An Unheralded Giant of Geology: Warren Carey

Professor (Emeritus) S. Warren Carey, University of Tasmania, renowned geologist, author and unbending patriarch of the Earth Expansion Hypothesis,[1] has now written a third book, this one with the sweeping title Earth, Universe, Cosmos. His first two books, The Expanding Earth [2] and Theories of the Earth and Universe, [3] did not make any best seller list because few geologists or geophysicists understood or could foresee the impact of expansion on the incredibly complex subject of planetary birth and growth. The subject is comparable to the medical search to understand development and functioning of the human brain or the human genome. Indeed, the philosophy of creation of the planet, and life itself, are intimately affected by Carey s expansion hypothesis, but the scientific world doesn t realize it yet.

Many younger scientists have never heard of Carey or the expansion hypothesis, and only a handful of scientists, young and old, realize the Earth is expanding rapidly and the rate of expansion is accelerating the message Carey tried to convey with exceptional detail in technical terminology that not everyone could comprehend. Unfortunately, most geologists and geophysicists do not believe Carey s logic and encyclopaedic knowledge because they do not share his imagination and insight, and few of his peers have a comparable level of technical knowledge and erudition.

Carey s latest book is a masterful *tour de force* with a vision of Earth and the heavens that will not come into focus for the rest of the scientific world until expansion of the Earth is proved and some hitherto unrecognized principles of fundamental physics are validated. In *The Expanding Earth* Carey faced the question squarely: *What causes the earth to expand*? *My first answer* is I do not know. Empirically I am satisfied that the earth is expanding. *My second answer* is that I may not necessarily be expected to know. The answer could only be expected to be known if all relevant fundamental physics is already known.

Carey has vehemently denounced subduction as a myth invented without any substantive evidence that subduction occurs anywhere on the planet. Academic sheep is one of his gentler references to believers of subduction, an unfortunate idea invented by geophysicists to solve a philosophical (not geophysical) problem the self-induced delusion that growth of new seafloor in the Atlantic Ocean must be offset by an equal amount of older Pacific seafloor in order for Earth s diameter to remain constant (a tenet of Laplace s *nebular hypothesis* the basis for the self-delusion.)[4]

Geophysicists and seismologists trying to decipher the mystery of earthquakes will be intrigued by the success of one French scientist in predicting volcanic eruptions. [Volcanos and earthquakes will one day be recognized as *secondary consequences* of expansion and localized crustal adjustments to maintain surface or spherical equilibrium, as explained in the Accreation (creation by accretion) hypothesis. *LSM*]

The final four chapters, Solar System, Stars, Gravitation, and Cosmology, are exceptionally thought-provoking and should stimulate the imagination of any thoughtful physicist, astronomer or cosmologist who takes the time to read them with an open and inquiring mind capable of looking beyond ideas the reader may disagree with. Each reading uncovers some new insight. [Carey is on target with his revision of the Titius-Bode Law to reflect the superior gravitational power of Jupiter as the central determinant in the solar system, with broad implications for planetary motions explained in the Accreation model. *LSM*]

Carey s book is not an easy read; it is not only weighty, but very broad in scope and content. Many geologists may find it a useful reference for obscure geologic formations throughout the world; Professor Carey knows them all. With a modern dictionary and World Atlas at hand, readers of *Earth, Universe, Cosmos* will be intellectually stimulated and treated to an exceptional spectrum of classical literature, chemistry, geography, geology, geophysics, astronomy, cosmology, and other scientific fields. Some future Nobel laureate may find his inspiration here. As Carey states in the preface: This saga is not complete. I am now 84[?], so do not expect to live to recognize the next step. Another must take over the baton.

What is the Earth Expansion Hypothesis?

