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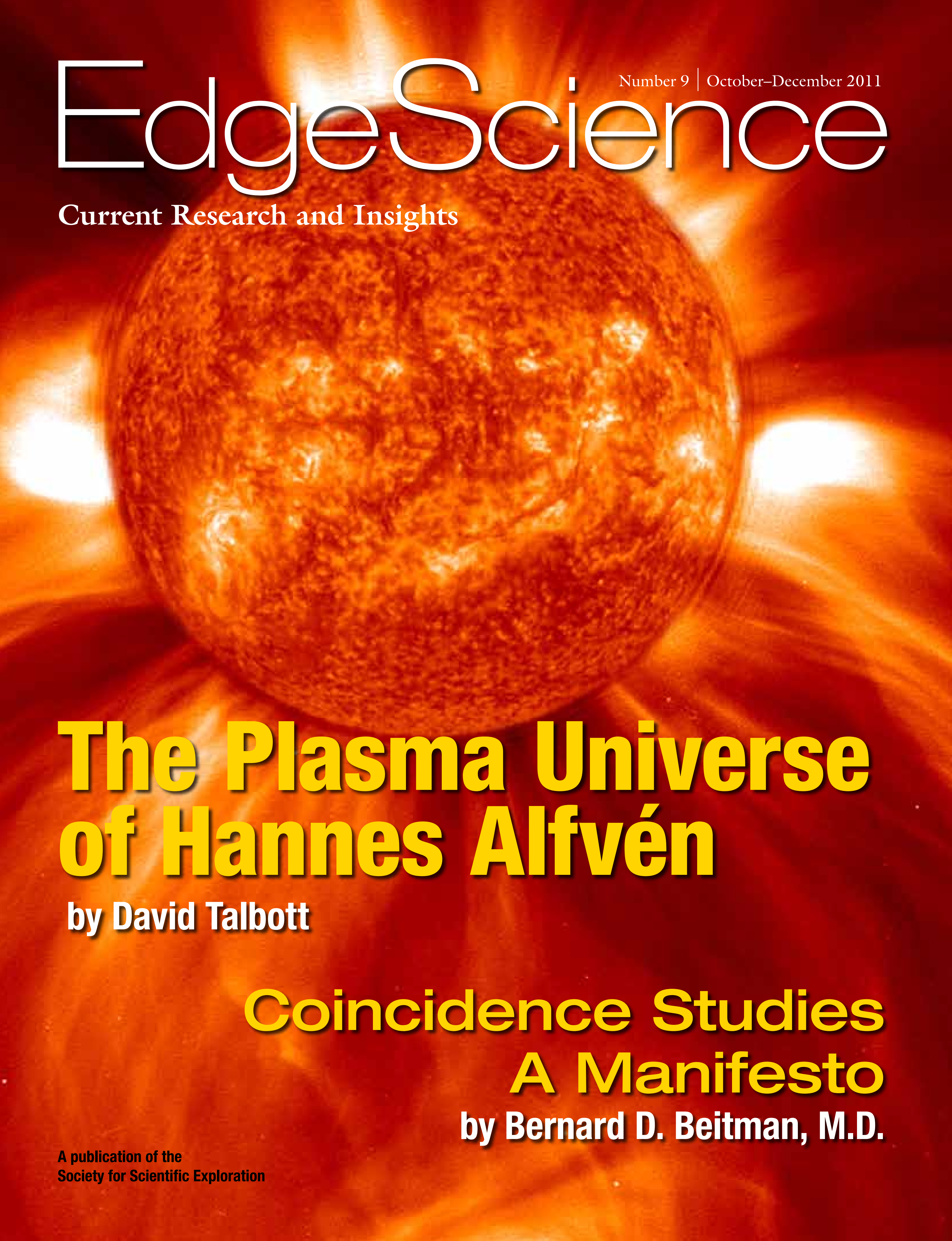
EdgeScience

Current Research and Insights



The Plasma Universe of Hannes Alfvén

by David Talbott

Coincidence Studies A Manifesto

by Bernard D. Beitman, M.D.

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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.

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: A coronal mass ejection. Credit: SPHO/LASCO consortium

By Robert McLuhan

Anecdotal Evidence

One of the skeptic's most popular arguments is that anecdotal evidence can't be relied on. If you agree with that, you can ignore, for example, much of the case for psi—the whole human experience bit. With that out of the way, the experimental data can be waved away on the grounds of methodological flaws and wishful thinking.

I've been reading up on neuroscience recently and started to notice how often the Phineas Gage story crops up. Gage was a nineteenth century railway worker who miraculously survived an explosion in 1848 that sent an iron bar 43 inches long and more than an inch in diameter right through his skull. Although Gage suffered massive damage to his frontal lobes, he remained conscious and eventually recovered, still able to function normally in most respects (although it eventually did him in—he died 11 years later). However he underwent a major personality change: having been a solid, dependable sort he now became roguish and disreputable, given to drinking and swearing, to the extent that his friends no longer knew him as the man he had been.

The story is told to demonstrate the dependence of the personality on the brain, and, more specifically, the frontal lobe as the seat of emotion. It's a colorful piece of evidence given in support of the orthodox view that the mind is what the brain does. If the structure of the brain is compromised, then so too will the personality be.

The case is big in popular culture; apparently there are rock bands named after him. It's also much referred to in academic books about cognitive psychology and neuroscience: I did a quick search on Questia and came up with 122 mentions. I can't tell in detail what each mention there consists of, but from the excerpts the majority seem to raise it as demonstrating the dependence of personality on the brain. And it continues to be influential; for instance, it's a key piece of evidence in Antonio Damasio's controversial recent book *Descartes' Error*, which proposes that rationality is largely guided by emotions.

But how true is the story? According to author and psychologist Malcolm Macmillan, who did some sleuthing, the before-and-after contrast has been greatly exaggerated.

The main testimony comes from John Harlow, the physician who attended Gage an hour after the accident and more or less put him back together. In 1868, eight years after his patient's death, he wrote: "The equilibrium or balance, so to speak, between his intellectual faculty and animal propensities, seems to have been destroyed. He is fitful, irreverent, indulging at times in the grossest profanity (which was not previously his custom), manifesting but little deference for his fellows, impatient of restraint or advice when it conflicts with his desires, at times pertinaciously obstinate, yet capricious and vacillating, devising many plans of future operation, which are no sooner arranged that they are abandoned in turn for others. His mind was radically changed, so decidedly that his friends and acquaintances said that he was no longer Gage."

Yet Harlow said little about any of this when he first publicly talked about the case, when Gage was still alive. In 1850, two years after the accident, a Harvard professor of surgery stated that Gage was "completely recovered in body and mind," making no mention of any personality change.

In subsequent accounts by other writers Harlow's later testimony was embellished. Gage was now said to have become a drunkard and a boastful exhibitionist, as well as suffering an absolute lack of foresight—all unmentioned by Harlow. In fact, most of what has been said about Gage subsequent to his physical recovery, Macmillan says bluntly, is "fable."

Coincidentally, I've been reading Marilynne Robinson's excellent *Absence of Mind*, an attack on the view of humanity represented in what she calls the "parascientific literature" of Richard Dawkins, E. O. Wilson, Stephen Pinker, Daniel Dennett, etc. On the subject of Gage, she asks whether it is really so remarkable that a man who has had a crowbar pass through his brain should not start to act in ways that other people find less than reasonable.

Are we really to believe that Gage was not in pain during the years until his death? How did that terrible exit wound in his skull resolve? No conclusion can be drawn, except that in 1848 a man reacted to severe physical trauma more or less as a man living in 2009 might be expected to do.

As for the attention the story gets from neuroscience, Robinson says, "It's as if there were a Mr. Hyde in us all that would emerge spluttering expletives if our frontal lobes weren't there to restrain him."

Nicely put.

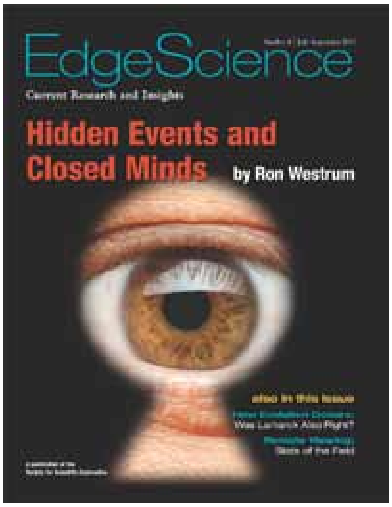
Anecdotal evidence—that is to say, reported human experiences—are absolutely valid in scientific discourse. Surely most scientists accept this. Psychology and medical science in particular wouldn't get far without it; it's just in writing about psi and other anomalies that it's so suspect. What matters is that a story be properly validated. That's not the case here, and it's interesting to see such a key element of the materialist worldview being illustrated by a story with such slender foundations.

ROBERT McLUHAN is an Oxford graduate and former foreign correspondent for the *Guardian* newspaper. He has long been interested in psychic research and the science of spirituality, and blogs at *Paranormalia* (www.paranormalia.com). He recently published *Randi's Prize: What sceptics say about the paranormal, why they are wrong and why it matters.*

LETTERS

Tunguska, UFOs, and Pluto

Henry Bauer's criticism of the 1908 Tunguska event [in "Pseudo-Science in Science," *EdgeScience* #8] is interesting, but misses the point. No one human saw the impact who was able to describe it. However seismic detectors recorded the event all around the world. It is not in dispute that a catastrophic event happened at a certain location at a certain time. The destruction and the seismic records are solid evidence. Now what caused this? From our experience (historical knowledge) it is likely the cause was a collision with a celestial small object. (Humans did not have nuclear bombs then!) It does not matter what you call the object that caused the event. Science tries to describe how and why nature works the way it does. It could have been an asteroid or a comet (most likely), but to suggest that this event might have been caused by a totally unknown object is grossly improbable, given our experience.



