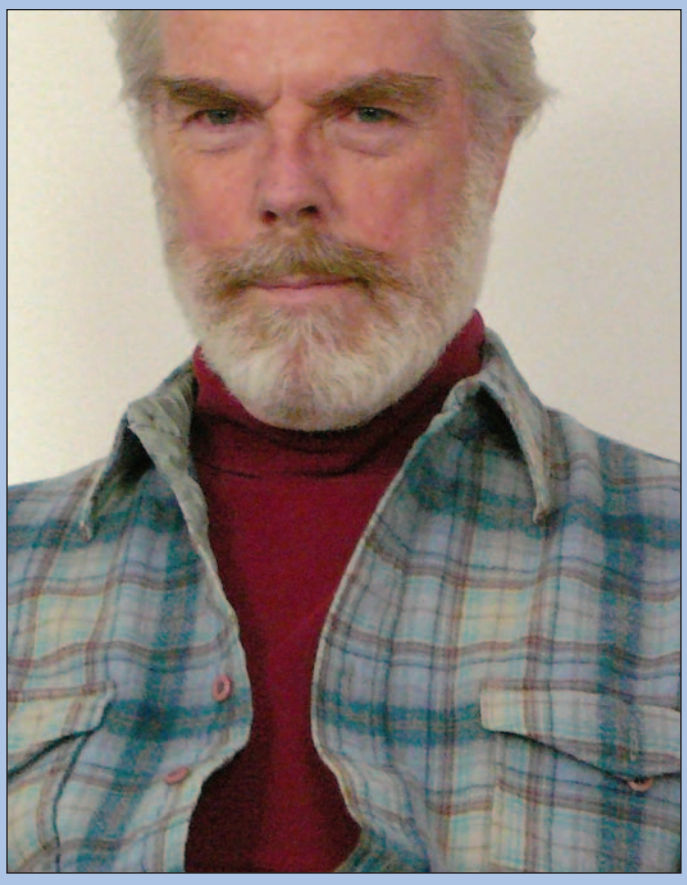
"In high school, I encountered yoga while searching for judo, and found parapsychology while looking for eastern philosophy. Thus I accidentally began practicing yoga and meditation, and not quite so accidentally began a lifelong engagement with science at the edges. My friends and I did clairvoyance experiments, guided by what J. B. Rhine had reported at Duke University more than 40 years ago, and we got results—not big effects, but just the right sort to look possible even if improbable. I was hooked—this was science designed to learn something, not merely to fill in the blanks. But engaging it would wait for years.

The next step was discovering the rich combination of science and aesthetics in Père Teilhard de Chardin's books, *The Phenomenon of Man* and *The Future of Man.* His vision clearly depended on being both an accomplished scientist (a paleontologist; he discovered Peking man), and an equally eminent theologian (though Rome did not see things his way), and it was presented by a poetically gifted writer. His message meshed with my desire to bring both art and science to bear on my perceptions of the world, and though I did not know it then, his central idea would become a framing construct for my work more than a quarter century later. Teilhard believed we are still evolving, and that our human destiny is to grow into a role as a sheath of intelligence for the earth—a noosphere, or thinking layer, parallel to the biosphere and the atmosphere. He argued that the forces of increasing density and complexity would inevitably yield a new type of human consciousness that would be global in scope.

As a young professor teaching psychology and experimental design at Johnson State College in Vermont, I said "yes" when students wanted to take on the challenge of quality research projects in parapsychology. It was by far the most frequently chosen domain for good students looking for a research topic. We are interested, especially when we are still learning, in the difficult questions at the boundaries of what is known, and college students freely ask about mind and consciousness, topics long ignored by psychology in favor of simpler behavioral science. Where is the mind? What are its limits? Do my wishes and prayers matter? Are there direct effects of intention in the physical world? This desire for engagement with hard problems drew out and restored my interests, and prepared me for a continuing round of coincidences.

Given a page from *The Chronicle of Higher Education* with a couple of jobs circled, I noticed by chance a curious ad looking for a "cognitive scientist interested in the lesser known aspects of perception" to work in the School of Engineering at Princeton University. The phrase evoked the senses of smell and touch but the actual job turned out to be vastly more intriguing. I went to Princeton and met Bob Jahn and Brenda Dunne, who were in the early stages of developing a research program to study mind-machine interactions and remote perception. It was not yet the Princeton Engineering Anomalies Research (PEAR) lab, but the people and the prospects were deeply interesting. Again I was hooked, and this time by an opportunity to combine aesthetics and philosophy with a high level of scientific professionalism. We would be doing it beautifully…and doing it right.