Carey s hypothesis of an expanding Earth postulates that the planet is expanding; *i.e.*, increasing in size and diameter, and has done so throughout geologic history. Furthermore, Carey suggests that the rate of expansion is accelerating, possibly exponentially, but does not elucidate the cause beyond reference to gross expansion of the core, the aether, and the Null Universe. In the final chapters Carey suggests that Earth s expansion is part of a general expansion of the Universe, and labels the Big Bang as a myth, preferring the *steady state hypothesis.* [Accreation also supports the *steady state hypothesis. LSM]*

Expansion of the planet was not a new idea with Carey; it had been suggested by many past giants of geology as a potential solution to some of their most vexing geophysical problems. The earliest known suggestion was published in 1888 by I. O. Yarkovskii,[5] a Russian scientist, but Carey was the first to put together a comprehensive theory of continental movements and related geological phenomena attributable to expansion of the planet. Carey s model was conceived when a graduate student, perhaps to explain Alfred Wegener s revolutionary new theory introduced in 1912,[6] later dubbed Continental Drift.

Wegener, a German meteorologist and polar explorer, postulated a radical new idea that millions of years earlier all of today s continents had been joined together as a single super-continent he termed Pangaea, surrounded by a single super-ocean he named Panthalassa. His concept was based on a fairly obvious geographic feature of matching Atlantic coastlines suggesting that South America and Africa had once been conjoined but by some unexplained physical mechanism had sundered and drifted apart until the two continents are now separated by ~4000 kilometers (~2500 miles) of Atlantic Ocean. (Fig. 1)

Wegener may have suspected the Pacific rim continents also had been joined even earlier when he wrote: The present-day cordilleran system of eastern Australia was formed in still earlier times; it arose at the same time as the earlier folds in South and North America, which formed the basis of the Andes (pre-cordilleras), at the

1 S. W. Carey, *The Tectonic Approach to Continental Drift* pp. 177-355 in S. W. Carey (ed): *Symposium on Continental Drift*, 1956, Univ. of Tasmania, Hobart. (Univ. of Tasmania, 1958)

2 S. W. Carey, *The Expanding Earth* 1976, p. 446. (Elsevier, Amsterdam)

3 S. W. Carey, *Theories of the Earth and Universe* 1988. (Stanford University Press, Palo Alto, CA)

4 P-S Laplace, *Exposition du système du monde* 1796.

5 I. O. Yarkovskii, *Hypothèse cinétique de la gravitation universelle en connexion avec la formation des éléments chimiques* 1888. (Chez l auteur, Moscou) 134pp.

6 A. L. Wegener, *Die Entstehung der Kontinente* 1912. Geologische Rundschau, Vol. 3, No. 4, pp.276-292

leading edge of the continental blocks, then drifting as a whole before dividing. [7]

On the following page, Wegener wrote: The outermost layer, represented by the continental blocks, does not cover the whole earth s surface, or it may be truer to say that it no longer does so.

Implicit in Wegener s suggestion that the continents once may have covered the entire planet, Earth would then have been a much smaller, very young planet consisting of a single landmass without ocean basins, although it is well known that large, shallow epicontental seas periodically existed on all continents during earlier epochs. This proto-Earth would have been analogous to the size and appearance of Mars today, including the huge surface graben created by expansion known as *Valles Marineris*. [A similar graben can be visualized as the forerunner of the Pacific basin on Earth. *LSM*]

Whatever Wegener had in mind, a Pangaea with the Americas joined to Asia and Australia, while still joined to Europe and Africa, is impossible unless the nascent Earth was about half its present diameter. Unfortunately, he did not elaborate or speculate further and did not present a theory for such gross separation of the continents in even earlier times.

Wegener s theory of Continental Drift aroused intense debate in the scientific world, but it took another 50 years before discovery of the Atlantic midocean ridge and its parallel growth patterns showing periodic polarity reversals[8] convinced scientists that generation of seafloor in the Atlantic was Wegener s missing mechanism that had caused South America and Africa to separate and drift apart. Realization that the Atlantic Ocean was increasing in width started the search for a compensating mechanism in the Pacific Ocean, a search that culminated in invention of the new concepts of subduction and plate tectonics.

In essence, scientists finally realized that Wegener had been correct about the continents shifting position relative to each other, but unfortunately Wegener died in 1930 on the ice fields of Greenland before his theory was vindicated and his name entered in the annals of geology and geophysics as one of the Giants in science history. How many of his detractors and naysayers are similarly remembered?