What is pseudo science is to suggest that a UFO may have caused the Tunguska event. Additionally, it also depends what one means by UFO. If it is "unidentified object," then we have zero clue of what they are, and have zero evidence that they exist (other than unverified hearsay).

This reminds me of the recent saga about Pluto being a planet or not. Science says that Pluto is a certain size object gravitationally bound to the Solar system and it has certain physical characteristics that we can measure and deduce (mass, mean density). That is all. Science does not say anything about Pluto being a "Planet" or not. That is human intervention on how to communicate the truth to other humans, by ad hoc human made definitions.

—*Yervant Terzian, Cornell University*

Henry Bauer replies:

I think my article just says that it isn't known for sure that an asteroid caused Tunguska. Comets are not asteroids; and I don't think it's unreasonable to allow the possibility of something that we don't presently know about. Improbable doesn't equate to impossible, and our experience suggests that we should allow for the possible existence of "unknown unknowns," even if Donald Rumsfeld used that term. I didn't define UFO but treated (and do treat) it (them) as mysteries.

I certainly agree about Pluto. The fuss isn't about the facts but about what to say about them, what to call things.

David Talbott

The Plasma Universe of Hannes Alfvén

In the 20th century no scientist added more to our knowledge of electromagnetism in space than Hannes Alfvén (1908–1995). His insights changed the picture of the universe, revealing the profound effects of charged particle movement at all scales of observation. But recognition never came quickly, and never easily, and mainstream journals typically regarded Alfvén as an outsider, often rejecting his submissions. In retrospect, Alfvén's difficulties in gaining acceptance can only highlight the inertia of institutionalized ideas in the sciences, reminding us of the obstacles faced by all of history's great scientific innovators.

Awarded the Nobel Prize in 1970 for his contribution to physics, Alfvén emerged as a towering critic of directions in astronomy, cosmology, and astrophysics. Though he was surely not correct on everything he proposed, decades of space exploration eventually confirmed a lifetime of observations and hypotheses, often with implications that many space scientists did not want to hear. "In the world of specialized science," wrote plasma scientist Anthony Peratt, "Alfvén was an enigma. Regarded as a heretic by many physicists, Alfvén made contributions to physics that today are being applied in the development of particle beam accelerators, controlled thermonuclear fusion, hypersonic flight, rocket propulsion, and the braking of reentering space vehicles."[1]

But Alfvén's impact reached far beyond new technologies. He devoted much of his life to the study of plasma, a highly conductive, elementary form of matter characterized by the presence of freely moving charged particles, not just electrically neutral atoms. Normal gases become plasma through heating and partial ionization as some percentage of the atoms give up one or more of their constituent electrons. Often called "the fourth state of matter" after solids, liquids, and gases, plasma is now known to constitute well over 99 percent of the observed universe.

Alfven is the acknowledged father of "plasma cosmology," a new way of seeing formative processes in the heavens. Proponents of plasma cosmology suggest that vast but invisible electric currents play a fundamental role in organizing cosmic structure, from galaxies and galactic clusters down to stars and planets. The Big Bang hypothesis, black holes, dark matter, and dark energy are only a few of today's popular cosmological themes disputed by scientists working with this new perspective. Many central tenets of plasma cosmology emerged from laboratory experiments with plasma and electric discharge, and it was Alfvén himself who showed that plasma behavior in the laboratory can be scaled up to galactic dimensions: vast regions of plasma in space behave similary to plasma on earth.

Hannees Alfvén with necklace of feathers from Fiji. Courtesy Carl-Gunne Fälthammar

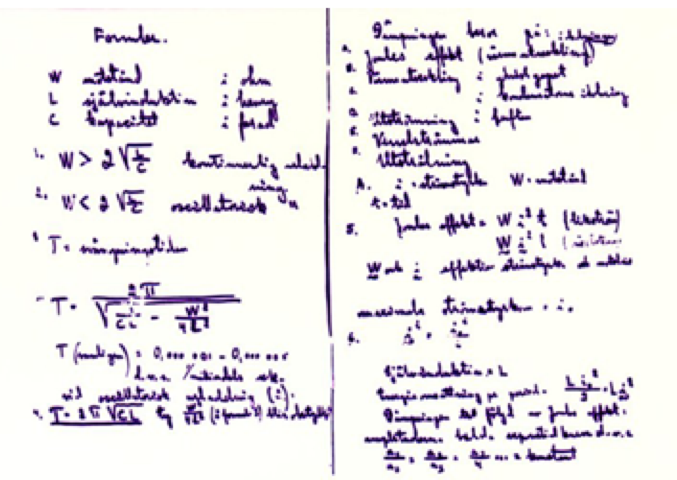
Underscoring the enormity of ignoring cosmic electromagnetic effects in cosmology is the fact that the electric force between charged particles is some 39 orders of magnitude (a thousand trillion trillion trillion) times stronger than the gravitational force. In comparative terms, gravity is incomprehensibly weak; a hand-held magnet will raise a small metallic sphere against the entire gravity of the Earth.

Alfvén's documentation of laboratory plasma experiments eventually made it impossible to ignore the role of electricity in space. He explained the auroras based on the work of his predecessor Kristian Birkeland; correctly described the Van Allen radiation belts; identified previously unrecognized electromagnetic attributes of Earth's magnetosphere; explained the structure of comet tails; and much more.

Early Life

Hannes Olof Gösta Alfvén was born on May 30th, 1908, in Norrköping, Sweden. Astrophysicist Carl-Gunne Fälthammar, perhaps Alfvén closest colleague, notes two childhood experiences influencing the pioneer's intellectual development and eventually his scientific career.[2] One was a book on popular astronomy by Camille Flammarion, sparking a lifelong fascination with astronomy and astrophysics. The other was his active role in a school radio club, a role that included building radio receivers. His natural facility for electronics can be seen at an early age and continued through his formal education. "...As a scientist," writes Fälthammar, "Hannes was inclined to look at astrophysical problems from an electromagnetic point of view, and this turned out to be very fruitful."

A young Hannes Alfvén reading a popular astronomy book by Camille Flammarion. Image credit: Carl-Gunne Fälthammar



Pages from 15-year-old Hannes Alfvén's notebook.
Image credit: Carl-Gunne Fälthammar

While a graduate student Alfvén wrote a paper interpreting the source of cosmic rays. He submitted the article to the distinguished scientific journal *Nature*, which published it in 1933. In this first peer-reviewed article by Alfvén, one sees his early confidence in laboratory experiments as pointers to events in space.

Alfvén received his PhD in theoretical and experimental physics from the University of Uppsala in Sweden in 1934. Early highlights of his academic career, beginning the year of his PhD, include teaching physics at the University of Uppsala and at Sweden's Nobel Institute for Physics. He later served as professor of electromagnetic theory and electrical measurements at the Royal Institute of Technology in Stockholm. For many years he served as Chair of Electronics, a title changed to "Chair of Plasma Physics" in 1963. He also spent time in the Soviet Union before moving to the United States, where he worked in the departments of electrical engineering at both the University of California, San Diego, and the University of Southern California.

In 1937 Alfvén observed that the charged particles of a rarified plasma appear to pervade interstellar and intergalactic space. And he suggested that these particle motions were responsible for the detected magnetic fields. A few years later, in the early 1940s, Alfvén proposed that the Sun and planets emerged from a cloud of ionized gas and that, in such processes, "electromagnetic forces have been more important than mechanical forces." The latter claim, together with other emphases on electric currents, would place Alfvén's work in direct conflict with a cardinal tenet of astronomy at the beginning of the space age—the assumption that only gravity can perform "real work" across interstellar or intergalactic distances.

Magnetohydrodynamics

Alfvén's interest in magnetic fields laid the foundations of today's magnetohydrodynamic theory, a theory widely employed by astrophysicists. In the original formulations of the theory, Alfvén spoke of magnetic fields being "frozen" into neutral plasma, and the magnetohydrodynamic equations he formulated implied that the electric currents that create magnetic fields could be effectively ignored. Hence, the plasma activity on the Sun and in more remote space could be analyzed without reference to any larger domain of electric currents or electric circuits.

To this notion astronomers were readily attracted, and for a time they thought they had an ally in the brilliant electrical engineer. Although his "fundamental work and discoveries in magnetohydrodynamics" led to his Nobel Prize in 1970, the background to this occasion is paradoxical.

Through much of the 19th and 20th century, most astronomers and cosmologists had assumed the "vacuum" of space would not permit electric currents. Later, when it was discovered that all of space is a sea of electrically conductive plasma, the theorists reversed their position, asserting that any charge separation would be immediately neutralized. Here they found what they were looking for in Alfvén's frozen-in magnetic fields and in his magnetohydrodynamic equations. Electric currents could then be viewed as strictly localized and temporary phenomena—needed just long enough to create a magnetic field, to *magnetize* plasma, a virtually "perfect" conductor.

The underlying idea was that space could have been magnetized in primordial times or in early stages of stellar and galactic evolution, all under the control of higher-order kinetics and gravitational dynamics. All large scale events in space could still be explained in terms of disconnected islands, and it would only be necessary to look *inside* the "islands" to discover localized electromagnetic events—no larger electric currents or circuitry required. In this view, popularly held today, we live in a "magnetic universe" (the title of several recent books and articles), but not an electric universe. The point was stated bluntly by the eminent solar physicist Eugene Parker, "…No significant electric field can arise in the frame of reference of the moving plasma."[3]

But the critical turn in this story, the part almost never told within the community of astronomers and astrophysicists, is that Alfvén came to realize he had been mistaken. Ironically—and to his credit—Alfvén used the occasion of his acceptance speech for the Nobel Prize to plead with scientists to ignore his earlier work. Magnetic fields, he said, are only part of the story. The electric currents that create magnetic fields must not be overlooked, and attempts to model space plasma in the absence of electric currents will set astronomy and astrophysics on a course toward crisis, he said.