The PEAR program was a rich environment for developing the tools and the expertise to study human consciousness at the edges of what we know. I had the rare privilege of experiencing every aspect of research intended to establish and then explore the extended reach of mind in the physical world. I was engaged in the conception and design of rigorous experiments, building high quality equipment, collecting data (including some as a participant), performing analyses, and searching for interpretations. This full immersion is very different from reading about such experiments, and yields not only confidence, but tacit knowledge that is otherwise difficult to attain. I could *know* how good the evidence is for a subtle but real connection of mind and matter, in which intention can change the world slightly but significantly. We showed that wishing or willing could affect the behavior of random devices; their undetermined future could be altered from what it might have been."



William Corliss

Pyramid Building in the Americas and Other Archeological Anomalies

1 THE PATH OF THE PYRAMIDS

About the same time the Egyptians were hauling 100-ton limestone blocks to the Giza Plateau, some South Americans were toting basketball size rocks in bags woven from reeds to a site called Caral, located 23 kilometers from Peru's Pacific coast. While the Egyptians piled their weighty blocks neatly into pyramids, the South Americans simply dropped their stones, reed bags and all, onto crude but growing piles.

When finished, the largest "rock pile" at Caral contained 7 million cubic feet of rocks and had assumed the shape of a pyramid (or platform mound) four stories high (60 feet) and covering an area 500 by 450 feet. This was probably the first monumental architecture in the New World; and it was constructed some 800 years earlier than mainstream archeologists had expected. In fact, Caral boasts six large platform mounds, three sunken plazas, and many impressive buildings.

For all its precocious architecture, Caral is a "preceramic" site; that is, it was built before the advent of pottery in South America. Caral was "officially" discovered in 1905, but it was neglected by both archeologists and grave robbers because there were no artifacts to collect and nothing worth stealing. No one recognized its great age until just recently. Today, Caral is recognized as the work of the first complex society in the New World.

Could Caral, which was built about 2600 B.C., have been the progenitor of a wave of pyramid building cultures that swept northward and manifested itself in the Mayan pyramids (Tikal, circa 700 A.D.), the Aztec pyramids (Teotihuacan, 150–750 A.D.), and the works of the Moundbuilders (Cahokia, 1300 A.D.)? South to north would be just the opposite direction for a cultural wave originating at the Bering Land Bridge!

(Solis, Ruth Shady, et al; "Dating Caral, a Preceramic Site in the Supe Valley on the Central Coast of Peru," *Science* 292:723, 2001. Maugh, Thomas M., II; "Scientists Say Peruvian Ruins Are Oldest City in Americas," *Houston Chronicle* April 27, 2001. Ritter, Jim; "Pyramids as Old as Egypt's," *Chicago Sun Times* April 27, 2001.)

2 GIANT GLYPHS OF WESTERN AMAZONIA

For at least two centuries, archeologists have made their reputations exploring the ruins on the Pacific side of the Andes. There, building stones were easy to find, and man-made structures lasted for centuries. Archeological digs were relatively easy. The pyramids, forts, and walls were meant to be admired for centuries.

Once across the Andes, though, in western Amazonia, raw earth was the basic building material. Any signs of high civilizations were thought to have been eroded away and any remnants submerged in a thick jungle rife with fevers, snakes, and hostile Indians. It was largely an archeological backwater.

But had west Amazonia always been inferior to Tiahuanaco and Machu Piechu and all those photos in *National Geographic*?