Carey s *earth expansion hypothesis* suffered the same fate as Wegener s *continental drift hypothesis* four decades earlier. His genius and insight into Earth s past geologic history has gone unrecognized for forty years by contemporary peers whose education, experience and egos hobbled them with limited vision. Instead of trying to understand Carey s ideas or discover some new fundamental principle of physics that might explain and validate Carey s theories (and so gain fame for themselves), the experts wasted their time and energies trying to disprove Carey s concept, the same treatment given to Wegener s concept.

As the experts would point out, *everyone knows* that the Earth, along with all other planets of the solar system, was created approximately 4.5-4.6 billion years ago by the gravitational collapse of a cloud of dust and gas surrounding the Sun and has not since changed in size or composition except for minor surface reconfiguration by weather over the course of known geologic time. [Or so the *nebular hypothesis* has led all scientists to believe. Carey suggests a different creation of the solar system from a proto-Sun, but still a singular event that occurred more than four billion years ago. The Accreation (creation by accretion) model offers a more pragmatic and logical planetary creation process that starts from a cold, solid neoplanet that constantly increases in size and mass over time until it reaches spherical shape, at which time internal core heating and expansion commences to accelerate growth of the planet. *LSM*]

Since the concept of a constant-diameter Earth is a product of the *nebular hypothesis,* proof that the diameter is increasing would destroy the assumption of a rapid and completed planetary creation process. Logic demands that, if expansion is proven, then Earth and the other planets must be still in the process of creation and not completely formed 4.5 billion years ago. *Ipso facto,* the *nebular hypothesis* must be declared invalid and a different hypothesis adopted in its place.

As shown in the history of science, when confronted with a revolutionary new idea contradicting the *status quo,* scientific minds often chose the wrong hypothesis because their knowledge and the laws of fundamental physics were incomplete. The *nebular hypothesis* was just such an error. It was adopted at a moment in history when competing theories of solar system creation were being debated and science was flourishing in every field, but the Bible s story of creation in six days still exerted immense influence on any new idea.

[The *nebular hypothesis,* now in its 200th year as one of the most fundamental assumptions in science, will be shown to be the most erroneous and misleading scientific hypothesis in history, even Ptolemy s *geocentrism* that misled scientific thought until 1543 when Copernicus introduced *heliocentrism.*[9] *LSM*]

The Man Behind the Expansion Hypothesis

Carey, an Australian born in 1911, the year Wegener s ideas were first published, was one of the first of his generation of geologists to publicly support Wegener s concept of continental drift. However, Carey, unknown to most, had earlier become convinced that Wegener s drifting continents were attributable to, and caused by, secular expansion of the Earth. Such heretical thoughts were originally included in his doctoral dissertation at the University of Sydney in 1938, but he withdrew them at the last moment, realizing such revolutionary ideas would cost him his degree.[10]

Carey remained convinced that the planet is expanding, but it was not until his 1956 Symposium on Continental Drift at the University of Tasmania that he put his career on the block by exercising his prerogative as editor to enunciate the first detailed exposition of his *earth expansion hypothesis.*

Carey s early career in geology field work took him into the wilds of New Guinea, gaining knowledge and experience that made him a war hero later as commander of Australia s ZED Force that parachuted into the jungles of New Guinea behind Japanese lines, sabotaging and harassing enemy forces. He was still parachuting until age 78, and at age 85 he completed this third book.

Despite so far unsuccessful efforts to convince his peers the Earth is expanding, Professor Carey s name, like Wegener s, will one day be inscribed in the history of geology and geophysics as one of the true giants of geology. Carey s reputation is solidly established as a geologist, having taught and lectured the world over in advancing his hypothesis. He never wavered in the correctness of his belief, and always presented his views in a scholarly manner. Professor Carey is not only a gentleman and a man among men, but a geologist decades ahead of his peers. In 1996 he was duly and properly honoured by the University of Tasmania on the 50th anniversary of the University s Geology Department, which he founded in 1946 and directed until his retirement in 1976.