In accord with Alvén's observations, American physicist, professor Alex Dessler, former editor of the journal *Geophysical Research Letters*, notes that he himself had originally fallen in with an academic crowd that believed electric fields could not exist in the highly conducting plasma of space. "My degree of shock and surprise in finding Alfvén right and his critics wrong can hardly be described."[4]

In retrospect, it seems clear that Alfvén considered his early theoretical assumption of frozen-in magnetic fields to be his greatest mistake, a mistake perpetuated first and foremost by mathematicians attracted to Alfvén's magnetohydrodynamic equations. Alfvén came to recognize that real plasma behavior is too "complicated and awkward" for the tastes of mathematicians. It is a subject "not at all suited for mathematically elegant theories." It requires hands-on attention to plasma dynamics in the laboratory. Sadly, he said, the plasma universe became "the playground of theoreticians who have never seen a plasma in a laboratory. Many of them still believe in formulae which we know from laboratory experiments to be wrong."

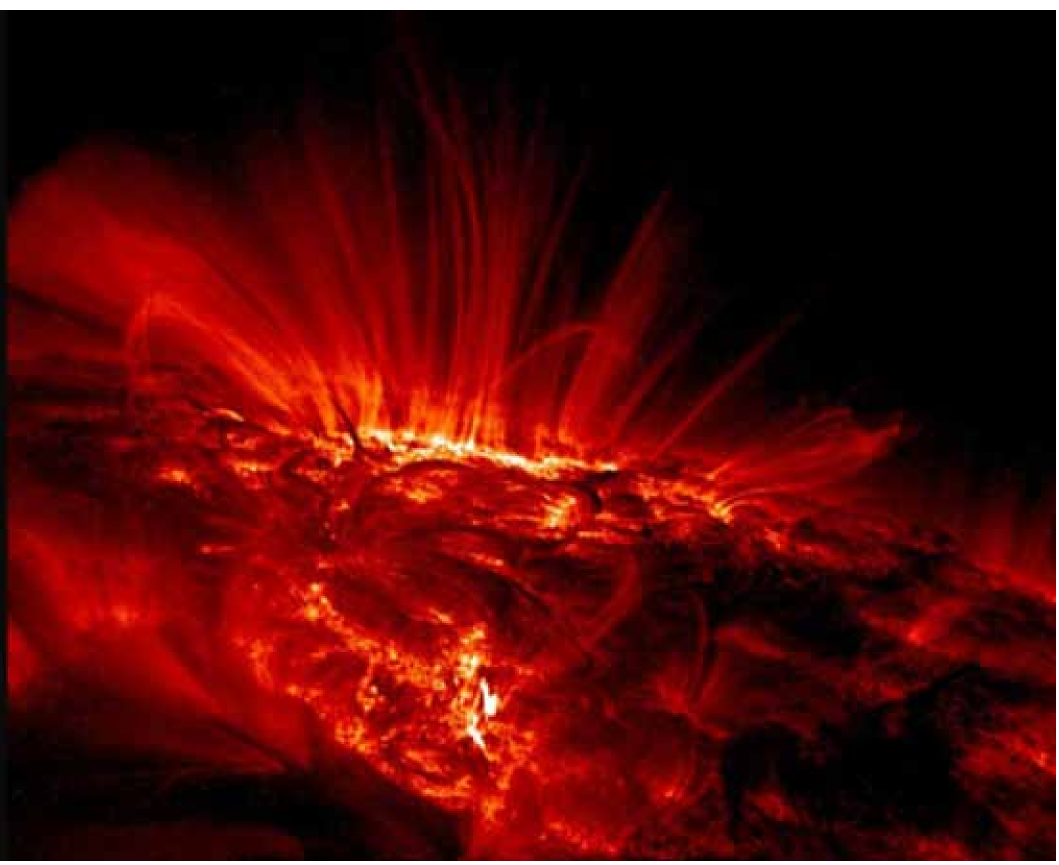
Again and again Alfvén reiterated the point: the underlying assumptions of cosmologists today "are developed with the most sophisticated mathematical methods and it is only the plasma itself which does not 'understand' how beautiful the theories are and absolutely refuses to obey them."

Cellular Structure and Filamentation of Space

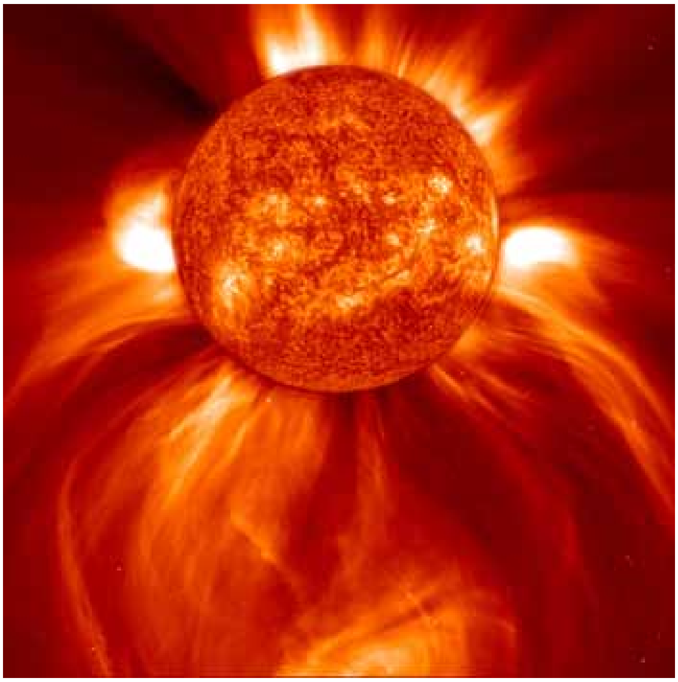
The fundamental truth discerned by Alfvén, but ignored by proponents of his "magnetohydrodynamic" model, is that plasma in space cannot have a magnetic field permanently "frozen" in to it. In space plasma environments, electric currents are required to create and sustain magnetic fields. "In order to understand the phenomena in a certain plasma region, it is necessary to map not only the magnetic but also the electric field and the electric currents. Space is filled with a network of currents that transfer energy and momentum over large or very large distances. The currents often pinch to filamentary or surface currents. The latter are likely to give space, interstellar and intergalactic space included, a *cellular* structure."[5]

Of course when Alfvén discussed these issues, electric currents and cellular plasma configurations in space were simply off the grid of theoretical astrophysics: "...Space in general has a 'cellular structure,'" he wrote, observing that the cellular walls are not visible and could only be measured by sending a space probe through those inaccessible regions. Based on his own laboratory research and backed by the work of Nobel Laureate Irving Langmuir and others, he noted that the plasma cell boundaries, called "double layers," tend to insulate the regions inside these cells from the regions outside.

Plasma experiments show that strong electric fields can be present across the walls of these cellular sheaths (double layers), and the presence of the these fields is essential to understanding plasma behavior. To ignore this cellular structure in the cosmos, Alfvén observed, is to assume that deep space plasmas "have properties which are drastically different from what they are in our own neighborhood. This is obviously far more



A "typical day on the Sun," showing the energetic loops and prominences that trace out the complex magnetic fields carpeting the Sun's surface. But what is the contribution of external electric fields to these events? Credit: NASA/TRACE



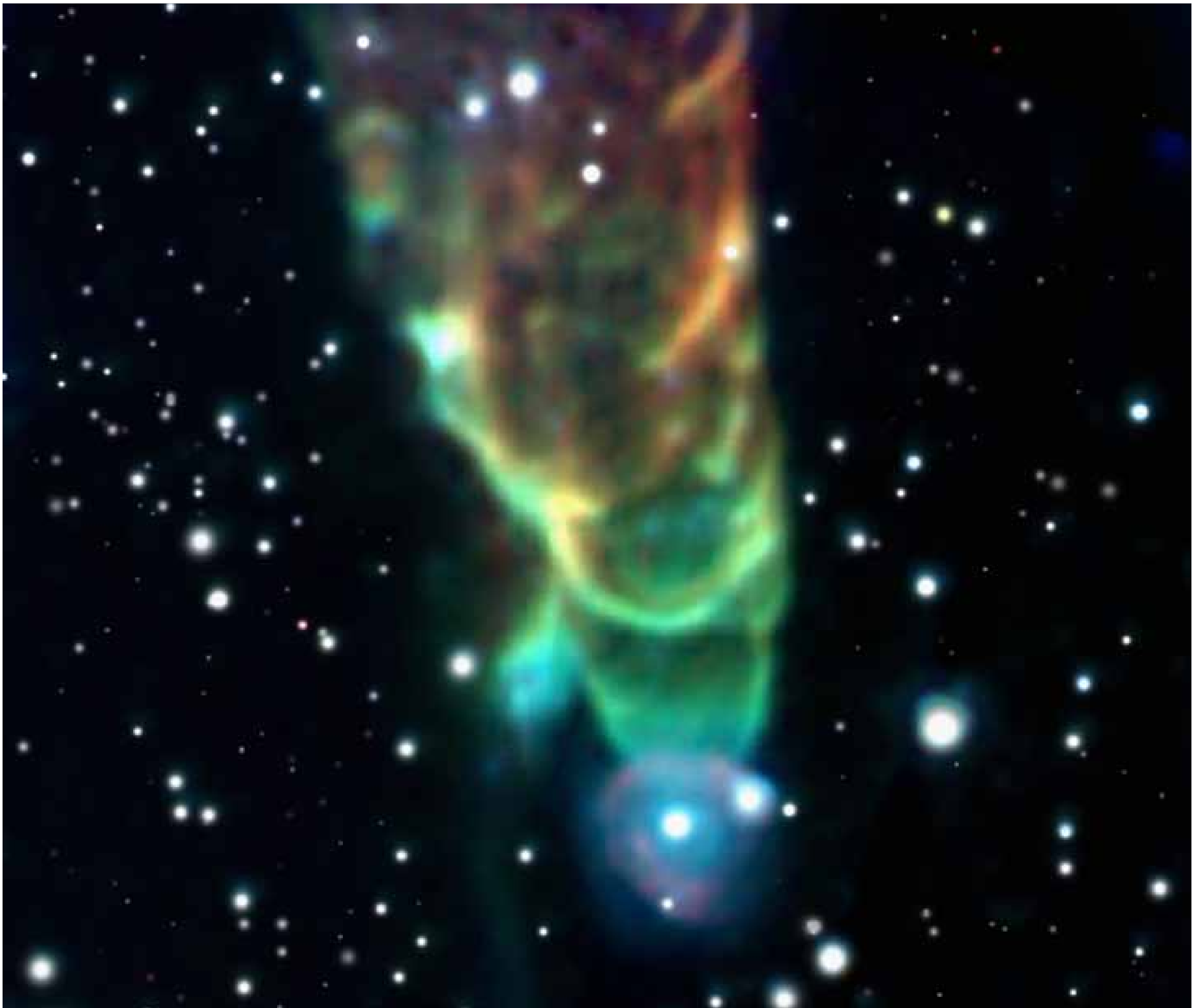
unpleasant than our inability to detect distant 'cell walls.' Hence, a thorough revision of our concept of the properties of interstellar (and intergalactic) space is an inevitable consequence of recent magnetospheric discoveries."[6]

