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Humanity Imperiled by the Geomagnetic Field and Human Corruption

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ABSTRACT

Earth's magnetic field acts as a shield, protecting life and our electrically-based infrastructure from the rampaging, charged-particle solar wind. In the geologic past, the geomagnetic field has collapsed, with or without polarity reversal, and inevitably it will again. The potential consequences of geomagnetic collapse have not only been greatly underestimated, but governments, scientists, and the public have been deceived as to the underlying science. Instead of trying to refute or advance a paradigm shift that occurred in 1979, global geoscientists, individuals and institutions, chose to function as a cartel and continued to promote their very-flawed concepts that had their origin in the 1930s and 1940s, consequently wasting vast amounts of taxpayer-provided research money, and making no meaningful advances or understanding. Here, from a first person perspective, I describe the logical progression of understanding from that paradigm shift, review the advances made and their concomitant implications, and touch upon a few of the many efforts that were made to deceive government officials, scientists, and the public. It is worrisome that geoscientists almost universally have engaged in suppressing or ignoring sound scientific advances, including those with potentially adverse implications for humanity. All of this suggests that the entire institutional structure of the geophysical sciences, funding, institutions, and bureaucracies should be radically reformed.

Keywords: Magnetic reversals; Corona ejections; Electrical transmission networks; Communications disruptions; Solar wind; Geomagnetic storms; Paradigm shift; Inner core**.**

INTRODUCTION

Our planet's magnetic field, sometimes called the geomagnetic field, is important, not only as a navigational aid for many creatures [1, 2], but as a shield that protects all life on Earth from the charged-particle rampages of the solar wind [3]. As illustrated in Figure 1, the geomagnetic field deflects the solar wind safely around Earth.

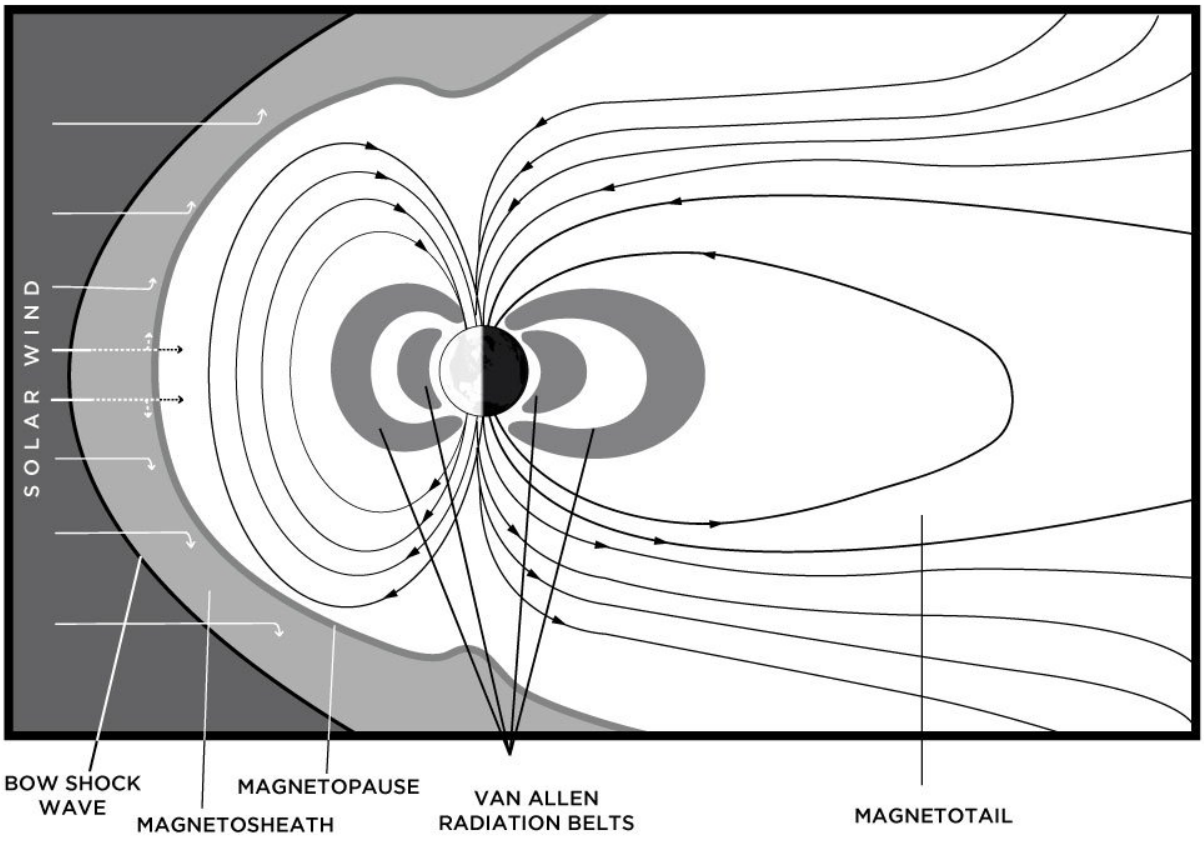


Figure 1. Schematic representation of the geomagnetic shield. From [4].

Neither the impinging solar wind nor the shielding geomagnetic field is constant. From time to time, more-intense-than-usual outbursts from the sun briefly overwhelm the geomagnetic field. During these times charge particles stream through Earth's atmosphere lighting the Northern and Southern skies with dazzling auroral displays and inducing dangerous and damaging electrical currents in long metallic conductors at the surface. These sporadic events prefigure potential calamities that will inevitably occur when the geomagnetic field weakens, reverses and/or collapses [5].

From time to time irregularly, the geomagnetic field reverses. The last geomagnetic reversal occurred about 786 million years ago. Our stone-age ancestors with no technological infrastructure survived that reversal. The next geomagnetic field reversal and/or collapse will ravage our electrically-based infrastructure, potentially wiping out two centuries of infrastructure development [6]. One of the foremost obligations and responsibilities of scientists should be to advance geomagnetic understanding to protect humanity. Instead, as described below, the global geoscience community, functioning as a cartel, for decades has systematically deceived world governments, scientists, and the public about the origin and nature of the geomagnetic field and its potentially near-term risks to humanity's infrastructure [5]. In the following, I provide first-hand documentation.

CONSENSUS NONSENSE

In 2020, Li et al. published an article entitled "*Shock melting curve of iron: A consensus on the temperature at the Earth's inner core boundary*" [7]. Its title illustrates well the non-science that permeates the geoscience establishment, specifically, the failure to understand principles of science, which are contrary to *consensus*, and the nature of Earth's interior.

In the realm of politics, *concensus* is a measure of the popularity of an idea, not necessarily its correctness. In science, consensus is nonsense. At the frontiers of understanding, at the interface of the unknown, the popularity of a concept in science is not a measure of correctness. Providing data that supports a *consensus* is not the way science progresses; if *consensus* determines scientific truth, progress would be impossible. Scientific paradigm-shifting revolutions inevitably overturn *consensus*. Science progresses by determining what is wrong with currently-held perceptions.

When a new concept emerges in science that challenges important current thinking, the obligation of the scientific community is to attempt to refute the new concept. If unable to do so, the new concept should be cited in subsequent literature. To ignore or fail to cite a new concept that challenges important current thinking, is not only poor science, but it cheats those who fund the research, usually taxpayers, and cheats fellow scientists who might otherwise make advances on the new concept.

Li et al. [7] join hundreds, if not thousands, of scientists who for forty years have systematically ignored or failed to cite published contradictions to the very *consensus* they attempt to support. That collective failing has wasted millions of dollars of taxpayer-provided research funding and has misled governments officials, scientists, and the public into a false sense of security concerning the risks and consequences of a geomagnetic reversal and/or collapse. Why? To what end? Malfeasance by government funding-agencies and scientific publishers are partially to blame, but so too are the scientists, some of whom are corrupt, or are afraid to speak out, or are simply ignorant of what constitutes good science.