Despite the passage of 40 years since its introduction, Carey s *earth expansion hypothesis* is still considered by geophysicists as just another unproven hypothesis. Many of today s science students have never heard of Carey or expansion. Why? Simply put, Carey s revolutionary idea failed to win acceptance among geophysicists and geologists for the same reason Wegener s continental drift proposal foundered for 50 years lack of an acceptable causative mechanism. In this respect, both Wegener and Carey shared a common burden in having grand, but incomplete, visions of Earth s dynamic processes.

Wegener was finally vindicated after four decades by discovery of a new geophysical phenomenon the midocean ridge system. Now that another four decades have passed, it is time to prove Carey s prescient hypothesis that the Earth is expanding. New evidence of expansion has been revealed by an unpublished analysis of space geodesy studies inferring horizontal Pacific plate motions that have

7 A. L. Wegener, *The Origin of Continents and Oceans,* 1928, p. 20 (Transl. of 4th Ed. by John Biram, Dover Publications, Inc., New York)

8 F. J. Vine and D. H. Matthews, *Magnetic Anomalies over Oceanic Ridges,* Nature, vol. 199 (Sept. 7, 1963), pp. 947-949.

9 N. Copernicus, *De Revolutionibus Orbium Coelestium* (1543)

10 Remarks by Professor Carey, Feb. 1981.

been erroneously interpreted by the scientific community to be proof of subduction.

[Much empirical evidence of expansion shows clearly on any map of the oceans, but no one seems able to recognize it because of the current fixation on subduction and plate tectonics. The following evidence supporting Carey s *earth expansion hypothesis* is not exactly new; most of it was rejected earlier by journal editors after abstracts were accepted and published.[11] *LSM*]

Proving Expansion of the Earth

The planet is increasing in diameter, or it is not. The problem is to prove which is the real truth.

It is time to make some precise measurements, resolve the question finally and definitively, and focus on a better understanding of the planet and solar system. Earth s diameter can not be changed by philosophical beliefs of scientists, but philosophical beliefs of scientists can be changed by re-measuring Earth s diameter. [12]

Expansion can be demonstrated with common-sense logic and deduction, or with maps showing surface morphologies and empirical features, but this may not satisfy skeptics who demand scientific proof in the form of measurements. The measurements proposed here are simple in theory but difficult to execute, but perhaps they can be accomplished in time to disprove Carey s prediction that he does not expect to live long enough to see the next step possibly in time to earn him the Nobel Prize he has long deserved.

To remove all further doubt I have requested the National Geodetic Survey (NGS)[13] to perform two simultaneous and complementary measurements over a reasonable period of time, predicated on the deceptively simple question: *How rapidly is subduction reducing the width of the Pacific Ocean?*

1. Measure the rate of increase or decrease in width of the South Pacific basin as measured between fixed stations in Australia and Peru. (Other trans-Pacific measurements from China to North America, and from Alaska to Antarctica, should provide further confirmation.)
2. Remeasure the Earth s diameter for comparison with the North American Datum, 1983,[14] which determined the semi-major axis to be 12,756.274 km, the semi-minor axis to be 12,713.504 km, and the average diameter to be 12,734.889 km.

The premise for these proposed measurements involves a fundamental principle of subduction that few geophysicists have ever carried to its ultimate conclusion; *i.e*., subduction on a constant-diameter Earth with continued seafloor spreading in the Atlantic, Pacific and Indian Oceans, regardless of relative velocities, *must result in eventual elimination of the entire Pacific basin.*

To demonstrate this fundamental principle, place both hands in front of you, thumbs together, to simulate Wegener s Pangaea, with the left hand representing North and South America, and the right hand representing Eurasia and Africa. Now, separate the thumbs to signify opening of the Atlantic basin and slowly slide both hands around an imaginary globe of fixed diameter and observe what happens to the Pacific Ocean on the other side of the planet. *The Pacific basin clearly decreases in size!*