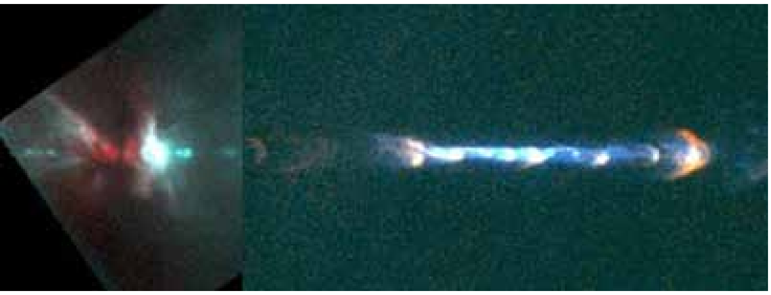
Stellar Jets

Even before the space age, Alfvén had come to realize that, for stars, the electrical circuitry will show up in equatorial current sheets and polar current streams. Based on laboratory plasma experiments, Alfvén noted that electromagnetic energy could be stored in a star's equatorial ring until a critical juncture when that energy switched to a polar discharge. The resulting

LASCO C2 image, recording a coronal mass ejection. Astronomers continue to offer "explanations" for such events, based on the interplay of magnetic fields, with no regard for the external electric fields that are required for the acceleration of charged particles away from the Sun. Credit: SPHO/LASCO consortium

The energetic stellar jet of HH (Herbig Haro) 49/50, as seen through the Spitzer Space Telescope. Credit: J. Bally (Univ. of Colorado) et al., JPL-Caltech, NASA





Herbig Haro 111, displaying a jet *12 light-years long* with charged particles accelerated to speeds approaching 500 kilometers per second. The finely filamentary and knotted jet spans three times the distance from the Sun to our nearest star. By what means are these jets confined to a narrow stream across such unfathomable distances? Credit: NASA and B. Reipurth (CASA, University of Colorado)

jet would be energized by a particle-accelerating double layer: the gravity of a star would then give way to the incomparably more powerful electric force, accelerating matter away from the star.

And now, thanks to more powerful telescopes, we see exactly what Alfvén envisioned. One noteworthy form is the Herbig Harro (HH) object; such objects are now counted in the hundreds and observed in sufficient detail to invalidate all early, non-electric theories of such formations.

The unsolved mysteries confronting mainstream astronomy were popularized in the "Astronomy Picture of the Day" (APOD) on Feb 3, 2006. The caption identified this stellar jet as a "cosmic tornado" light-years in length, with gases moving at 100-kilometers per second.

Of course, gravitational models featured in twentieth century astronomy never envisioned narrow jets of *anything* streaming away from stellar bodies. Neither gravity nor standard gas laws would allow it. The Hubble Space Telescope website compares the whirling, pulsating, and oscillating jets to the effects of lawn sprinkler nozzle: "Material either at or near the star is heated and blasted into space, where it travels for billions of miles before colliding with interstellar material."[7] Does a star have the ability to create collimated, high energy jets across *billions* of miles by merely "heating" material in its vicinity? The matter in the jet is *hot* and it is moving through a *vacuum*. If one is to use an analogy with water, the better example would be a super-heated steam hose. But it will not form a jet of steam for more than a *few feet* before the steam disperses explosively.

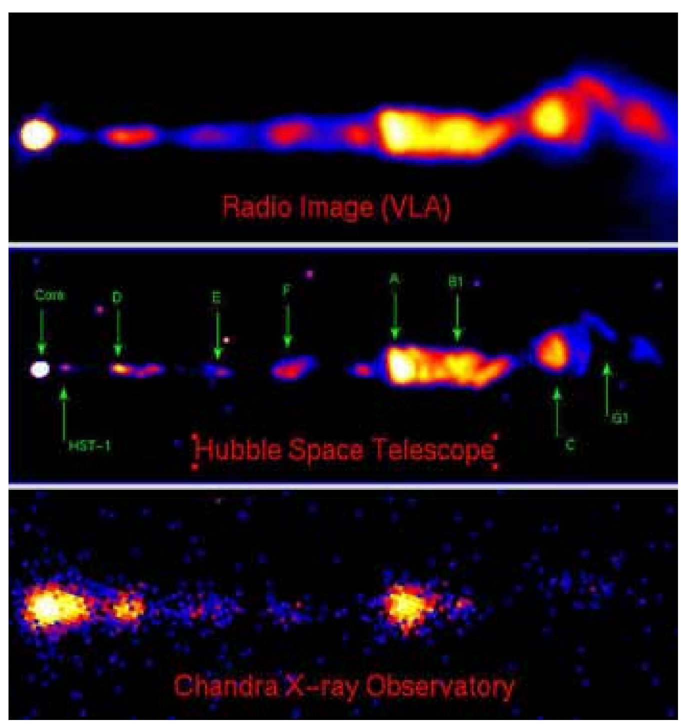
The Hubble page poses two additional questions: "What causes a jet's beaded structure?" and "Why are jets 'kinky?'" Ironically, the questions point directly to two of the most prominent features of electric discharge in plasma—"beading" and "kink instabilities." Both occur not just in laboratory discharge experiments but in everyday lightning on earth.

Herbig Haro objects do not just defy all traditional astrophysics; they explicitly confirm Alfvén's vision of the polar discharging of stars. Axial currents, confined by a current-induced, toroidal magnetic field, flow along *the entire length of the jet*, in precise accord with Alvén's expectations. Only an electric field can accelerate charged particles across interstellar space. There is no canon-like explosion, and there is no "nozzle" on one end. The jet is defining astrophysical objects in fundamentally new terms, confirming Alfvén's suspicions more than 60 years ago, that interstellar space is alive with electric currents.

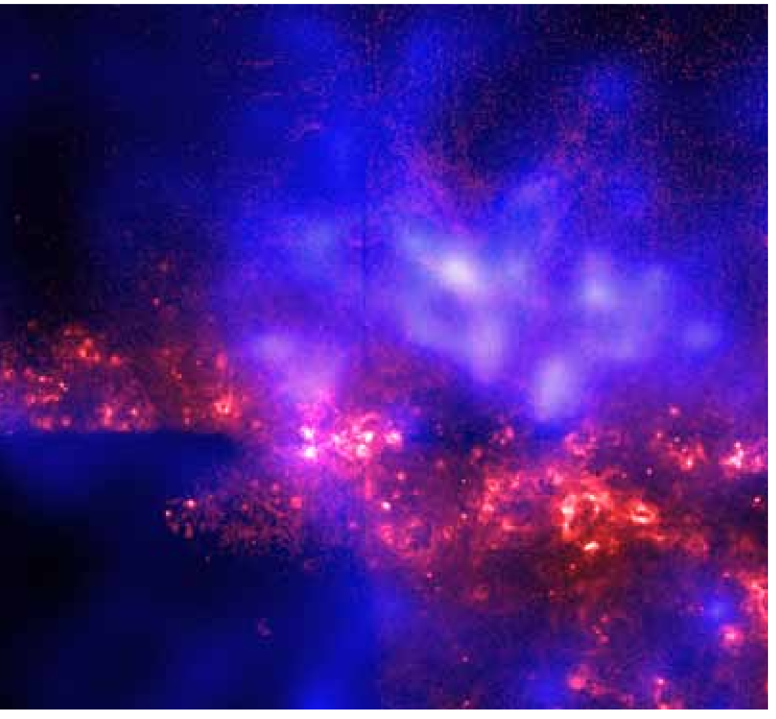
X-Rays and Synchrotron Radiation

Alfvén's view of space was radically different from that of mainstream astronomy before the electromagnetic spectrum became a door to discovery in space. In the first years of the space age astronomers were generally satisfied with seeing objects in visible light alone. Earth's upper atmosphere shielded the surface of our planet from most emissions at the higher end of the spectrum, and there was little reason to expect a broader spectrum of electromagnetic emissions from space. That all began to change in the 1930s, when an engineer named Karl Jansky accidently discovered the existence of radio waves from space. The eventual interest in space telescopes detecting ultraviolet, X-ray, and gamma-ray wavelengths came largely through incremental surprises such as Jansky's.