FUNDAMENTAL DEEP-EARTH DISCOVERIES AND DECEIT

In the following I present a historical record of the deceitful response to a challenging new concept published in 1979 [8]. Not only has that challenging new concept been systematically ignored, but concerted efforts have been made to deceive the public of its consequential advances, many of which are related to geomagnetic field origin [9-13] and the next potential geomagnetic reversal and/or collapse [5].

In 1906, Oldham discovered Earth's iron metal core whose boundary lies about half way to the planet's center [14] (Figure 2). By 1930, its dimensions were well established and the core was found to be liquid [15]. A simple picture of Earth's interior emerged: An iron alloy core surrounded by a silicate-rock mantle and topped with a very thin crust (discovered by Mohorovičić in 1909 [16]). But something was missing. Earthquake waves from a large New Zealand earthquake, instead of being shadowed by the core, were actually observed at the surface in the shadow zone. This posed a great geoscience mystery.

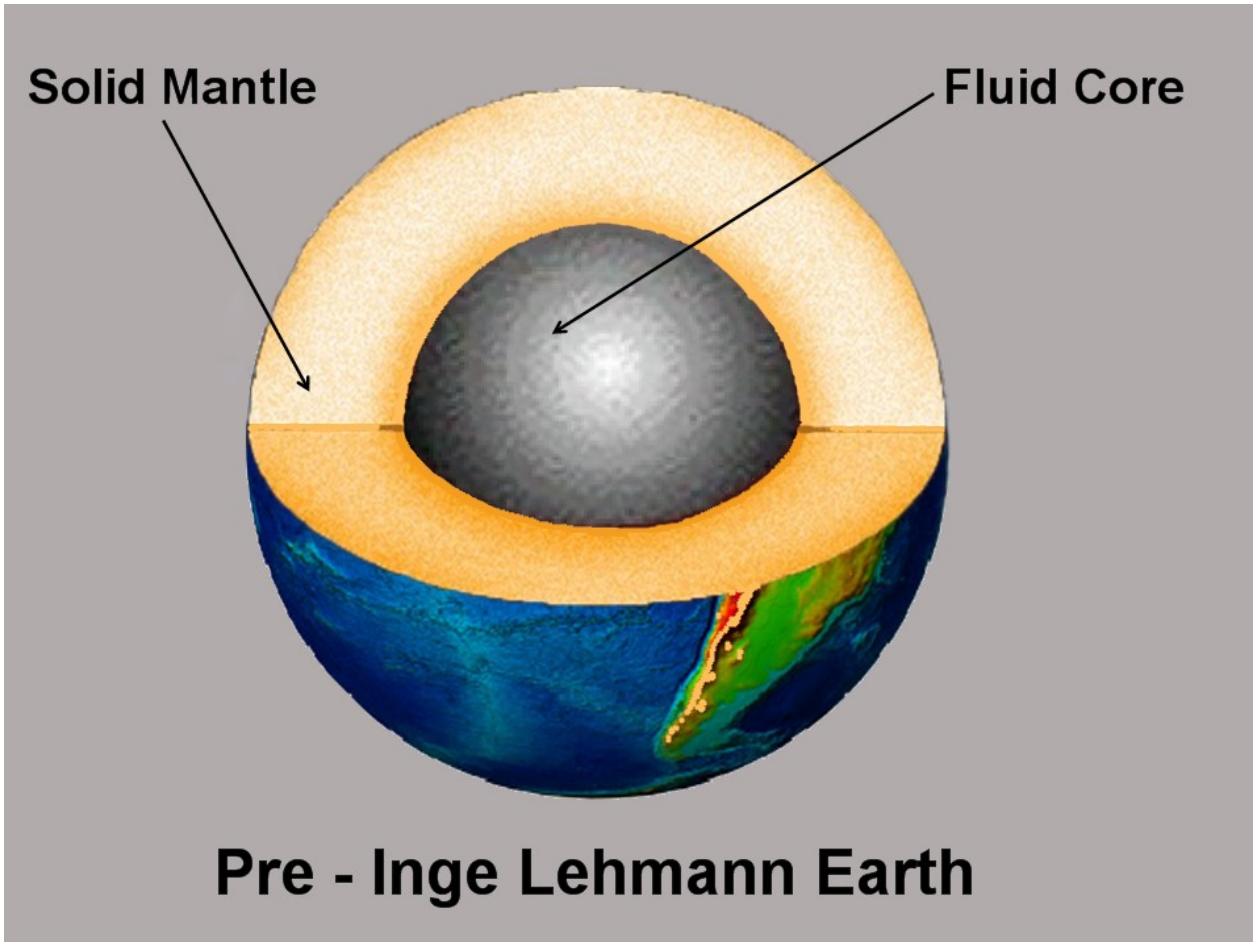


Figure 2. The simple picture of Earth's interior as understood in 1930.

In 1936, the Danish seismologist, Inge Lehmann, solved this great mystery by correctly deducing that within the fluid core there must be a solid inner core that would reflect earthquake waves into the shadow zone, thus explaining seismic observations [17]. Figure 3 shows her discovery diagram. Lehmann's reasoning was of such great precision that her inner core concept was accepted as fact even though confirmatory evidence was not available until the 1960s.

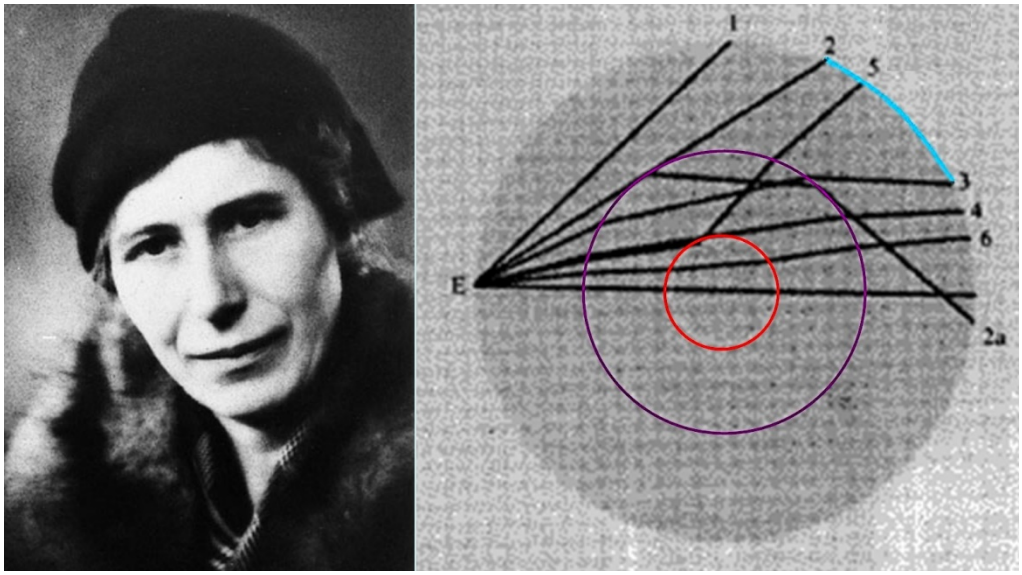


Figure 3. Photograph of Inge Lehmann (1888-1993) and a drawing from [17] illustrating her discovery of the inner core. I colorized that drawing for clarity.

Studies of Earth's rotation and earthquake waves can provide information on the distribution of mass-layers within the planet. The chemical composition of those layers, however, must be deduced from studies of meteorites. In the 1930s and 1940s, Earth was thought to resemble an *ordinary chondrite* meteorite, called ordinary because of their great abundance. If heated sufficiently in the laboratory, the elements of an *ordinary chondrite* separate into two components, an iron alloy beneath silicate-rock, a configuration reminiscent of Earth's then understood composition before Lehmann's inner core discovery [17].

In *ordinary chondrite* meteorites, nickel is *always* found alloyed with iron metal; all of the elements heavier than iron and nickel, even combined together, could not comprise a mass as great as the inner core. So what is the composition of the inner core? In 1940 Birch [18] thought he had the answer. Birch *assumed*, without corroborating evidence, that the inner core is iron metal in the process of solidifying (freezing) from the liquid iron-alloy core (like an ice cube in a glass of ice-water). If Birch were correct, one could determine the temperature at the inner core boundary by measuring the solidification temperature of iron at the respective pressure. That is what Li et al. [7] did in 2020 and which has been done by many since the 1940s, but the basis is a fatally-flawed assumption.