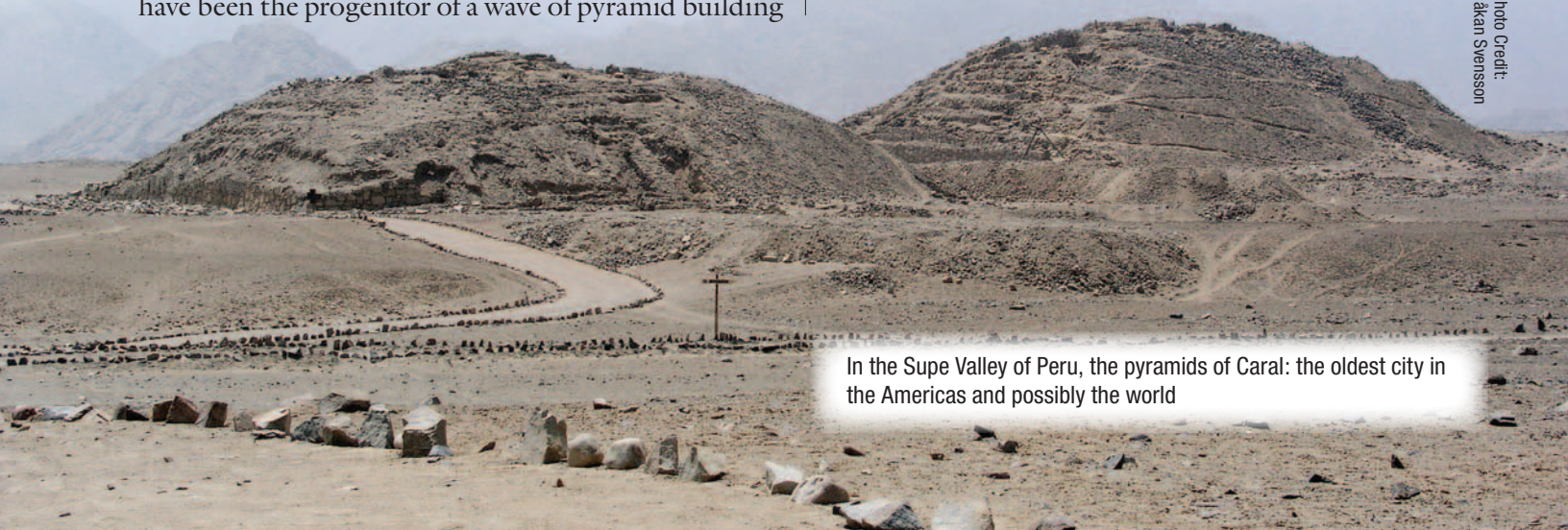


Photo Credit: Håkan Svensson

In the Supe Valley of Peru, the pyramids of Caral: the oldest city in the Americas and possibly the world

Today, as the forbidding Amazon forests are cleared for biofuel farms and cattle ranches, the remains of unsuspected pre-Spanish cultures are emerging. Their earthen infrastructure has not all been eroded away. There are road networks, municipal plazas, canals, and grand thorofares kilometers long. Once, sophisticated cultures throve there.

Now, a more enigmatic feature has been discovered. Known to local peoples and some South American archeologists for years are giant geometrical figures cut deeply into the soil. Now, no longer subdued by the jungle, these glyphs are, according to *Science,* "Shaped like circles, diamonds, hexagons, and interlocking rectangles, the geoglyphs are 100 to 350 meters in diameter and outlined by trenches 1 to 7 meters deep. Many are approached by broad earthen avenues 50 meters wide and up to a kilometer long."

More than 150 such geoglyphs are found in western Brazil alone. Many more are still concealed by vegetation. The archeological community is finally interested in this vast land that they once believed was barren of culture.

Most of the glyphs and associated infrastructure were made about 1250 A.D.

One does see some resemblance between the Amazonian earthen geoglyphs and the famous Nazca Lines of highland Peru. But the former are only geometrical; i.e., no depictions of animals. If the glyphs of Amazonia carry a message, we have no inkling of their meaning.