The intense electromagnetic activity across the cosmos requires a vast complex of electric fields and electrical circuitry, just as Alfvén confidently predicted decades before the new telescopes were launched into space. Prior to the launch of the X-ray telescope Uhuru in 1970, for example, astronomers knew of only two X-ray sources in the heavens—Scorpius X-1 and the Crab Nebula. But the Chandra and XMM-Newton X-ray telescopes, more recently launched into space, began to reveal X-ray activity in virtually every corner of the universe, even in the deepest vacuum *between* galaxies. X-rays require



Energies along the jet of Galaxy M87 confirm the presence of synchrotron radiation. Credit: VLA/Hubble/Chandra



Chandra's observations of NGC 4631 reveal a giant halo of electrified plasma, with X-ray emissions seen in blue and purple, animating this spiral galaxy. We now know that X-ray emissions are ubiquitous in space. Credit: NASA/Chandra

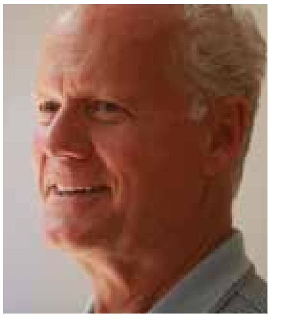
an acceleration of charged particles up to speeds far beyond the capabilities of thermal expansion or gravitational acceleration. So it's understandable that most astronomers did not anticipate an X-ray universe. Of course, we routinely employ electric fields today to produce X-rays, and if Hannes Alfvén had lived to see the recent results, he would have not been surprised at all.

Then at the upper limit of the electromagnetic spectrum, just above X-rays, lie the wavelengths of Gamma-rays. The name for a full complex of electromagnetic emissions—including Gamma-rays—is "Synchrotron radiation," a radically new phrase in the astronomer's lexicon. Such radiation is produced by electrons moving at close to the speed of light while spiraling along magnetic fields. Magnetic fields *require* electric currents—of this fact no reasonable dispute is possible. Ironically, it was in 1950, well prior to the space age, that Hannes Alfvén *predicted* synchrotron radiation in space, based on an electrical interpretation of galactic activity. Astronomers could not imagine such a thing at the time. But in 1987, astronomer Geoffrey Burbidge detected synchrotron radiation emitted by a spectacular jet along the axis of a galaxy called M87. And the fact that these frequencies have now been detected abundantly in space is perhaps the greatest surprise of all.

As every electrical engineer knows, charged particle acceleration is routinely achieved by electric fields. The ubiquitous synchrotron radiation from space simply confirms that the isolated islands envisioned by traditional astrophysics do not exist. But the specialized training of astronomers had suggested no need for electricity. As a result, the discovery of intensely energetic events in space have provoked exotic and untestable amendments to traditional theory—from "black holes" to "dark matter" and "neutron stars"—all based on phenomena unknown in our practical world and disconnected from any verifiable behavior of nature.

Though the history and practice of science is often cluttered with dismissals of scientific "outsiders" and obstructive allegiance to dogma, it can at least be said that in the last 40 years astronomers have grudgingly come to accept an entirely different view of the universe from the one they started with. And for this, no one deserves more credit than the cosmic electrician, Hannes Alfvén.

DAVID TALBOTT is the founder of the Thunderbolts Project (http://thunderbolts.info), an internet collaboration on behalf of the "Electric Universe." He was the founder and publisher of *Pensée* magazine's ten issue series, "Immanuel Velikovsky Reconsidered," bringing international attention to the Velikovsky issue from 1972 through 1974. His book *The Saturn Myth* was published by Doubleday in 1980 and helped to inspire the continuing research of scholars and scientists now involved in the Thunderbolts Project. He has co-authored two books with Australian physicist Wallace Thornhill: *Thunderbolts of the Gods* and *The Electric Universe*, and his work was the subject of the 1996 documentary, "Remembering the World." More recently he served as editor-in-chief of an e-book series, *The Universe Electric* (*Big Bang, The Sun*, and *The Comet*) and has written and narrated two DVDs of a planned series called *Symbols Of An Alien Sky*.



ENDNOTES

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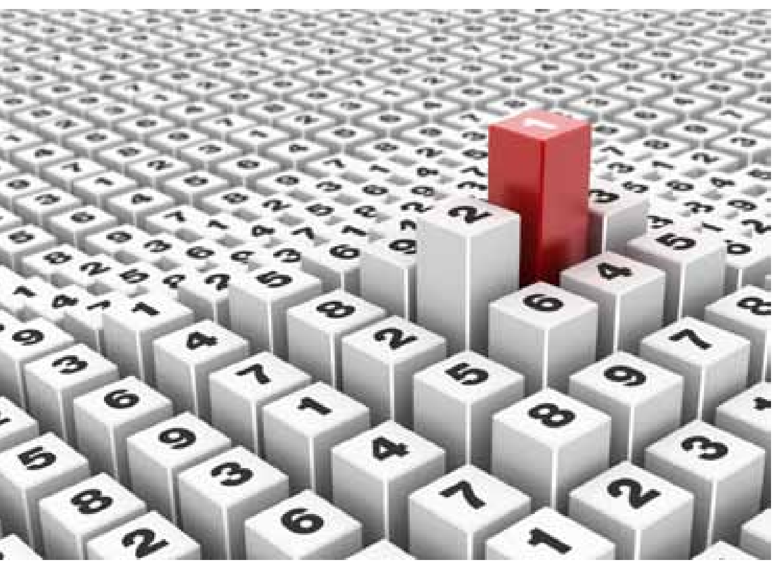
Bernard D. Beitman, M.D.

Coincidence Studies
A Manifesto

We instinctively seek order in our surroundings. The recognition of order helps us to survive by producing predictability. We also seem to find pleasure in the discovery of order. One way in which we establish order is through the detection of coincidence. Two events occurring closely in time suggest a possible causal connection. Causal connections imply principles and laws by which to predict and control the future.



Our perceptions of coincidence emerge from swirls of information in our minds juxtaposed with swirls of events in our surroundings. Like two dials being spun by separate hands, the active mind and a pattern of events briefly coincide, bringing the mind to note an odd correspondence. The match is often surprising because it seems improbable.

At least a third of the general population frequently notices coincidences (Coleman, Beitman, Celebi, 2009). Reports of synchronicity seem to be increasing exponentially in print and electronic media. With world interest in coincidence reaching a tipping point, it is time to create a new field to explore how these unexpected conjunctions of events are to be understood and used. In response to this development, I propose the establishment of the transdisciplinary field of coincidence studies.

Definition

The central idea of coincidence is the unlikely juxtaposition of similar events that seem to be meaningfully connected. If there is a cause for their coming together, it is not apparent. The events making up a weird coincidence come from two sources: the human mind and the environment or context within which that mind is aware. The primary variables involved in coincidence are time interval, similarity, degree of surprise, and ownership.

Time Interval

Dictionaries define *coincidence* as the coming together of two or more events simultaneously in time or in the same space. In the future dictionaries will recognize an additional definition—that in popular and scientific usage, time intervals characterizing coinciding events can vary from simultaneous to many years.

Short time intervals seem to increase the potency of a possible coincidence because short time intervals between two seemingly related events begin to suggest a cause—lightning is quickly followed by thunder so lightning causes thunder. Unknown cause more easily evokes surprise and wonder.

But even events taking place years apart may be very surprising and have major impact. Take this example: "Allen Falby was a highway patrolman in Texas. One night on duty he crashed his motorcycle and lay bleeding to death on the road, having ruptured a major artery in his leg. At that point, a man named Alfred Smith arrived, quickly put a tourniquet on his leg, and saved his life. Five years later, Falby was again on duty and received a call to go to the scene of an auto accident. There, he found a man who was bleeding to death from a severed artery in his leg. He applied a tourniquet and saved the man's life. Only then did he find out it was Alfred Smith, the very man who had saved his life in the exact same way five years earlier. Falby joked, 'It all goes to prove that one good tourniquet deserves another'" (Combs and Holland, 2001).

In the creation of a coincidence, time usually goes forward: you're thinking something and then an event outside your mind matches what you are thinking. Coincidences can also be recognized by looking back in time and matching phenomena retrospectively, as happened to Allen Falby. As an example from my own life, I found myself choking on something caught in my throat for quite a long time. A few hours later I was told that my father had been choking and dying at the same time. (This example raised the question about whether or not a coincidence exists if no one notices it.)

Similarity

The two or more events making up a coincidence must be similar. The similarity between and among the events is based upon recognizing a pattern in each event and then concluding that the two patterns resemble each other. For example, someone goes to a class on movies that focuses upon a specific scene in a specific movie and then later that day hears from a friend about another class in another town in which the major event in that scene is discussed. The same pattern is being repeated. If later that evening, the person continues reading a book on spirituality and reads a passage referring to the same scene in the movie, then three parallel, similar patterns make up the coincidence.

Just how similar must similar be? How strongly do the patterns need to match to be called similar? Coincidence reporters may allow themselves great latitude in answering these questions.

Degree of Surprise

One of your friends arriving on time for coffee does not qualify as a coincidence. It is not surprising, though you may be glad to see her. There must be some mystery, something anomalous to make the intersection of two sequences surprising. Surprising coincidences make us wonder. They stretch our sense of probability—the less likely, the more surprising.

Along with its improbability, the degree of surprise is evaluated according to its relevance: how directly does this combination of coinciding events relate to our current thinking? When the coincidence seems to provide a comment on a current set of thoughts, the sense of surprise is also amplified.