For 39 years Birch and other geoscientists had no reason to believe the inner core composition was other than partially frozen iron (or nickel-iron) metal.

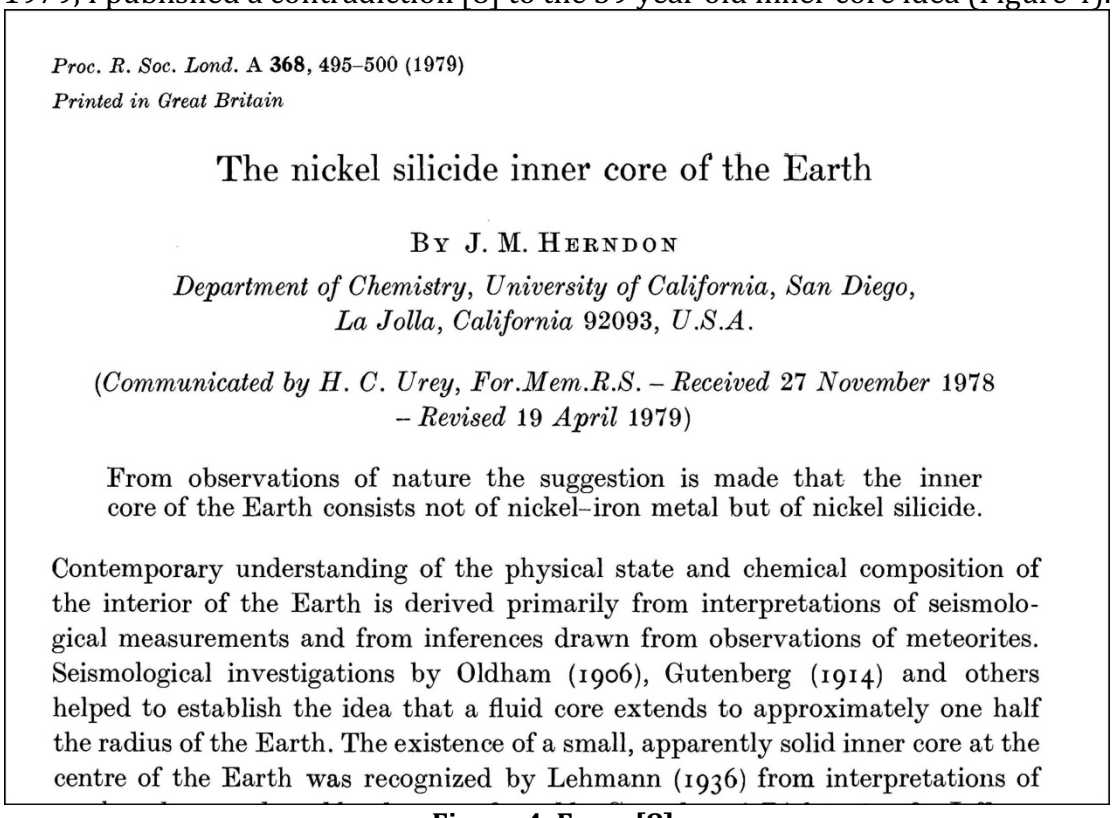
When Birch [18] and others imagined that Earth resembled an *ordinary chondrite* meteorite, they ignored a different possibility, an *enstatite chondrite*, one of the much less common chondrite meteorites whose matter had formed under oxygen-starving conditions and even contained some minerals not found on Earth's surface. Because of their rarity and seemingly inexplicable oxygen-starved minerals, *enstatite chondrites* were simply ignored as candidates for Earth's interior composition.

In 1976, Hans E. Suess and I [19] discovered that the oxygen-poor composition of *enstatite chondrites*' parent matter could be understood as a consequence of their having condensed at high temperatures and high pressures from a gas with the composition of the sun, provided that matter was isolated from further reactions at lower temperatures. In that medium, at higher pressures substances condense at higher temperatures, but the reaction that makes available oxygen is independent of pressure and limits availability of oxygen at higher temperatures.

Because of the oxygen-starvation of enstatite chondrite parent matter, a portion of their elements that love to combine with oxygen, instead of residing entirely in the oxygen-loving silicate-rock portion, occur in part in the iron alloy portion. These elements include calcium, magnesium, silicon, and uranium.

While studying enstatite chondrite meteorites in the 1970s, I realized that, if silicon were present in Earth's core, it would combine with nickel as nickel silicide, which would form a mass at the center almost identical to the mass of the inner core.

Then in 1979, I published a contradiction [8] to the 39 year old inner core idea (Figure 4).



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The nickel silicide inner core of the Earth

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(*Communicated by H. C. Urey, For.Mem.R.S. – Received* 27 *November* 1978 *– Revised* 19 *April* 1979)

From observations of nature the suggestion is made that the inner core of the Earth consists not of nickel–iron metal but of nickel silicide.

Contemporary understanding of the physical state and chemical composition of the interior of the Earth is derived primarily from interpretations of seismological measurements and from inferences drawn from observations of meteorites. Seismological investigations by Oldham (1906), Gutenberg (1914) and others helped to establish the idea that a fluid core extends to approximately one half the radius of the Earth. The existence of a small, apparently solid inner core at the centre of the Earth was recognized by Lehmann (1936) from interpretations of

Figure 4. From [8].

Figure 5 is the image of a complimentary letter I received from Inge Lehmann in which she expressed interest in the responses of other geophysicists. Now, four decades later I review those responses.

p.t.Søbakkevej 11
2840 Holte, Denmark

August 17, 1979

Dr. J.M.Herndon
Department of Chemistry
University of California, San Diego
La Jolla, California 92093

Dear Dr. Herndon,

Thank you for sending me your very interesting paper: Earth's nickel silicide inner core.

I admire the precission of your reasoning based on available information, and I congratulate you on the highly important result you have obtained.

It has been a special pleasure to be informed in advace of publication. I shall be interested to note the reactions of other geophysigists.

With kind regards

Yours sincerely

Inge Lehmann

Figure 5. Letter from Inge Lehmann to the author.

While awaiting publication of my nickel silicide inner core paper [8], I imagined that there would be debate and discussion, and worried that geoscientists with well-funded laboratories would pick up the ball and run with it, leaving me in their dust. Instead there was silence. It was as if the paper had never been published. That work was ignored and has been ignored for four decades, as evidenced, for example, by Li et al.'s 2020 paper [7]. Moreover, my NASA grant, which had funded the work, was not renewed, for no good reason. I was "excommunicated" and without that grant my university position evaporated.

Science, properly executed, is a logical progression of understanding. One new discovery, if correct, potentially leads to a series of successive discoveries. An incorrect "discovery" leads nowhere, trapping those blind adherents in an intellectual cul-de-sac: That is what happened to the geoscience community as a result of ignoring my 1979 fundamental nickel silicide paper.

But was I correct? One question to ask is which of the chondrite meteorites have a sufficiently great weight percent of iron alloy to match the weight percent of Earth's iron alloy core. The data, shown in Figure 6, leave no doubt that only the *enstatite chondrites*, not *ordinary chondrites*, are sufficiently rich in iron alloy to match Earth. Consequently, the rationale upon which Birch [18] based his inner core interpretation is baseless.