When geophysicists introduced the subduction hypothesis they failed to consider that the East Pacific Rise, running from Baja California southward to Antarctica and continuing westward through the Indian Ocean to Cape Horn, South America, is a more prolific generator of new basaltic seafloor than the Atlantic midocean ridge, in places propagating new seafloor at a velocity of ~80-160 mm/yr, four times greater than the Atlantic s growth velocity of ~25-40 mm/yr. (Fig. 2) This dictates that subduction zones must eliminate older Pacific seafloor at an accelerated velocity of at least ~105-200 mm/yr in order to maintain a constant Earth diameter, *but still at the expense of the Pacific Ocean basin.*

Empirical Evidence of Expansion

1. The most compelling empirical evidence that the Earth has expanded and is still expanding, is the distinctive curved outline of the Pacific deep ocean trench system delineating the Andesite Line. The deep ocean trenches that curve southward from Kamchatka and Japan to the Philippines suggest a congruent match with the coastal outline of North America, which implies Asia once conjoined North America.
   But more obvious and unmistakable is the right angle outline of the Vityaz-Tonga-Kermadec trench conjunction near Samoa extending southward through New Zealand to the curved tip of Macquarie Ridge. This outline fits neatly into the western coast of South America from the notch at 20°S southward to Cape Horn. The linear distance separating the two features and the N-S length match perfectly. Therefore, if the Australian plate was once part of South America, the fact it is now 10,000 km distant is prima facie proof of expansion over the short geologic time span of ~200-250 Ma.
   Another fact: these congruent outlines are not just coincidental. The southern trench outline is also replicated in the eastern coast outline of South America that once conjoined Africa. [These two identical ruptures on opposite sides of the same continent is a phenomenon far beyond chance. *LSM*]
   This unmistakable dual morphology is graphic empirical evidence that both Asia and Australia were joined to the western coasts of North and South America when Europe and Africa were still attached to their eastern coasts. Furthermore, this earlier connection is *prima facie* evidence the planet was much smaller prior to formation of the Pacific Ocean basin because *this connection is possible only if the continents were part of a single complete land mass covering the entire surface of a much smaller planet before today s oceans began to form!!*
2. Separation of the southern continents at approximately the same time in geologic history is reinforced by cored evidence from Ocean Drilling Program (ODP) Leg 129[15] that the oldest known sediment found in the Pacific basin is only ~175 Ma in age, which would have been prior to opening of the Atlantic Ocean basin somewhere between ~100-150 Ma. This Late Jurassic sediment further implies that all oceans have been created within the last ~200-250 Ma, an extremely short period of geologic time for creation of ocean basins that now cover over 70% of the planet. This further implies acceleration of the expansion process.
3. Further proof of expansion is the 65.3 mm/yr rate of trans-Pacific plate movement between Yaragadee, Australia, and Arequipa, Peru, measured by Smith, *et al.* (1993).[16] This study, and others

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11 L. S. Myers, *The Accreation of the Earth* (Myers, 1972) 30pp (This paper was returned by the AGU referee with the comment Mr. Myers does not understand plate tectonics.)
L. S. Myers, (Abs.) *Accreation of the Earth,* EOS, Vol. 63, No. 45, Nov. 9, 1982, p. 1114
L. S. Myers, (Abs.) *Geodetic Test to Prove/Disprove Subduction Hypothesis,* EOS, Vol. 67, No. 44, Nov. 4, 1986, p. 912
L. S. Myers, (Abs.) *Evidence Showing N. and S. American Continents Adjoined Asia and New Zealand prior to Formation of Pacific Ocean,* EOS, Vol. 71, No. 43, Oct. 23, 1990, p. 1642
L. S. Myers, (Abs.) *Plate Tectonics: Still Unproven After 25 years of Ignoring Carey s Earth Expansion Hypothesis,* EOS Supplement, Vol. 73, No. 14, Apr. 7, 1992, p. 284
L. S. Myers, (Abs.) *Empirical Evidence Earth Expanding Exponentially,* p. 149 in M. S. Strauss (ed): *Unity in Diversity*, Atlanta, GA, 16-21 Feb. 1995 (AAAS, Wash., D.C.)