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The degree to which a coincidence is surprising helps determine the degree we tend to pay attention to it. Without some surprise we would not look any further at the parallel; we would not search for its significance or meaning.

Ownership

Is it your coincidence or mine? I will usually find my coincidences more compelling than yours. Ruma Falk (1989) did the research to prove this point. While working on her PhD dissertation, she was teaching the psychological aspects of probability—specifically how people perceive randomness. Coincidences were a natural subject for her to study, so she conducted an experiment to compare the surprise gradient between first-person and second-person perspectives. She found that subjects rated their own coincidences as more surprising than other people's on an average of 14.6 to 11.2. Her conclusion: when a coincidence happens to me, it is much more important than when it happens to you.

Forms of Coincidence

The words most often used to describe the types of coincidence are synchronicity, serendipity, and seriality. A fourth type, simulpathity, has a more recent history.

Synchronicity

Carl Jung (1973) is single-handedly responsible for the emergence of a formal discipline of coincidence studies. He invented the word synchronicity from the Greek "Syn"—with, together—and "Chronos"—time (as in chronology). Synchronicity means together-in-time. Through his towering intellect, reflected in his theoretical writings and anecdotes, Jung laid the groundwork for the 21st century study of coincidences.

True to the experiences of his youth, he placed many events under the synchronicity umbrella including telepathy, precognition, and clairvoyance (collectively classed as psi), along with poltergeists, apparitions, divination (e.g. the I Ching), and astrology. Jung and those who followed him have maintained that synchronicity can be an important tool in the quest for self-realization, for personal and spiritual growth, and for a deeper experiencing of human interconnectedness.

A first step in the systematic study of synchronicity requires that it be couched in more common language that repositions it in the direction of "meaningful coincidence." The Weird Coincidence Scale-2 (WCS-2), a survey approach to coincidence studies, has yielded two subscales: psychological/interpersonal and action (Coleman and Beitman, 2009). As a set of weird coincidences, synchronicity primarily involves the psychological/interpersonal. Further research into synchronicity should take into consideration this less theory-based description.

Serendipity

Horace Walpole, a member of the British House of Commons in the 18th century, recognized in himself a talent for finding what he needed just when he needed it. Walpole first recorded the term in a letter to his friend and distant cousin Horace Mann, the British minister in Florence, Italy. Mann had sent Walpole a portrait of the Grand Duchess Bianco Capello without a frame. Walpole's new frame required a coat of arms from the Capello family to decorate it appropriately. He just happened to find the needed coat of arms in an old book he had picked up. On January 28th, 1754, thrilled with this coincidence, he wrote to thank his Cousin Horace and gave a name to this ability to find things unexpectedly—serendipity.

He based the name on an old fairy tale called "The Travels and Adventures of Three Princes of Sarendip." Sarendip (or Serendib) is an ancient name for the island nation Sri Lanka off India's southern coast. The king of the fable recognized that education requires more than learning from books, so he sent his sons out of the country to broaden their experience by becoming acquainted with the customs of other peoples. Throughout the story, the clever princes carefully observed their surroundings, and then repeatedly utilized those observations to save them from danger and death.

Horace Walpole invented the word serendipity to mean finding something by informed observation (sagacity as he called it) *and* by accident (Austin, 2003; Merton and Barber, 2004). But Walpole's ambiguous definition has invited a range of possible meanings. Its main ingredients include luck, chance, active searching, and informed observation.

Science advances not only by testing theories under controlled conditions but also by serendipity (Austin, 2003). For example, unexpected and remarkable pharmacological discoveries have often been made when prepared minds actively explored both jungle and laboratory. The best known example is Alexander Fleming's discovery of penicillin. It was Louis Pasteur who said that "Chance favors the prepared mind"—a combination of sagacity and luck.

Serendipity can be helpful in many other situations. For example, career counselors advise clients to make the most of chance events because luck can arise from unplanned events (Krumboltz and Lewin, 2004). They suggest that job seekers be prepared to seize an opportunity. Job advancement may result from being in the right place at the right time; being introduced to the right someone; trying something new; and having an obstacle placed in your planned pathway that leads to quite different circumstances. ("When a door closes, a window opens.")

The study of serendipitous events requires a simplification of the exotic term. Serendipity is a coincidence form based upon action.

Seriality

The phenomenon of seriality differs from serendipity and synchronicity in that it is a series of events in the objective world that the mind takes note of and remembers. Unlike the others, there is not necessarily a special subjective element. The series could theoretically be verified by anyone.

Few have described strings of similar events more thoroughly than Austrian biologist Paul Kammerer. He spent hours sitting on benches in various public parks, noting the people who passed by, classifying them by sex, age, dress, whether they carried umbrellas or parcels, and so on. He did the same during the long train rides from his home to his office in Vienna. Kammerer was not particularly interested in meaning—only repeated sequences. His hundred or so examples include apparently insignificant repetitions of numbers, names, words, and letters. Some examples: His wife was in a waiting room reading about a painter named Schwalbach when a fellow patient named Mrs. Schwalbach was called into the consultation room. His brother-in-law went to a concert and received cloakroom ticket #9, which was the same number as his seat. Shortly thereafter he and his brother-in-law went to another concert and again his brother-in-law's cloakroom ticket #21 matched his seat number. A third example involves his friend Prince Rohan. On the train his wife was reading a novel with a character "Mrs. Rohan." She saw a man get on the train who looked like Prince Rohan. Later that night the Prince himself dropped by their house for a visit.

Sometimes Kammerer described events that were clustered in space: "Case No. 10 concerns two young soldiers who had never met before. They were separately admitted to the military hospital of Ktowitze, Bohemia in 1915. Both were nineteen, both had pneumonia, both were born in Silesia, both were volunteers in the Transport Corps, and both were called Franz Richter. Six items overlapped" (Koestler, 1971).

Kammerer's (1919) work on seriality helped Jung develop his concept of synchronicity. In his book *Des Gesetz der Serie*, Kammerer defined "seriality" as "a recurrence of the same or similar things or events in time and space"—events that, as far as can be ascertained, "are not connected by the same acting cause." Afterwards Jung used a similar definition for synchronicity and also attributed it to influences outside known causal principles. The two developed very different theories. In addition, Jung emphasized personal meaning, while Kammerer did not. Nevertheless, a series of improbable parallel events can seem quite meaningful. Meaningful series may take the form of a repeated phrase, seeing the same person in different contexts, or references to the same movie or book.

Simulpathity

Within the broad concept of synchronicity at least one category of weird coincidence emerges as worthy of being distinguished—the simultaneous experience by one person of the distress of another without conscious awareness and usually at a distance. One person is in pain; the other begins to feel something similar without knowing why. While my father was choking to death on his own blood, I was 3,000 miles away desperately choking on something in my throat. As with my father, the involved pair usually shares a strong emotional bond. Twins serve as a prototype because the largest number of reports concerns them (Fairplay, 2008; Mann and Jaye, 2007), although stories about mothers and their children are prominent as well. These concordant experiences usually do not have idiosyncratic meaning as do classic synchronicities. Rather they carry a more universal meaning; namely, the two individuals are more closely bonded than current scientific thought holds people to be.

Since simultaneity and distress characterize these coincidences, I have invented the word simulpathy from the Latin word "simul," which means "simultaneous," and the Greek root "pathy," which means both "suffering" and "feeling," as in "sympathy" and "empathy." With "sympathy" (suffering together) the sympathetic person is aware of the suffering of the other. With "simulpathy" the one is usually not consciously aware of the suffering of the other (except for those pairs with whom this shared pain is a regular occurrence). Only later is the simultaneity of the distress recognized. No explanatory mechanism is implied. (Previously, the terms "telepathy" and "telesomatic" have been used for these experiences, each of which implies a psi explanation. Coined in 1882 by the classical scholar Fredric W. H. Myers, a founder of the Society for Psychical Research, the original meaning of "telepathy" suggested distress communicated at a distance as suggested by the suffix "pathy" but the definition has evolved to mean "thought transference.")

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Characteristics of Coincidence Prone People

People create coincidences by matching their own mental activity with contextual activity framing their experiences. Coincidence finders must be capable of paying attention to their thoughts, mental images, and feelings, while also monitoring events around them. The penchant to notice coincidences seems to be greater in some people than others. Various personal characteristics contribute to the meta-mental states conducive to experiencing meaningful coincidence.

Work with the Weird Coincidence Scale (WCS-2) suggests several characteristics associated with a readiness to perceive coincidences (Coleman and Beitman, 2009). As might be expected, people who describe themselves as "spiritual" and/or "religious" report experiencing coincidences with higher frequencies than those who are less so. Applying standard psychological instruments to undergraduate students as subjects, we found several additional characteristics that suggest elevated tendencies to connect mind with context:

- Self-referentiality: the tendency to believe that the thoughts of others involve the self
- High negative affect: high negative emotions like sadness, anger, and anxiety
- Vitality: the tendency to enthusiastically welcome the day accompanied by the belief that events are unfolding in one's favor
- Intuitive: the tendency to bypass rational thought sequences to make connections on the basis of feelings and general impressions
- Search for meaning: seeking clues to the meaning of life

These characteristics share in common heightened emotional states likely to increase readiness to scan the environment. The WCS-2 data indicate that people high on "agreeableness" saw fewer coincidences. Highly agreeable people are pleasant, amiable, cooperative, and think positively of others. Why do they score low on coincidence sensitivity? Perhaps they are looking for ways to connect to the needs of others and are less concerned about their own inner experiences.

Neuropsychology research adds another related variable: the degree to which people are prone to associate ideas. Those who associate easily are more likely to make connections between mental and contextual events (Brugger, 2001).

Some coincidence-prone people may fit none of these descriptions. They may be deeply immersed in a subject and find connections to it in many different times and places. Or they may simply have learned to look for such correspondences after having had positive experiences with them.