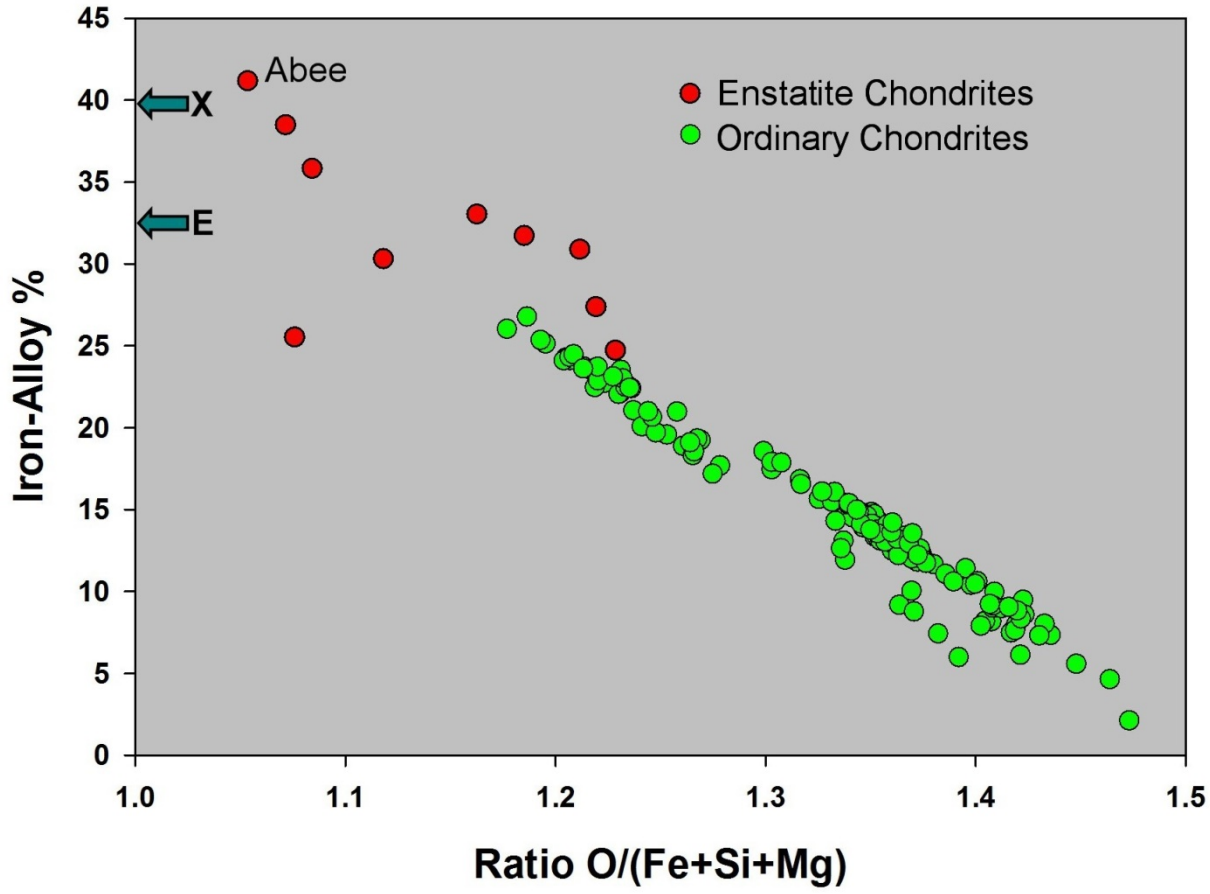

Figure 6. Comparison of the mass percent of iron alloy in various chondrite meteorites to that of the Earth as a whole (E) and the endo-Earth (X) (lower mantle plus core [20]).

The composition of Earth's inner core is not an isolated, disconnected entity, but is inextricably related to Earth's origin and composition.

On June 9, 1952 the Abee *enstatite chondrite* fell to ground in Alberta, Canada [21]. Figure 7a shows a nearly complete slice of the roughly basketball-size, 107 kg Abee *enstatite chondrite*. Abee has been described as an explosion breccia because of its angular fragments[22], but its morphology is quite unique. Peripheries of some of the angular components are shiny, enriched in iron metal that was molten. Figure 7b, is a micrograph showing crystals of the major silicate-mineral, enstatite ($MgSiO_3$) embayed (surrounded) by iron which was liquid at a time when the mineral crystal was solid. Figure 7c is a micrograph of the iron metal, etched with acid, that reveals platelets of *pearlite*, iron carbide, indicative of relatively rapid cooling. M. Lea Rudee and I in 1978 [23] and 1981 [24] published the results of metallurgical experiments that showed during its formation Abee last cooled from 700°C to 25°C in ten hours.

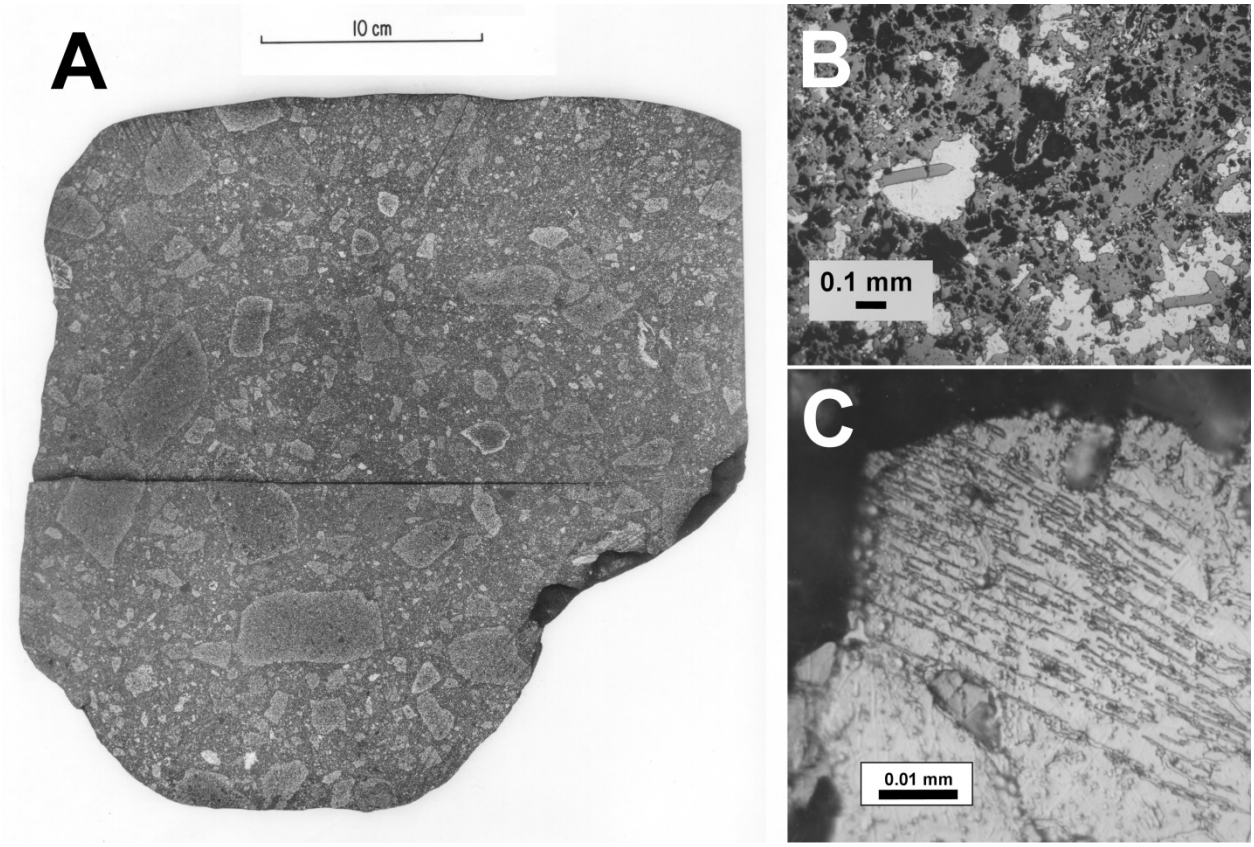

Figure 7. (A) Nearly complete slice of the Abee enstatite chondrite. (B) Micrograph showing its enstatite crystals surrounded by previously molten iron metal. (C) Micrograph showing platelets of iron carbide in its metal.