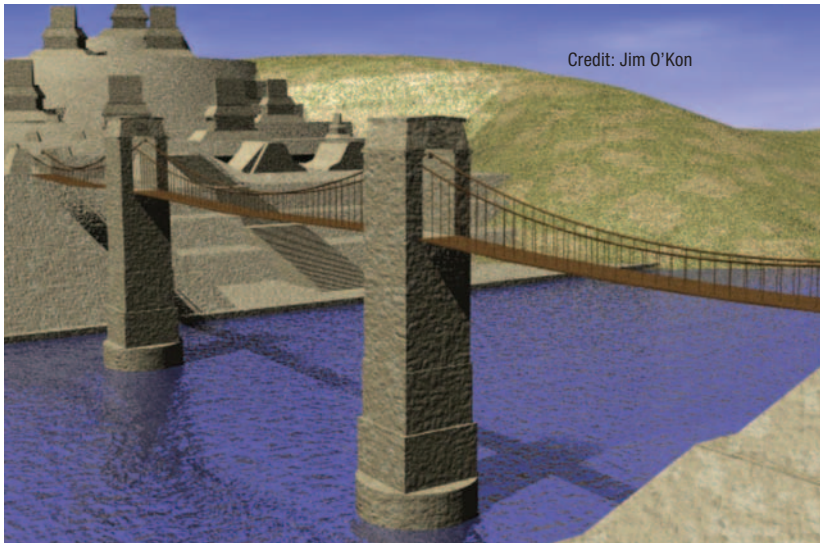
It seems that part of the thick jungle we now see in Amazonia must be "second growth," for it was once cleared by the glyph makers. We wonder what this region looked like, say, 2,000 years ago. We see only an enigmatic "cultural footprint" accompanied by flora that probably have little resemblance to what once grew there.

(Mann, Charles G.; "Ancient Earthmovers of the Amazon," *Science,* 321:1148, 2008)

3 A REMARKABLE MAYAN SUSPENSION BRIDGE

We tend to think of Mayan engineering only in terms of those impressive pyramids at Tikal, Copan, and many other sites, but they were accomplished builders of roads and bridges, too.

A civil engineer working at the Mayan ceremonial center of Yaxchilan, Mexico, discovered the remains of what appears to be a pier belonging to a sophisticated suspension bridge built in the seventh century A.D. above the the Usumacinta River. The bridge's three spans stretched 538 feet. The wooden deck was 10 feet wide and was suspended by large diameter hemp ropes, probably bundles of six one-inch ropes, according to modern calculations. The towers of the two bridge piers were 35 feet across and built up from large, flat 4 x 4 feet stones set in bedrock. The bridge probably stood for 500 years above water 40 to 150 feet deep, with a steady current of 5 to 7 m.p.h., which increases to 10 to 15 m.p.h. at flood stage. European engineers did not build a larger bridge until 1377, when a larger one was built in Italy. One wonders why such a talented society collapsed so suddenly.