Situations in which coincidences are more likely to occur

Two prominent variables influence coincidence frequency. The more intense the current emotional state and the more often a mind intersects with streams of environmental events, the more likely will coincidences be noticed. Everyday events that increase mind-context intersections include telecommunications, media immersion, out of the ordinary situations, and intense discussions involving personal feelings and ideas. Situations that increase the intensity of emotion include such life transitions as births and deaths, marriage and divorce, severe sickness, moving, job changes, vacations and travel, psychotherapy, as well as engaging in creative activities, being in the "flow," and facing apparently unsolvable personal problems. In considering how these situations increase the possibility of coincidences, one could speculate that each of us is enmeshed in a self-designed web of regular daily interactions. Regularly recurring patterns of behavior and events are comforting and insulate us against new intrusions. Traumatic events tear the regularity of the quotidian web, increasing the possibility that something weird can enter our reality.

Meaning

Subjective meaning is an essential ingredient in coincidence. Subjective meaning can be applied to the past, present, or future.

Future meaning emphasizes the practical: What do these parallel events imply about what I am doing or what I am about to do? Perhaps the most famous instance of synchronicity occurred to a patient of Jung's who was closed to Jung's ideas for her. Prior to the pivotal session, she dreamed of a scarab (a beetle-like insect of Egypt). A moment after she told Jung about it, he presented her with a scarab-like beetle that had been buzzing at his office window as she was describing her dream. The synchronicity changed her attitude, helping to break through her rigid thinking to become more open to Jung's therapeutic influence. Her future was changed.

Past meaning seeks a cause, an explanatory framework. When I tell a coincidence story or an amazed person tells me their story, the same question usually follows—"how (or why) does this happen?" We are cause-seeking creatures; we want to know why and how things happen. We want to understand. Sometimes we are driven by inborn curiosity preserved from childhood. Sometimes causal understanding helps to clarify the implications of the coincidence for the future. For example, there are those who believe that some especially significant coincidences are messages delivered by God, and that attribution of causality increases the desire to comply with the implied message.

Present meaning emerges in simulpathity experiences—we come to experientially know how deeply we are connected to those we love. The present expands in breadth and depth. Jungian Analyst Roderick Main described the effect of some coincidences on the present: "In synchronicity, uniformly unfolding clock time is interrupted with moments of extraordinary timeliness, which in turn can open our eyes to a sense of present time as qualitative, filled with varying landscapes of meaning" (Main, 2004).

Theories

Jung and his followers have formulated the most elaborate theories of synchronicity. Jungian theories share in common the belief that the collective unconscious and archetypes are major participants in coincidence creation. Archetypes are thought to be activated (or constellated) in high-emotion situations. They are thought to exist in a state from which both mind and matter emerge—the psychoid. Jungians support their theories with ideas drawn from mythology to quantum physics and have provided a rich soil from which to speculate about meaningful coincidences.

Among the general public, divine intervention is the most widely accepted explanation for meaningful coincidences (Rushnell, 2006). Among those who place high value on currently accepted scientific concepts of reality, coincidences are explainable in statistical terms— randomness, probability, and chance. Those who wish to combine these two predominant explanations can combine divine intervention and chance by suggesting that "God works through random events." The Freudian perspective offers a personal unconscious explanation, requiring only current need and early childhood experience to explain coincidences (Williams, 2010).

The resolution of conflicts among coincidence theories could take two forms. One possibility is that a superordinate theory will be developed to encompass all others, explaining all instances of coincidence. A second possibility is that different theories may account for different types of coincidences. This second approach to theory appears more likely to fit the current state of knowledge in the study of coincidence: different coincidence subtypes require different theoretical explanations. Do quantum principles govern any aspect of the macro world? Perhaps. Are there overlaps between various coincidence theories? Probably.

The Use and Misuse of Coincidence

How can coincidences be used? They can support tentatively made decisions; reinforce psychological change; offer opportunities not yet apparent; provide encouragement in times of trouble; alter rigid beliefs; demonstrate interpersonal connectedness; provide help for financial problems; provide help for medical problems; produce creative ideas; and increase the sense of connectedness to something greater. Much more needs to be done to expand and clarify the practical function of coincidences.

Coincidences can have strong negative as well as strong positive effects. The popular literature has generally ignored the downside of coincidences; they can be used to exaggerate self-importance; confirm paranoid thinking; coerce others; and support malevolent decisions. The ways in which coincidences can be used destructively also requires expansion.

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Increasing the Frequency of Coincidences

People's interest in coincidence ranges from disinterested to skeptical to deeply committed. Disinterested people don't see the value or relevance of examining coincidences. Skeptics do not believe that objective events can have symbolic personal meaning. They also believe that randomness and chance best describe how coincidences occur and, by this reasoning, dismiss them. The deeply committed find coincidences to be friendly companions on life's journey, acting as metaphorical advisors and supporters.

Between the skeptics and the deeply committed are those who would like to try using coincidences. An effective training program based upon this developing science is ripe for development. The premise of a proposed training program is that coincidences can be helpful in love, work, and creativity, as well as in spiritual and psychological growth.

The Twin Aims of Coincidence Studies

Coincidence studies aim to develop coincidence theories and expand the usefulness of coincidence. These aims reciprocally advance each other. Increasingly effective usage helps sharpen connections to specific theories and helps to further advance understanding of that particular theory. Refined theoretical understanding helps to sharpen interpretation by placing the coincidence within a context that clarifies its limitations and potentials.

Use: In how many different ways can coincidence aid decision-making, self-development, and aesthetic appreciation? When are coincidences best utilized, and when is their use likely to be inconsequential or harmful? What are the principles that determine which interpretation may be optimally applied? How do we help those who want to increase their sensitivity to detecting coincidences?

Cause: The study of coincidence will join other attempts to discover laws we do not currently understand. Coincidences affront the current scientific understanding of reality. Shall we stop and simply admit that they are an incomprehensible mystery, or shall we push back the frontiers of faith and mystery to uncover currently unknown principles governing our world? Despite the objections of many skeptics and scientific fundamentalists, much data supports the human ability to know things without a clear idea of how we can know them (Radin, 2006; Carpenter, 2004; Mayer, 2007).

Establishing the Field of Coincidence Studies

This manifesto lays out basic definitions, principles, and problems around which divergent groups can organize. In the future we need to:

- Clarify definitions: synchronicity, serendipity, and seriality. What are more operationally useful terms?
- Develop a taxonomy of coincidences—create sharper categories like simulpathity,
- Define methods to judge the strength and weakness of coincidences and the differing relevance,
- Expand the value (and difficulties) of coincidence use,
- Develop and clarify interpretation principles,
- Further characterize coincidence prone people,
- Address the positive correlation between intense affect and increased coincidence frequency,
- Firmly establish viable theories and test them, recognizing that we may be expanding our understanding of causation.

To establish the field, interest in coincidences must garner the energetic attention of sufficiently large numbers of people positioned to help it develop. The enthusiasm of the general public must be coalesced sufficiently to motivate popular media to write, talk and produce videos on the subject. Public and popular media interest will drive the idea into the academic and grant funding arenas.

Many disciplines can contribute to this new field. These disciplines include but are not limited to Jungian psychology, statistics, neuropsychology, psychiatry, cognitive neuroscience, psychotherapy, parapsychology, vocational counseling, narrative arts, cultural anthropology, theology, and the Mantic Arts. What can these fields tell us about coincidence? Research results and accompanying academic interest will add to growing support, leading to the establishment of formal interdisciplinary and transdisciplinary units in and outside of academics to promote the use and study of coincidences.

New story collecting websites could be established with more systematic data gathering. A screening tool would find stories of particular interest and an interviewer would ask the experiencer more details about the events. These would be "thick" descriptions, sometimes augmented with visuals like photographs and videos to make the details clearer. Content analyzers would be developed to find themes that might escape the view of trained readers.

The Yale SynchroSummit, held in October 2010, marked the first focused gathering for the study of meaningful coincidences that included the full spectrum of competing theories. More such summits would help to accelerate the field's development.

Citizen Scientists need to be engaged. Two leaders of the SynchroSummit, James Clement van Pelt and Lesley Roy, initiated the Citizen Scientist approach to studying coincidence centering around an app that can be activated when the subject experiences a meaningful coincidence. The subject is then prompted through a series of questions to characterize the coincidence.

A related approach would test the hypothesis that coincidences occur regularly but are often missed because of the absence of the heightened emotional state or sufficient attention. This project would define a specific time and place for ongoing reports. A baseline study would examine coincidence type and frequency in a circumscribed quotidian reality like a shopping mall. A comparison group could be a high-energy gathering like a music festival or coincidence conference. Not only would standardized questions accompany the subjects when a coincidence is noted, but real time video cameras, GPS locators, and subsequent interviews would also be employed. This study would apply current anthropological methods for gathering data and then apply computer programs to define patterns of coincidences that might not be readily discerned by the human mind alone.

We should study coincidence sensitive people. What makes them so sensitive and how do they interpret and use them? Life transitions also need more systematic attention since they have so regularly been reported to be correlated with an increase in coincidence frequency. The association of grief and coincidence, for example, was the subject of a doctoral dissertation (Hill, 2011). Other conditions to be studied include sickness, pregnancy-birth, and job transitions with normal life comparators.

Individual, couples, and family psychotherapy provide another potentially controllable setting to study the possible regular occurrence of coincidences. How people show up in therapists' offices appears to be random—the timing of the call, the day of the opening, the type of problem. Therapy increases emotional intensity, opens all participants to the contents of their minds, and increases mind-context intersections, providing fertile ground for coincidence creation and detection. How can this potentially rich depository of meaningful coincidences be mined?