Follow this logical progression which I first considered in 1980 [20]: If the inner core is indeed nickel silicide, then the core must be like the alloy portion of the Abee *enstatite chondrite* meteorite, which means that Earth's core should be surrounded by a silicate-rock shell like Abee's enstatite silicate ($MgSiO_3$). Multiplying the mass of Earth's core times Abee's silicate to alloy ratio [25] yielded the mass of the silicate shell that must surround the core. I found that the radius of

that silicate shell corresponds within 1% to the location of the seismic boundary that separates the lower mantle from the upper mantle [26]. Thus, the ratios of mass for the internal shells of the Earth (inner core, total core, lower mantle) should match those of the Abee *enstatite chondrite* meteorite, and they do, as shown in Table 1.

Later, I realized that calcium and magnesium, additional elements in the core with high affinities for oxygen, would combine with sulfur to form calcium sulfide (CaS) and magnesium sulfide (MgS), respectively, and float to the top of the core. These components also can be connected with parts of Earth by mass ratios, as shown in Table 1; for details, see [27].

Table 1. Comparison of fundamental Earth mass ratios with corresponding ratios for the Abee enstatite chondrite

Fundamental Earth Ratio	Earth Ratio Value	Abee e.c. Ratio Value
Lower Mantle Mass to Total Core Mass	1.49	1.43
Inner Core Mass to Total Core Mass	0.052	theoretical 0.052 if Ni_3Si 0.057 if Ni_2Si
Inner Core Mass to Lower Mantle + Total Core Mass	0.021	0.021
D'' CaS + MgS Mass to Total Core Mass	0.09	.011
ULVZ of D'' CaS Mass to Total Core Mass	0.012	0.012

The mass ratio relationships, shown in Table 1, are compelling evidence that the interior 82% of Earth (lower mantle plus core) resembles an *enstatite chondrite*. Moreover, the calcium sulfide and magnesium sulfide mass ratio relationships solve another problem geoscientists have wrestled with for decades.

Since 1938 seismologists have observed "roughness" or "islands of matter" at the interface between the core and lower mantle [28-30] which geoscientists attempt in various ways to explain as originating from above the core [31-33]. The mass ratio relationships, shown in Table 1, on the contrary, provide compelling evidence that the "islands of matter" at the core-mantle boundary originate from within the core. Moreover, the totality of the relationships in Table 1 clearly indicates that the endo-Earth, core plus lower mantle [20], strongly resembles the Abee

enstatite chondrite. A schematic representation of Earth's interior layers consistent with Table 1 is shown in Figure 8.

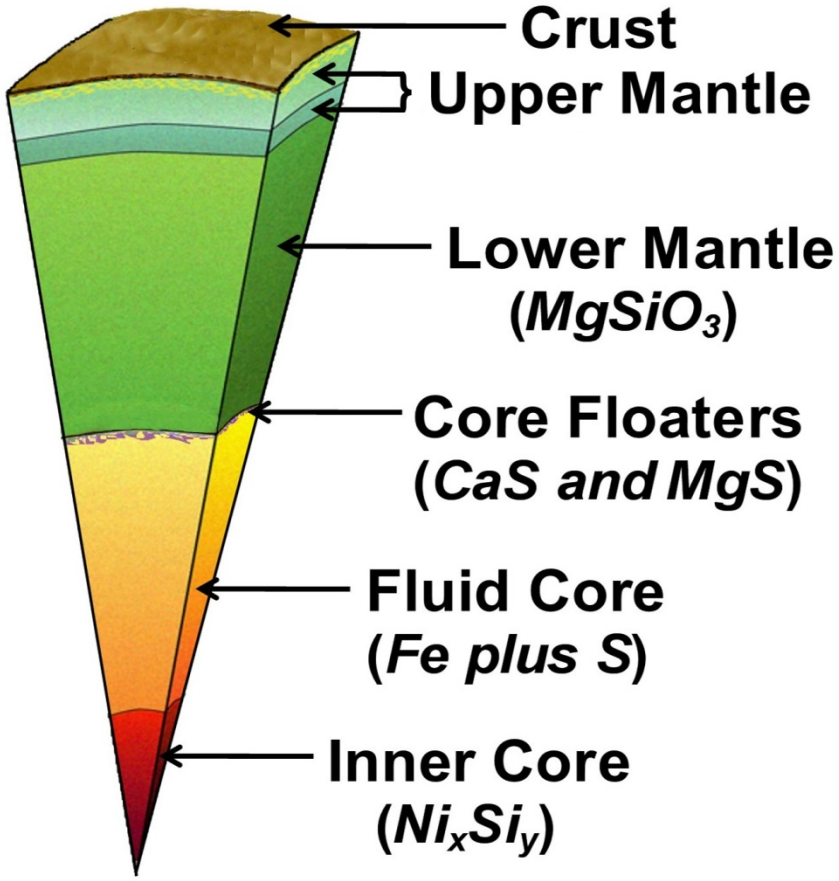

Figure 8. Schematic representation of the interior parts of Earth as indicated by the mass ratio relationships shown in Table 1. For details see [34].

In an article published in *Naturwissenschaften* in 1982 [35], I pointed out the importance of determining whether uranium resides in the alloy component of enstatite chondrites. Serendipitously, in 1982 Murrell and Burnett [36] discovered that virtually all of the uranium in the Abee *enstatite chondrite* resides in its alloy portion. Because Earth's core is virtually identical to the alloy portion of the Abee *enstatite chondrite*, according to Table 1, one may therefore infer that a very large proportion of Earth's uranium exists in its core, not in its rocky mantle as often assumed by the geoscience community [37].

The next step in my logical progression of understanding was realizing that uranium in Earth's core would settle at the very center of the Earth. In 1993 and in following publications, I applied Fermi's nuclear reactor theory [38] to demonstrate the feasibility of an accumulation of uranium at Earth's center functioning as a nuclear fission reactor, called the georeactor, as the energy source for the geomagnetic field [9, 10, 39] (Figure 9).