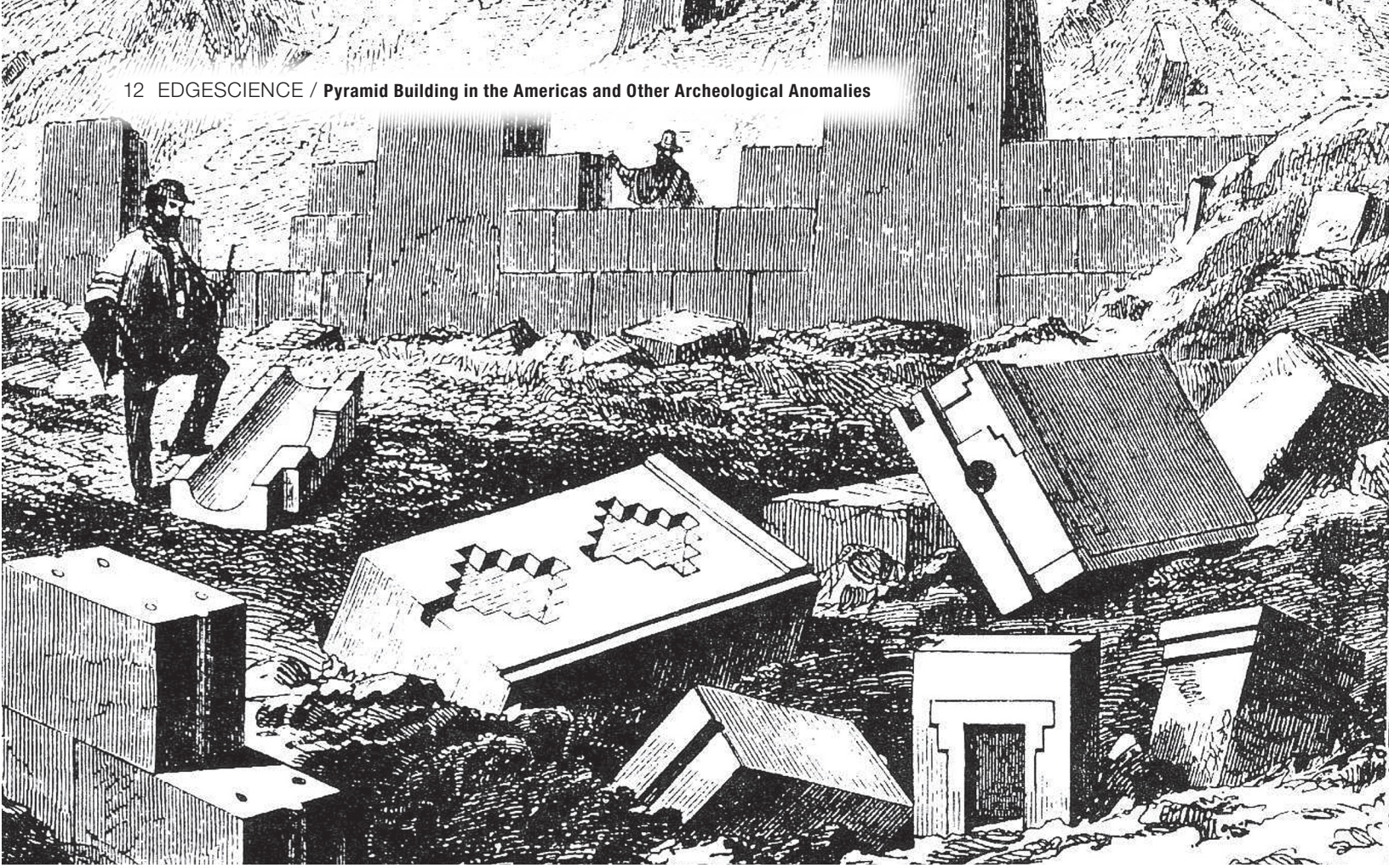


A computer generated image of a 7th century Mayan bridge in Mexico

(O'Kon, James A.; "Bridge to the Past," *Civil Engineering,* p. 62, January 1995.)

4 WHO BUILT AND WHO WRECKED PUMA PUNKU?

Puma Punku is located at 13,200 feet altitude in the Bolivian Andes, only a few football fields away from the mysteries of Tiahuanaco. Tiahuanaco has been restored in part, but Puma Punku has been torn to pieces. All of its stonework that was movable by modern Bolivian builders has ended up in recent structures far from Puma Punku. Result: no one knows what Puma Punku really looked like, nor its purpose. Basically, it is now only a melange of massive, precision-carved



Sketch of the Puma Punku's jumbled stone blocks as seen by E.G. Squire more than a century ago.

blocks of obdurate stone, such as andesite and granite. Some stone blocks weigh over a hundred tons and are 8 meters long.

"The most remarkable feature of the ruins of Puma Punku," wrote German scientists M. Uhie and A. Stubel in 1892, "is created by the still existing platforms and the whole or broken blocks lying scattered between, which exhibit extraordinary diversity in their shape, size, and workmanship. There are platform like stones, symmetrically dressed atones, others with small gate like excisions with depressions like basins, stones with ornaments like crosses, with small niches and thick or quite thin embossed moldings, as well as countless other shapes. With the exception of the three main platforms, which run in a straight line, the present state of the ruins is in extreme disorder. The three so-called main platforms run in a north-south direction. They cover an area 43m long and 7m wide."

The following attributes of Puma Punku merge into a major *pre-Inca* archeological anomaly:

- The site's extreme disarray, as if it had been wantonly destroyed.
- The extreme precision of narrow slots, square corners, etc., in hard stone made sans iron tools.
- The quarrying and hauling of 100+ ton stones from the quarry 65 kilometers distant over rough territory at 13,000 feet. The presence of stone blocks carved, as always with great precision and fine polishing, into shapes that are truly enigmatic.
- The unknown builders and their purpose.
- The unknown ancient destroyers and motives. Or was it a natural catastrophe?

(Ref. 1. Squier, E. George; *Peru Incidents and Travel and Exploration in the Land of the Incas,* New York, 1877, pp. 272 301, 1877; Stubel, A. and Uhle, M.; Die Ruinenstatte von Tiahuanacoim Hochland des Alten Peru Leipzig, 1892; Von Daniken, Erich, "Puma Punku The Unsolved Mystery of the Andes," *Legendary Times,* 9:40, no. 1, 2008.)