12 L. S. Myers, *Subduction: A Scientific Hoax (And how to prove it), 1966* (St. Clair Enterprises, Knoxville,TN)

13 L. S. Myers, ltr to National Geodetic Survey, NOAA, July 28, 1997.

14 C. R. Schwarz, (ed), *North American Datum of 1983,* 1989, p. 249-250 (National Geodetic Survey, NOAA, Dept. of Commerce, Rockville, MD)

15 Cheryl Silver (ed), *A Record of Our Changing Planet,* (Joint Oceanog. Inst., Inc.. Wash., D.C.)

16 D. E. Smith, et al, *SLR Results from LAGEOS.* (1993)

like it, was published as evidence of subduction, but when subjected to close scrutiny actually proves the southern Pacific basin to be widening and the Earth expanding in diameter.

4. Expansion is evident also in the oblate figure of the Earth; the result of midocean ridge growth, 80% of which occurs in the southern hemisphere. Antarctica increases in total surface area for the same reason.
5. The midocean ridges trending N-S in the Atlantic and Pacific are evidence of expansion on the E-W axis, but the ridges trending E-W in the South Pacific and Indian Oceans are evidence of expansion on the N-S axis. On both axes expansion is further manifested in the chasms created by so-called transform faults, which are slip-strike faults formed in the expansion process. The midocean ridges can be likened to the cranial sutures of an infant s skull that allow the head to grow until the child reaches maturity.
6. The midocean ridges are really an extended horizontal volcano 65,000 km in length extruding new basaltic seafloor and virgin new water via black smoker vents, plus an unknown amount of heat. Earth s surface water is considered to have been outgassed via the continental volcanoes. This was true in earlier times, but inception of the midocean ridges as the mechanism of growth and expansion of the oceans has changed things completely. The ridges are now the single greatest source of new water filling the expanding ocean basins.
7. Another indication that subduction is false is the lack of sediments in the deep ocean trenches, none of which exhibit the immense volume of unconsolidated sediments that should have been scraped off the ocean floor on descent into the supposed abyss over a period of several billions of years.
8. External accretion of mass is irrefutable. The daily influx of meteorites and meteor dust from meteor streams (374 total Terentjeva, 1965)[17] that intersect Earth s orbit each year is well known, but the total volume of mass is not. Estimates of total volume vary widely just for dust alone, ranging from 10,000 metric tons/day (Dubin and McCracken, 1962)[18] to 20,000,000 tons/yr (Fiocco and Colombo, 1964).[19] No one suggests that Comet Shoemaker-Levy did not add to Jupiter s mass. Jupiter s thick atmosphere undoubtedly converted a portion of the comet into heat and dust by ablation, just as Earth s atmosphere ablates meteors into heat and dust. On Earth, remnants of larger meteors often survive the atmospheric friction and land as meteorites; extremely large ones weighing up to 34 tons can be seen in museums, and the Barringer Meteor Crater near Flagstaff, Arizona, is estimated to have been created by a meteorite weighing from half a million to a million tons or more. [In the final analysis, every atom on the planet came from outer space at some time in the past. *LSM*]
9. External accretion of mass is evident in Grand Canyon layers deposited at the rate of ~2m/Ma (Fig. 3) and worldwide coal deposits covered with deep layers of overburden. People too easily overlook the obvious fact that the deepest layers at the bottom of the Grand Canyon and coal beds were once the surface of the Earth and disregard the source of the immense volumes of overburden built up in layers in subsequent millenia.
10. The Moon s surface is covered by very fine, powdery dust, and many large craters now filled by post-impact accretion of cometary dust are pocked by subsequent smaller impact craters, implying accretion. The same extraterrestrial dust settles on Earth today, with a 75% chance of landing on some body of water.
11. Increasing length of the day (LOD) is further evidence the planet s diameter is increasing, necessitating periodic addition of leap seconds (the latest on 30 June 1997.) The increasing diameter satisfies the requirement for conservation of angular momentum and is a more logical and plausible explanation than a slowing rotation due to tidal friction.
12. Palaeobiotic populations on continents now widely separated by broad oceans have been correlated by Shields (1981)[20] to show they shared a common ancestry in the past when the continents were contiguous. Speculation about sunken land bridges for biotic migrations is unnecessary.
13. So-called exotic terranes that supposedly migrated thousands of kilometers across ocean expanses (by unknown means) are nothing more than remnants left behind when the continents split apart.