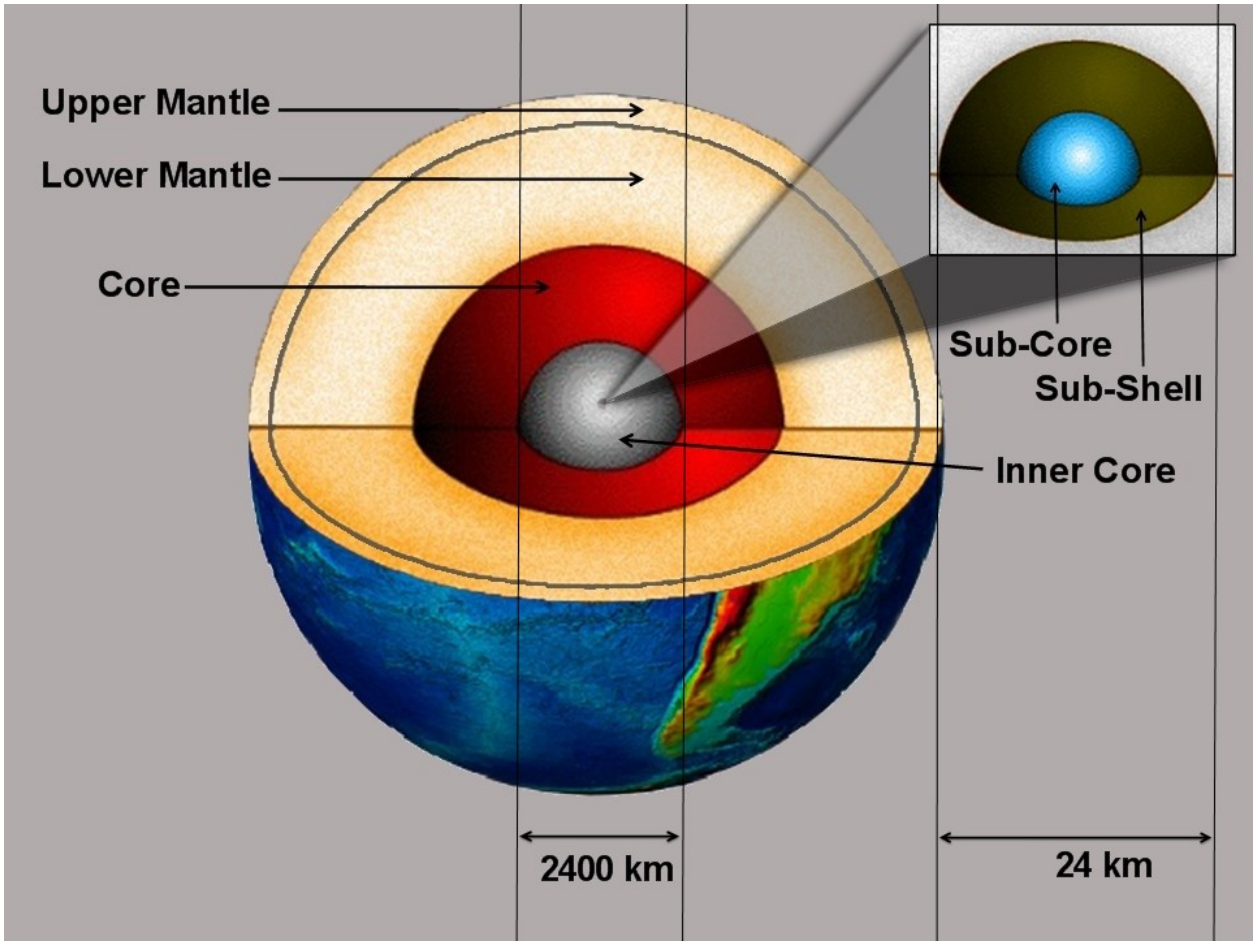

Figure 9. Schematic representation of the georeactor, a natural planetocentric nuclear fission reactor.

Fermi's nuclear reactor theory is useful, but does not yield some information, for example, fission products. For decades, Oak Ridge National Laboratory has been developing software to simulate the operation of a variety of nuclear reactors. Dan Hollenbach graciously agreed to modify that software to permit georeactor simulations. The Oak Ridge data confirmed that the georeactor could operate over the lifetime of Earth as a fast neutron breeder reactor and also showed that the fission products include helium-3 and helium-4 in precisely the ratios observed exiting Earth [40, 41]. Figure 10 shows georeactor calculated helium-3 to helium-4 ratios relative to atmospheric helium for comparison with their observed ranges in oceanic basalts. The measured basaltic helium-3 to helium-4 ratios provide the first independent, compelling evidence of nuclear georeactor existence.

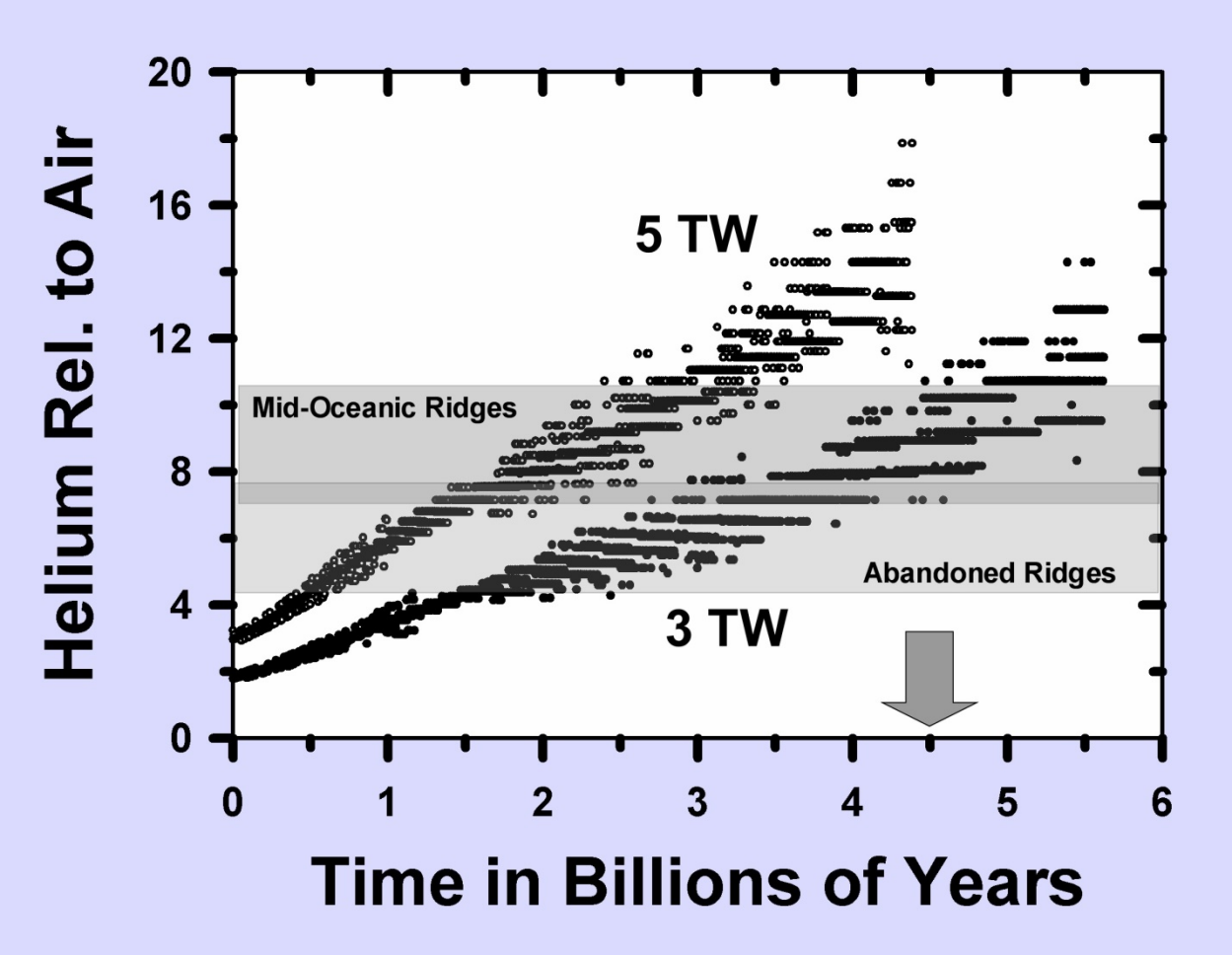

Figure 10. Oak Ridge georeactor simulation data calculated at energies of 3 and 5 terawatts compared to measured helium ratios in oceanic basalts. Data from [11].

In a news article *in Current Science*, Associate Editor K. R. Rao [42] noted that a nuclear reactor at the core of the Earth is "*a solution to the riddles of relative abundances of helium isotopes and to geomagnetic field variability*". The helium riddle referred to by Rao [42] is this: Since measurements were first made in the 1970s, the helium-3 to helium-4 ratio determined in volcanic basalts typically ranged from 4 to 49 times the same ratio measured in atmospheric helium [43-47]. As there was no deep-Earth mechanism known for producing helium-3 in the requisite quantities, the geoscience community made mantle-mixing computational models based upon *ad hoc* assumption that primordial trapped helium-3 was mixed with radiogenic helium-4 in just the correct proportion to yield the observed ratios [48-50].

The geoscience community never credited me with the discovery of the origin of deep-Earth helium, but mantle mixing models ceased to be made. Although as late as 2020, some geoscientists began again promoting the same model-nonsense [51, 52].

Note the georeactor helium ratio data shown in Figure 10 increase over time. Some helium measurements in basalt from Iceland display high helium ratios, as high as 50 [53]. To me the high helium ratios mean that the georeactor will run out of nuclear fuel at some yet unknown time in

the future. In 2002, I submitted a manuscript to the *Proceedings of the National Academy of Sciences* (PNAS) about this. The manuscript was reviewed and was about to be accepted for publication, when suddenly I was advised that PNAS would obtain additional anonymous reviews. I later learned what happened.

The PNAS Editor offered NAS member Don Anderson the opportunity to write a Commentary to accompany my article. Anderson, however, had a conflict of interest, having published a different *ad hoc* idea about the helium [44]. Instead of disclosing his conflict of interest, Anderson convinced the Editor-in-Chief, a biologist, that my paper was deficient and should be further reviewed, of course, by reviewers who owed Anderson for their membership in the National Academy of Sciences (NAS). After two rounds of anonymous reviews by NAS members, in which the three reviewers could make no substantive criticisms, I learned what happened and told the Editor-in-Chief that PNAS integrity had been compromised; the paper was finally published in 2003 [11].