William Corliss is a physicist who since 1974 has been scouring the scientific literature for what science can't explain, or at least can't explain very well. The effort, which he calls the Sourcebook Project, has resulted in more than 30 volumes of source material on scientific anomalies in fields ranging from astronomy to biology, and from geophysics to psychology and archeology. "It is surprising that a Catalog of Anomalies does not already exist to guide scientific thinking and research," says Corliss. "It is at least as important to recognize what is anomalous as it is to realize what is well-explained in terms of prevailing paradigms." For more information about the Sourcebook catalogs, see science-frontiers.com or write to: Sourcebook Project, PO Box 107, Glen Arm, MD 21057.

Book Review by Thomas M. Dykstra

A Charged Life

Robert Becker passed away May 14, 2008, at the age of 84. His most famous book is entitled *The Body Electric,* and although it was first published nearly a quarter century ago, it seemed appropriate to take a second look at it on the occasion of his passing.

The Body Electric begins with a lamentable introduction to penicillin. Lamenting not the saving power it offered to those who were sick, but the impact it had on the philosophy of medicine. Becker reminisces that medicine became very mechanistic, too biochemical, and sorely lacking in innovation once penicillin hit the medical scene. Becker comments that most doctors who have graduated since 1950 have never even seen pneumococcal pneumonia in crisis. This would include almost all doctors today.

This difficult past helped to shape Becker, the medical student, as well as reshape the direction his research would eventually lead. In an effort to move away from a purely chemical way of treating patients, he wandered into the field of bioelectromagnetics, the study of electromagnetic fields on life. This scientific field was not as developed as it is today, so Becker is credited with being one of its pioneers. He used bioelectromagnetics in order to study bone healing and did so with wildly successful results. In addition to bone, he would eventually open up to the more generalized field of regeneration and investigated the head of the hydra, the body of the flatworm, the legs of the salamander, and finally skin regeneration in man. As a scientific field, regeneration is still relatively new.

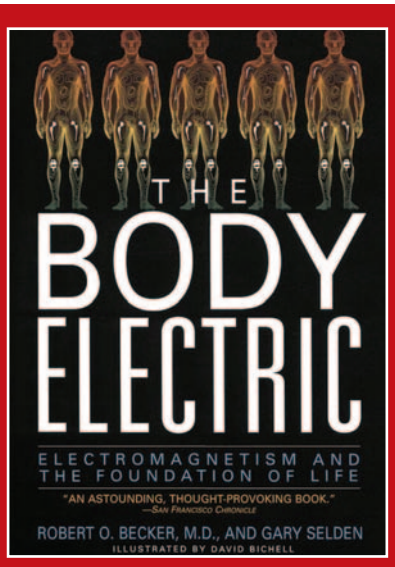
Although Robert Becker earned an M.D. and not a Ph.D., he possessed a penchant for research. Among his accomplishments, Becker discovered the existence of electrical currents in parts of the nervous system. These are not the usual neuronal pulses familiar to many scientists, but direct currents (DC) in the glial cells. Prior to his work, the glial cells had been considered “blankets” for the nerve cells, their function beyond protection and insulation being unknown. It is unfortunate that universities still teach that glial cells are mere insulators for the neuron.

With regard to generally accepted theories, Becker wrote: “Science is a bit like the ancient Egyptian religion, which never threw old gods away but only tacked them onto newer deities until a bizarre hodgepodge developed. For some strange reason, science is equally reluctant to discard worn-out theories...even though there was absolutely no evidence to support [them]...”

The small amount of electricity in the glial cells is important for many life functions but most notably for regeneration. For example, Becker was able to dedifferentiate certain somatic cells with a very small charge of electricity (200–700 picoamps). These dedifferentiated cells could then develop into any one of a number of alternate cell types. This regenerating ability has parallels in modern research, which has shown that adult stem cells can cure or alleviate almost 100 different ailments.

Becker also contributed to the field of anesthesia. He discovered he could anesthetize salamanders with currents and then have them regain consciousness in a matter of seconds. This method contrasts sharply with other forms of anesthesia. I have personally heard of this type of anesthesia being used today, but not in this country.