Other evidence of expansion could be included here, but the above evidence should be sufficient to make it clear that expansion must be taken seriously and the controversy over subduction versus expansion put to rest once and forever.

The question of expansion and the *nebular hypothesis* is particularly important at this historic moment when NASA teams are investigating a small surface area of Mars with Pathfinder scientists speculating about immense floods for which there is no concrete evidence to support such speculation. Unfortunately, these speculations arise from the belief (*nebular hypothesis*) that Mars was formed at the same time as Earth and from the same materials, and therefore assume that large volumes of water once existed on Mars. [This assumption is incorrect. As will be shown in the Accreation model, Mars is relatively young when compared to Earth, but has reached the stage where volcanism has generated enough water vapor and other gases to have commenced formation of an atmosphere. Water has condensed out of the atmosphere and become frozen in the polar ice caps, but the volume is not yet sufficient to collect in surface pools. However, it is possible that periodic melting of the ice caps has produced minor surface flows that evaporated or disappeared into the soils. *LSM*]

Accreation An Alternative Cosmology

In this final book Carey explains earth expansion by gross expansion of the core and invokes some cosmological mechanisms that I, frankly, am unable to understand: Particles are random disturbances of the æther, waves, similar to solitons which behave like particles, which may appear anywhere at any time, as mutually cancelling and mutually repelling pairs, which causes universal expansion. We differ in the mechanisms causing expansion, but we both are convinced beyond doubt that the Earth is expanding at an accelerating velocity. My self-inflicted task has been to prove it and offer an alternative cosmology.

Carey is correct about the factor of core expansion but it is only one part of a far more complex planetary creation process controlled by gravity that I call ***accreation*** (creation by accretion). Accreation of a planet begins with the Sun s capture of a comet (a supernova fragment from another star the most probable source event capable of imparting the extreme velocity and long-period parabolic orbits seen in early comets.) Comets constantly shed dust particles (the tail becomes visible only when near the Sun) that float in space available for gravitational accretion by any passing solar body.

The Sun s plane of the ecliptic is determined by the most massive object orbiting the Sun, in this case Jupiter, and all smaller bodies are compelled to join the dance. Each orbit of a new cometary nucleus is warped slightly towards the Sun s plane of the ecliptic and in time will orbit in the same plane. Its relative position within the plane of the ecliptic is determined by the accident of its initial entry point and its mass relative to the mass of other bodies in any of the several planetary orbits. Each body in the ecliptic plane exerts its own measure of gravitational attraction upon all surrounding bodies,

17 A. K. Terentjeva, *Research on Orbits of Minor Meteor Streams*, pp.109-114 in G. S. Hawkins (ed): *Symposium on Meteor Orbits and Dust*, Cambridge, MA, 1965 (NASA, Wash., D.C.) (1967)

18 G. Newkirk, Jr., *Meteoric Dust in the Stratosphere Determined by Optical Scattering Techniques*, pp.354-355 in G. S. Hawkins (ed): *Symposium on Meteor Orbits and Dust*, Cambridge, MA, 1965 (NASA, Wash., D.C.) (1967)

19 *Ibid*.

20 O. Shields, Trans-Pacific biotic links that suggest Earth Expansion, pp. 199-205 in S. W. Carey (ed): Expanding Earth Symposium, Sydney, 1981 (Univ. of Tasmania, Hobart) (1983)

and vice-versa, in relation to its mass. Gravity eventually exercises its control and this is reflected in the mass relationships of the Titius-Bode Law, but better exemplified by Carey s modification having Jupiter as the central focus.