Recently, the Editorship of PNAS devised a different means to suppress articles they do not want to see published. Without even seeking reviews, a member of the PNAS Editorial Board may reject a manuscript simply because the member deems "*it is not of sufficient interest for the readership of PNAS*." That response must surely cause U. S. President Abraham Lincoln to turn over in his grave! President Lincoln chartered the NAS to provide scientific advice to the U. S. Government.

The earlier PNAS article by Hollenbach and me [41] attracted the interest of Brad Lemley, who penned the cover story about my work for the August 2002 issue of *Discover* magazine. Shortly after its publication, I was contacted by an intern at Bell Labs (Lucent Technologies, Inc.). She was planning to give a lunchtime seminar about the georeactor and asked for additional information. One of the attendees at her talk was R. S. Raghavan, who had published an important article about measuring the elusive, hard to detect antineutrinos to determine radioactive elements in the Earth's interior [54]. Soon after that talk, Raghavan posted on a pre-print server an article entitled "Detecting a Nuclear Fission Reactor at the Center of the Earth" [55]. Raghavan [55] showed that the antineutrino spectrum resulting from nuclear fission has a higher energy component than from radioactive decay thus in principle permitting georeactor discrimination.

Despite Raghavan's stellar track record in physics, that article was allegedly rejected for publication in two scientific journals, *Physical Review Letters* and *Physics Letters*. I suspect that it was rejected by physicists and/or geophysicists to cover up the fact that for decades the physics and geophysics communities have been deceiving government science-funding officials, the scientific community, and the public.

Raghavan's article [55], never published but posted on a physics archive, was timely, and stimulated discussions worldwide [56-59]. For example, Russian scientists [60] remarked, "*Herndon's idea about georeactor located at the centre of the Earth, if validated, will open a new era in planetary physics*."

At the time several large-scale antineutrino detectors were under construction or were being considered. The first to reach operational stage was the Kamioka Liquid Scintillator Antineutrino Detector (KamLAND), a joint Japan/American project.

In July 2005, in a paper published in *Nature*, the KamLAND consortium reported the first detection of antineutrinos originating from within the Earth [61]. But what the paper said and what it should have said are two entirely different things. In easy to understand terms, this is what the paper should have said: *In just over two years of taking data, a total of 152 "detector events" were recorded. After subtracting for the background from commercial nuclear reactors and making corrections for contamination, only 20-25 "detector events" were considered to be from antineutrinos originating within the Earth. Within the limitations of the experiment, it is absolutely impossible to ascertain the proportion of those that may have resulted from the radioactive decay of uranium and thorium, or may have been produced from a nuclear fission georeactor at the center of the Earth*.

Instead, what the 87 authors of the KamLAND consortium did was to mislead the scientific community and the general public by wholly and intentionally ignoring the possibility of georeactor-produced antineutrinos. Raghavan's 1998 paper on measuring the global radioactivity in the Earth was cited [54], but not his 2002 paper "*Detecting a Nuclear Fission Reactor at the Center of the Earth*" [55]. And, there was absolutely no reference to any georeactor paper.

The KamLAND *Nature* misrepresentation was undergirded by a "News and Views" companion article in the same issue [62] that discussed radioactive decay heat production in the Earth, noting: "*The remaining heat must come from other potential contributors, such as core segregation, inner-core crystallization, accretion energy or extinct radionuclides – for example the gravitational energy gained by metal accumulating at the centre of the Earth, which is converted to thermal energy, and the energy added by impacts during the Earth's initial growth.*" Absolutely no mention was made of georeactor-produced heat, which is on a firmer scientific foundation than some of the "*other potential contributors*" mentioned.

For Japan, the detection of geo-antineutrinos by the KamLAND consortium should have been cause for celebration; instead it was cause for shame. Rather than confronting new and contradictory ideas, American geoscientists have a long and documented record of attempting to prevent their publication and/or simply ignoring them, thereby misleading government research-funding officers, scientists, and the public. In announcing the detection of geo-antineutrinos, Japanese KamLAND scientists, instead of standing tall in integrity, became party to the same American anti-science behavior, and in doing so dishonored themselves and Japan. Curiously, all that was really required in their paper was one carefully worded sentence with appropriate references.

To their credit, after I complained to Japan's Minister for Science and Technology about the 2005 *Nature* misrepresentation, the georeactor was cited in their future publications, although usually just a brief mention among lengthy discussions of models based upon assumptions [63].

Twenty years after my first paper demonstrating the feasibility of a nuclear fission reactor at the center of the Earth as the energy source for the geomagnetic field [9], much development and understanding took place [10, 11, 39, 40, 64, 65]. There had been no published review articles on the georeactor, so I wrote one and submitted it to the Elsevier journal *GeoResJ*. The assigned Editor, a Professor of Geology at the University of Oxford, with no training in the subject of nuclear reactors, rejected the review article, without referee reviews, with a few unwarranted, pejorative remarks. I complained to the University of Oxford's Registrar and Vice-Chancellor, but to no avail.

When academic transgressions occur, such as unwarranted rejection of my papers by faculty members, I frequently file appeals to university presidents and sometimes to regents. But these appeals are *never* successful. Grants are typically made to universities, not to their faculty members. University officers, signatories for government grants, should be those in authority and should maintain integrity. But in my experience, that is *never* the case.

Here is a contrast in intellectual integrity: Following the *GeoResJ* rejection, I submitted the manuscript to *Current Science*, which since 1932 has been published in association with the Indian Academy of Sciences. In that instance, the Editor sent the manuscript to knowledgeable referees who asked for clarification and who asked me to provide additional information, which I did. And it was published [13], entitled "Terracentric Nuclear Fission Georeactor: Background, Basis, Feasibility, Structure, Evidence and Geophysical Implications".

The two currently operational deep-Earth antineutrino detectors, at Kamioka, Japan [63] and at Grand Sasso, Italy [66], to date have not only failed to refute georeactor nuclear fission, but at a 95% confidence level, have measured georeactor energy production of 3.7 and 2.4 terawatts, respectively. Notably, the energy production levels used in the Oak Ridge National Laboratory georeactor calculations, indicated in Figure 10, ranged from 3 to 5 terawatts [11]. These antineutrino measurements provide the second independent, compelling evidence of the existence of Earth's nuclear georeactor.

HUMANITY IMPERILED

In 1993 and for fifteen years thereafter, I considered the georeactor as being the energy source that powers the Earth's magnetic field [9-11, 39-41]. Later, I discovered that there are serious problems with the idea articulated in 1939 [67] for geomagnetism production, and realized that the georeactor could serve both as the energy source and the production mechanism for Earth's magnetic field [5, 12, 13]; the same nuclear fission mechanism could also account for magnetic fields of other planets and large moons [65, 68].

In 1600, Gilbert showed that Earth resembles a giant magnet, rather than the geomagnetism being of extraterrestrial origin as some believed [69]. In 1838, Gauss showed that the source of Earth's magnetism is at or near the center of our planet [70]. Earth's magnetism cannot be generated by a permanent magnet, however, because the iron-alloy core is too hot, being above the Curie temperature at which permanent magnetization disappears. So what produces the geomagnetic field?

In 1855, Faraday published his research which led to an understanding that the motion of electrical charges, i.e. electrical current, produces a magnetic field [71]. So, where might motion exist at or near the center of Earth? In 1939, Elsasser published an idea in the first of several scientific articles [67, 72, 73] that is 80 years later still considered to be the scientific basis of the presently popular, but incorrect, explanation of the origin of the geomagnetic field in Earth's core. Elsasser assumed that motion in the Earth's fluid iron-alloy core was caused by convection and that the electrically conducting, moving fluid acts as a dynamo, producing the geomagnetic field [67, 72, 73]. Millions of taxpayer-provided dollars have been wasted on computational models that purport to demonstrate generation of the geomagnetic field by convection in the Earth's fluid core by Elsasser's mechanism. But those models are wrong.