We should include coincidences as guiding influences in the development of coincidence studies. Our organizational mind should be alert to those unexpected, unpredictable parallels that can richly populate everyday life. The parallels could be presented to those interested for interpretation and possible guidance. If this principle can be incorporated into the living, growing organization, it will help keep us flexible, open, and studying in real time just what we might be studying in other systematic ways.

Of course there are problems that cannot be anticipated. But one problem is clear from the outset—the multiple disciplines, each with its own set of thoughts, beliefs, and methods will need to find ways to work together. The goal is not consensus but rather the bringing together of thoughtful people from a variety of perspectives to find ways of sharing new findings under a mosaic of theories.

The biggest challenge in the development of this new discipline is providing a systematic place for subjectivity and consciousness. Meaningful coincidences are fully dependent upon the mind of the observer. Without subjective recognition most coincidences do not exist. How do we develop a methodology and an accompanying language that includes the subjective?

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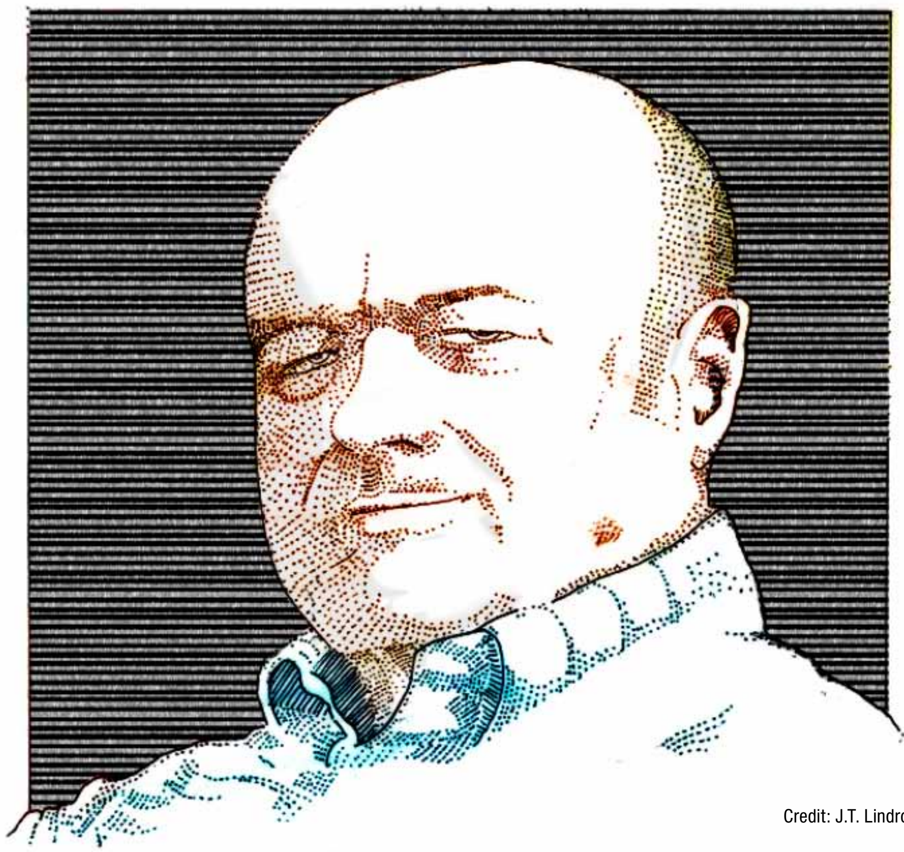
‘BACKSCATTER’

Patrick Huyghe

In Memory of William Corliss



Credit: J.T. Lindroos

William R. Corliss, regarded by many as the world's greatest contemporary anomalist, passed away at his home in Glen Arm, Maryland, on July 8, 2011, at the age of 84. During a span of some 40 years, the physicist turned stalker of paradoxical data brought to light a mind-boggling collection of unexplained observations, embarrassing deviations, and paradigm-shattering discoveries that orthodox science had largely swept under the carpet of consensus. In recognition of these contributions, he received, in 1994, the Tim Dinsdale Award presented by the Society for Scientific Exploration.

Corliss was born on August 28, 1926, in Stamford, Connecticut, and served in the Navy during World War II. After receiving degrees in physics from Rensselaer Polytechnic Institute (BS) and the University of Colorado (MS), he worked for more than a decade as a physicist in industry, first with Pratt and Whitney Aircraft, then with General Electric Company, and finally with the Martin Company where he was Director of Advanced Programs in their Nuclear Division. In 1963 he began another career, in technical writing, and produced works for NASA and the National Science Foundation on such topics as electric power generation, computers, space radiation, robotics, and telecommunications.

With an interest in "outlaw science" that had been sparked by the reading of a controversial book on geology in 1951, Corliss turned to writing about scientific anomalies in 1974, an endeavor he christened The Sourcebook Project. In the decades that followed he conducted a massive amount of library research, poring through many thousands of scientific journals and gleaning from them a wide assortment of neglected data in the fields of geology, biology, archeology, astronomy, psychology, and geophysics. He first reprinted the accounts he found in a series of six ring-bound volumes, followed by six massive hardback volumes he called "handbooks." But by 1982 he had switched to a hardback catalog format that not only presented examples of various anomalies and their sources, but also gave an evaluation of the quality of data—and an evaluation of an anomaly's possible impact on science, from being a mere curiosity to being "revolutionary," by which he meant that the anomaly could not even be explained by a modification of present scientific laws.

The evaluations were necessarily subjective. He admitted that it was difficult to categorize and organize the unknown, and always pointed out that the material he chose to include in his anomaly catalogs reflected what—*in his opinion*—was not well-explained, as "anomalousness is often in the eyes of the beholder." Not all the anomalies he highlighted presented a threat to mainstream science. Some are mere blemishes. Others are leaks, cracks, and fissures in the foundations and facades of the various sciences. But there are potholes as well, the potential game changers. "Instead of simply accepting nice, slick theories like evolution, relativity, and continental drift," he said in 1980, "I think we should occasionally reexamine them to be sure they are not accepted just because they are so slick. And based upon the material I've collected, what I'm saying is: I'm not so sure." Among the major paradigms widely considered to be fact that his catalogs of anomalies put at risk are: the expanding universe; the Big Bang origin of the universe; Neo-Darwinism, specifically evolution via random mutation and natural selection; plate tectonics and continental drift; Special and General Relativity; and the assumption that genomes are the complete blueprint for life forms.

Corliss made no claims of completeness. Indeed he would constantly point out that he had covered just a fraction of the literature on a subject. In 2005, he wrote that his 40 published volumes detailing more than 2,000 scientific anomalies and "provocative" phenomena represented just 50% of his database. And even after decades of work, only a handful of English-language journals had received his serious attention. "The journals in other languages, government reports, conference papers, publications of research facilities, proceedings of state academies of science, and an immense reservoir of pertinent books," he noted, "remain almost untapped." The task he faced was daunting: "The anomalies residing in the world's literature seem infinite in number."

But he never lost his enthusiasm, and one has to admire his courage in single-handedly attempting a project of such enormous scope. His catalogs are unique in the annals of science, in that he cataloged not what is known but what is not known. "It seems to me that any organized activity like science would have done this a long time ago," he said. "It is at least as important to realize what is not known as it is to recognize the well-explained."

Though Corliss has often been compared to a modern-day Charles Fort, their differences are considerable. Unlike Fort, he avoided using newspapers as the source of his data whenever possible, preferring instead to depend on academically accredited journals that described anomalies that were the product of scientific observation, research, and exploration. Furthermore, Corliss, unlike Fort, was not anti-science and he did not editorialize. He thought the data were damning enough on their own. "In the Catalog of Anomalies," he wrote, "the data rule; all theories and hypotheses are held to be tentative. The history of science proves that this is a wise policy." Corliss saw anomalies as a way to renew, to reinvigorate, science.

Though his first volume of anomalies, entitled *Strange Phenomena*, was actually recommended by both *Nature* and *Science*, quite often the publication of his catalogs met with disbelief, even disdain. The critics claimed that the data must be in error, that the data is anecdotal, that it was too old, that a supposed anomaly was explained long ago. His reply? "The baseline of well-established theories, against which anomalousness is measured, is always shifting and some data, indeed, are bad. But for every anomaly or example that can be legitimately demolished, ten more take its place. Nature is very anomalous or, equivalently, Nature is not yet well-understood by science." Such words did not endear him to the scientific mainstream, which largely ignored much of his later work.

Corliss did not have any illusions about the impact The Sourcebook Project would have on science. Would it revolutionize science? "Probably not—at least not immediately," he wrote. The late sociologist Marcello Truzzi called Corliss "an unsung hero of science."

I was introduced to the Sourcebook Project in the late 1970s, when I received my very first published volume of anomalies from the mail-order service he operated with his wife, Virginia. (Most volumes are still available from The Sourcebook Project, P.O. Box 107, Glen Arm MD 21057. See also: http://www.science-frontiers.com.) Shortly afterward, I met and interviewed him for an article I was writing on his work for *Science Digest*. We kept in touch over the years, and I would occasionally send him a newsclipping for the newsletter he published called *Science Frontiers*. After being involved in producing a couple of science exhibits for museums, I began to think that his work should have a wider audience, that there should be a William Corliss Museum of Anomalies or at least an exhibit for museums based on his work, called What Science Doesn't Know. I can't imagine anything more stimulating to the minds of young people than to discover areas of science that are up for grabs, puzzling topics they could explore, wide open fields of research where they could make a difference, instead of being presented with science as a closed book of knowledge, as at most science museums. The work of William Corliss is an inspiration, a wonder-filled refutation that we have not come to the end of science. Quite the contrary. As he would often say, "Much remains to be done."