Once while attempting to treat a patient, Becker decided to switch the more common stainless steel electrode to a silver electrode. The desired effects were to use a less reactive metal as well as to more efficiently transmit the electrical current. But the side effect led to the re-discovery of a beautiful antibiotic (silver) and the dedifferentiation of many cells that subsequently rearranged to form clean, healthy tissue. This in turn led to the discovery of utilizing a silver nylon mesh to treat osteomyelitis (bone infection), which in turn led to the accidental discovery that this treatment healed bones quite nicely. Becker commented: “Whatever its precise mode of action may be, the electrically generated silver ion can produce enough cells for human blastemas; it has restored my belief that full regeneration of limbs, and perhaps other body parts, can be accomplished in humans.”



The Body Electric: Electromagnetism and the Foundation of Life **by Robert O. Becker and Gary Seldon. William Morrow, 1985.**

More amazingly, Becker observed complete regeneration in a newt’s heart so long as a minimum of 30% of the heart was removed or severely traumatized. Less than 30% damage produced less than impressive results. Becker learned that massive trauma was not just sufficient, but necessary. Becker calls this the Polezhaev principle, which states, the greater the damage, the better the regrowth (named after Lev Polezhaev who spent his career investigating this seeming contradiction).

(continued on page 14)

Thomas M. Dykstra is the director of Dykstra Laboratories, Inc., located in Gainesville, Florida. The lab researches the effects of electromagnetics on life.

REFERENCE POINT, continued from page 13

To Becker's surprise, regeneration was found to be well under way 15 minutes after removing most of the heart and then completely healed, without scar tissue, in about a day. Amazing discoveries like these are sprinkled throughout the book with a lively scientific discussion as to how he arrived at these unsuspecting discoveries. Sometimes he got lucky, and he admitted that. Sometimes he achieved tremendous results simply through common sense.

The Body Electric ends with a change of pace. Moving away from the personal stories of research inquiry in the first three-quarters of the book, it then switches to recent issues in, and the work of others on, electromagnetic pollution. This section is a dry and a laborious read that is apparently meant to serve as an introduction to his next book, which was called *Cross Currents: The Perils of Electropollution, the Promise of Electromedicine*. Becker made an important point here, however, with regards to experiments in which cells or organisms are exposed to a single unmodulated frequency, as opposed to more complex modulated frequencies. Although these experiments may provide some useful answers in a laboratory setting, they are irrelevant outside the laboratory. They are most often conducted by researchers whose only goal is to be able to say, "See, there's no cause for alarm." While attending a Bioelectromagnetics Society meeting in 1998, I noticed with dismay that almost all the research on single, unmodulated frequencies had no effect on the test organism, whereas studies involving modulated frequencies almost always had observable effects. Becker's now prophetic observation is still valid today, and I consider it a shame that we have not corrected this seemingly blatant error.

The Body Electric weaves a truly fascinating story on the excitement of discovery. But Becker doesn't shy away from commenting on scientific politics, and he cites numerous examples of scientific dishonesty he encountered during his career. His pioneering work did not make him popular among his peers, and he was forced out of research in 1980. Why, by whom, you ask? The short answer is "everybody." A slightly longer answer is that when he started speaking out against electromagnetic pollution in the environment, everything went downhill from there. The culprits include the U.S. Navy, Syracuse University officials, U.S. granting agencies (which did not renew his grant), many individuals at competing universities – all of them having a piece to prevent him from getting funding and continuing his groundbreaking research. He had to disband his laboratory because he could no longer staff his lab or conduct any experiments. It is akin to stopping a car by simply allowing it to run out of gas. There is nothing wrong with the car, all the pieces are there, all the pieces work, they are just missing a critical element, that being gas. There is no need to shoot out the tires, no need to blow it up Hollywood style, no need to even take out the driver, just allow it to sputter out.

Thankfully, the shortening of Becker's scientific career did not adversely affect the quality of the work he managed to complete, nor the book that so wonderfully came as a result of it.

Thank you, Dr. Becker. May you rest in peace. ■

BACKSCATTER, continued from page 15

It's a shame Carey didn't take the next, quite obvious, but also obviously taboo, step in his research for the article by at least mentioning the presentiment studies conducted by Dean Radin and others over the past 16 years, which show that the brain actually anticipates emotionally charged situations, not only before the person is aware of them, but before any hint of them is available in any way, shape, or form.