Academic geophysicists rarely consider the most important aspect of science, but one often emphasized by Hans E. Suess [74]: Understanding what is *not* known is more important than knowing what *is* known. Lacking knowledge of any other fluid body at or near the center of the Earth, it is nevertheless wrong to simply assume that the existence of the geomagnetic field connotes convection in the Earth's fluid core. I looked more deeply and discovered that sustained thermal convection in the Earth's fluid core is physically impossible.

Thermal convection is a physical process that is easy to visualize. Heat a pot of water on the stovetop and add a few tea leaves. Before the water starts to boil, note that the tea leaves, carried along by the fluid, are in motion, bottom to top and top to bottom. Water heated at the bottom becomes less dense (lighter) and floats to the top as the cooler, more dense (heavier) water at the top sinks to the bottom. This is thermal convection. Just like in the fluid core? No. What is not obvious is that the heat being brought to the top of the water by convection is being lost from the surface. For sustained thermal convection in Earth's fluid core, the heat brought to the top of the core must be promptly removed, but that is not possible as Earth's fluid core is surrounded by an insulating blanket, the rocky mantle [27, 75].

The low loss of heat from the top of the core is not the only reason thermal convection is physically impossible. The weight of the matter above compresses the bottom of the core more than it compresses the top of the core. The very small decrease in density at the bottom of the core, caused by heat, is too little to overcome the greater density increase caused by the weight above [27, 75].

I attempted to publish this important contradiction to a long-standing geoscience misunderstanding in *Physical Review Letters*, which is published by the American Physical Society. My submission was rejected without a scientifically valid reason. I appealed the rejection all the way to the Editor-in-Chief, an NAS member who, after consulting with another unnamed NAS member, rejected my manuscript without a valid scientific basis.

Does the physical impossibility of convection in Earth's core mean that Elsasser is completely wrong? No, it only means that, if the geomagnetic field is produced by dynamo action, as suggested by Elsessar, there must be a different location at or near the Earth's center where thermal convection can continuously move electric charges. And there is, as I described [5, 12, 13], within Earth's central nuclear fission georeactor.

Figure 11 is a schematic representation of Earth's georeactor at the center of Earth. In the micro-gravity region near Earth's center, the less-dense nuclear waste, mainly fission and decay products, exist as a liquid or slurry sub-shell above the nuclear georeactor sub-core. Fission-produced heat is transported from the nuclear sub-core by convection to the bottom of the inner core which acts as a heat sink that removes the heat thereby permitting sustained convection. As I have described, this is a self-regulated system that, as necessary for a dynamo, produces electrical charges from radioactive decay. As similarly envisioned by Elsasser in different circumstances, the convective motion coupled with motion from Earth's rotation presumably results in dynamo action that produces the geomagnetic field [5, 12, 13].

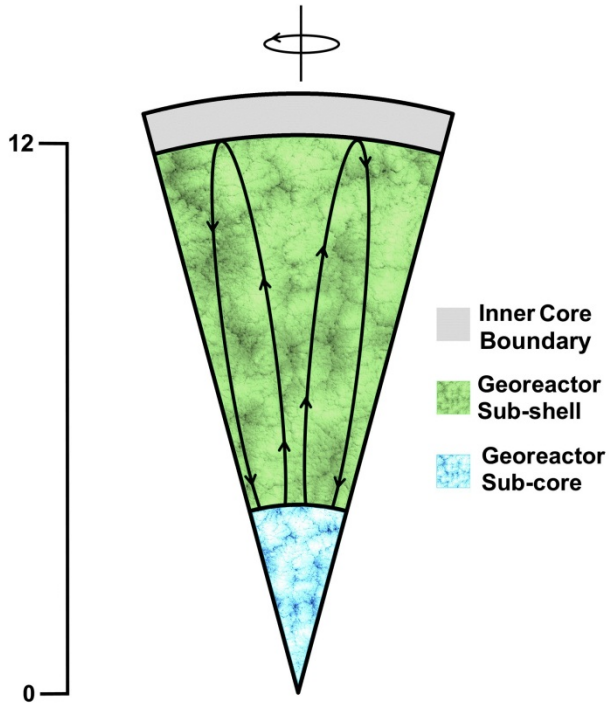

Figure 11. Schematic representation of Earth's georeactor, not to scale. Planetary rotation and fluid motions are indicated separately; their resultant motion is not shown. Stable convection is expected with the bottom hotter than the top and with heat removal at the top. Scale in km.

Instead of discovering the true nature of geomagnetism, members of the geoscience cartel have deceived government officials, the scientific community, and the public. That deception, based upon unrealistic and impossible geomagnetic field generation within Earth's fluid core, has left humanity unaware of the causes and unprepared for the consequences of geomagnetic reversals and/or collapse.

The fluid core is massive – nearly one-third Earth's mass. The georeactor mass, by comparison, is only about one ten-millionth the mass of the core. That means disruption in georeactor sub-shell convection, which causes geomagnetic reversals and/or collapse, can occur quite quickly [5].

Geomagnetic reversals and/or collapse, caused by disruption of georeactor sub-shell convection, can potentially occur for the following reasons:

- Massive trauma to Earth, for example, by asteroid impact
- Super-intense solar corona mass ejection
- Anthropogenic disruption of geomagnetic field, for example, by electromagnetic pulse weapons or ionospheric heaters
- Georeactor nuclear fuel burn-up

Williams described some of the consequences to humanity and to our infrastructure that might be expected during geomagnetic reversals and/or collapse [6]: "*Widespread communications disruptions, GPS blackouts, satellite failures, loss of electrical power, loss of electric-transmission control, electrical equipment damage, fires, electrocution, environmental degradation, refrigeration*

disruptions, food shortages, starvation and concomitant anarchy, potable water shortages, financial systems shut-down, fuel delivery disruptions, loss of ozone and increased skin cancers, cardiac deaths, and dementia. This list is not exhaustive. It is likely that a geomagnetic field collapse would cause much hardship and suffering, and potentially reverse more than two centuries of technological infrastructure development".

In 2020, I submitted a manuscript to the *Proceedings of the Royal Society of London* in which I described a fundamentally new scientific basis for understanding that, in addition to the widespread adverse consequences described by Williams [6] and quoted above, geomagnetic reversals and/or collapse potentially might also cause major geophysical disasters, for example, triggering super-volcano eruptions. Not unexpectedly, that submission was rejected on the basis of false, pejorative reviews devoid of scientific substance. I appealed the Editor's rejection decision, who, instead of appointing an Adjudicating Editor, rejected my appeal himself. I then appealed to the Editor-in-Chief whose background includes space weather, but he refused to consider my appeal.

In 1978, 1979, 1980, and 1994 I published important scientific advances in the *Proceedings of the Royal Society of London* [8, 10, 20, 76]. But that appears no longer possible. Science corruption seems to have permeated the Royal Society, as it has in other National Academies, and with many scientific publications, but, fortunately, not all. Noble ideals, such as freedom, truth, and concern for humanity, are not easy to kill, despite concerted efforts to do so.

CONCLUSIONS

Great advances in the physical sciences occurred during the first half of the 20th century, a time of debate, discussion and integrity in science, despite severe funding limitations. New insights, such as quantum mechanics, laid the foundations for the technological revolutions decades later. But circumstances changed after World War II when government funding for civilian science begun by the U.S. National Science Foundation whose flawed policies started corrupting science [77, 78].

After earning the Ph.D. degree in nuclear chemistry, I was invited to learn from two aging masters, who had themselves learned from masters [79]. Consequently, I have been able to make several fundamental series of advances in a number of areas of the physical sciences. Here, I have only discussed one series of discoveries pertaining to the geomagnetic field, and have provided only a few of many examples of less than ethical behavior. It is worrisome that geoscientists almost universally have engaged in deception of my sound scientific advances, including those with potentially adverse implications for humanity.

All of this suggests that the entire institutional structure of the geophysical sciences, funding, institutions, and bureaucracies, should be radically reformed.

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