Typically in these experiments subjects sitting in front of a computer are shown a series of images, most of which are pleasant photos of people and landscapes, but a few are disturbing, shocking, or arousing in either their violence or sexual content. When the subject clicks the mouse, the screen goes blank for 5 seconds, then the computer randomly selects an image to display on the screen. During this time a subject's electrodermal activity, or sweating, as well as peripheral blood flow, heart rate, and EEG are all being measured.

There is nothing surprising in the fact that in these experiments the subject's physiological signs begin to rise in anticipation of each next image. What's stunning, however, is that Radin's studies repeatedly show that these bodily signs, specifically the subject's electrodermal activity, increases even more in the seconds before an emotional image has been selected by the computer and is displayed on the screen.

"The article in the *Times* reads like an introduction to research I've been engaged in for about 15 years," says Dean Radin, a Senior Scientist at the Institute of Noetic Sciences and the author of *Entangled Minds*. "Except for one difference. Conventional paradigms assume that these intuitions are entirely due to subconscious processing, forgotten knowledge, implicit learning, etc. These are the usual information-processing explanations for intuition, and some of those explanations are undoubtedly valid. But I've been looking at a more radical possibility—that some of the truly astounding intuitions reflect our mind's ability to transcend everyday temporal boundaries, and to perceive future events directly. I call this ability 'presentiment,' an unconscious, physiological reaction to events that are about to unfold. Specifically, in lab studies I am interested in events that cannot be inferred, outguessed, or anticipated, and where there are no sensory cues to provide hints about the future. This line of experiments has been successfully replicated by a growing number of independent investigators, and of the 20 or so studies I'm aware of, nearly all have shown effects in the predicted direction. About half of those studies report statistically significant outcomes."

Dr. Larry Dossey, the author of a new book called *The Power of Premonitions,* was also surprised that the *New York Times* failed to mention the presentiment studies, a line of evidence he calls crucial to the subject. "When I was a battalion surgeon in Vietnam," says Dossey, "I knew many soldiers who said they owed their lives to some ability to sense the future, if only for a split second. This is common in war settings. Too bad the *Times* article would not go there."

When it comes to saving lives, our soldiers lives, no potentially helpful evidence should be ignored—even if it comes from research in parapsychology. ■

Patrick Huyghe

Straight from the Gut

It took us by surprise: a front page article in the *New York Times* on premonitions, placed prominently “above the fold” and accompanied by a photograph of a watchful soldier in Iraq. Well, the *Times* didn’t use the word “premonitions,” of course. The key word in the headline was “hunches”; a subhead called it “The Gut Feeling.” Those words, along with “intuition,” are journalistically respectable. The p-word obviously is not.

The story, which ran on July 28, 2009, and was entitled “Hunches Prove to Be Valuable Assets in Battle,” focused on American soldiers in Iraq who “often cite a gut feeling or a hunch as their first clue” of imminent danger. The story was written by Benedict Carey, an experienced science writer hired by the *Times* in 2004 to cover human behavior and psychology. Carey tells us that U.S. troops are apparently now at the center of a “large effort to understand how…some people’s brains can detect danger and act on it well before others do.”

Carey cites the work of Steven Burnett, an Army researcher who studied perception and bomb detection in some 800 military men and women. He discovered, not surprisingly, that those with the most experience in the field performed best. They were “sensitive to small changes in the environment,” like a rock that was not there the day before. Then citing research by neuroscientists at Princeton University, Carey states that “the gut feeling may arise before a person becomes conscious of what the brain has registered,” and some people’s brains were faster at it than others.

Besides subtle visual clues, some soldiers seem to be able to pick up on “extra tension in the air, unusual rhythms in Iraqi daily life, oddities in behavior.” By this point Carey sums up what he understands hunches and gut feelings to be: “As the brain tallies cues, big and small, consciously or not, it may send out an alarm before a person fully understands why.”

Near the end of the article Carey cites a “landmark” study suggesting that still “something else” might be at work here. In the study, which was conducted at the University of Iowa in 1997, players were spotted some money and then asked to choose cards from any of four decks of cards presented to them. Some cards offered monetary rewards, others monetary penalties. But the decks were rigged: two decks were embedded with modest penalties, while in the other two the penalties were large. Some players reported “liking” some decks better than others by the 50th card to the 80th card before they could explain why; but a measure of their physiology, specifically how much they sweated, showed reactions as soon as the 10th card drawn.

(continued on page 14)

Photo Credit: U.S. Army