Any solar body still in a large elliptical orbit or an orbit perpendicular or oblique to the ecliptic plane is certainly a relatively recent arrival in the solar system. Eventually each new arrival is drawn into the plane of the ecliptic or captured by some larger body such as an asteroid or planet. The capture and subsequent orbital motion, prograde or retrograde, is determined by the accident of its original cometary orbit and the relative size and position of the two bodies at the moment of capture. Theoretically, a massive new comet could overwhelm a smaller protoplanet in an established orbit. [Retrograde bodies are probably destined for a future collision with a satellite sibling.]

Mechanisms

Gravity is the single overriding mechanism governing all forces in the entire Solar System.

The primary mechanism of accreation is ***passive external accretion of extraterrestrial material*** onto the surface of every neoplanetary body. After a cometary nucleus has been captured and brought into solar orbit, passive external accretion of dust and meteorites continues unceasingly, gradually accelerating in direct proportion to its increasing size and gravitational power until it becomes a spherical protoplanet.

The second mechanism of accreation is ***dynamic internal core expansion*** that commences when the neoplanet has accreted sufficient material to attain spherical (or perhaps near-spherical) shape at ~400 km diameter (see Table 1), and has become a protoplanet. Upon attaining sphericity, the accreation process becomes dynamic and the rate of expansion begins to accelerate, perhaps exerting gravitational compression that initiates internal compressive heating and formation of a central core.

From that moment, the accreation process begins to accelerate and continues at an increasing rate of expansion, perhaps exponentially, as predicted by Carey (1976), accelerating over time until it becomes another sun with its own retinue of satellite planets. Jupiter has nearly reached this stage, and the Great Red Spot appears to be a very large volcanic magma pool formed when the core reached the surface.

The third mechanism of accreation is ***formation of an atmosphere*** that commences when the internal core expands to the point it ruptures the protoplanet s confining outer shell to form grabens and volcanoes that act as pressure safety valves.

An unrecognized element in understanding the accretion of meteorites and dust is that, over time, a planet s atmospheric envelope gradually increases in depth and density as volcanic outgassing increases. As the atmosphere thickens and becomes increasingly dense, meteorites that would have struck with full mass at an earlier point in time are today ablated and reduced to ever smaller particles and dust but the addition of mass remains significant.

The exponential acceleration of expansion predicted by Carey derives from the fact that core melting starts from a cold beginning, not an initial molten state as postulated by the *nebular hypothesis*. As the protoplanet increases in size and mass by external accretion, the core diameter increases and has available an increasingly larger volume of surrounding material to melt through on its way outward to the surface.

Individual planetary development is determined by the volume and variety of chemical or particulate matter available in meteorites, dust and other extraterrestrial material such as solar particles converted by photosynthesis to create organic matter that becomes additional mass. This is exemplified by the great variety, composition and varying depth of the many different layers displayed in the Grand Canyon walls.

The primary difference between the *nebular* and *accreation hypotheses* is the element of time and the constancy of change. In the former, all the planets were created simultaneously and rapidly 4.5 Ga earlier, but accreation postulates that each planet is created independently by solar capture of a cometary nucleus at some unknown time in the past, and thenceforward changes constantly as it develops into a unique solar body by new material and mass added by the law of gravitational accretion.

Calculating the age of any planetary body by dating rocks or meteorites is an exercise in futility because the specimen s provenance is completely unknown. Surface rocks are among the most recent arrivals from space or Earth s interior, but its age can indicate only its last reincarnation older original material at the central core has long since melted and been recycled onto the surface by volcanism. [A*ccreation* fits the *steady state theory*, the ultimate recycling program with no known or knowable beginning or end. *LSM*]

Sphericity plays a key role in planetary creation because of the obvious fact that all major planetary bodies are spherical. When arranged in order of size, all objects in the solar system <400 km in diameter are irregular and angular, but as they reach this critical threshold of ~400 km, sphericity becomes the norm.

This key role of sphericity is derived from the observation that any liquid suspended in a vacuum (as noted in liquid droplets on shuttle flights) assumes a spherical shape, suggesting that sphericity results from the gravitational aggregation of all atoms contained therein. The principle is further reinforced by the ancient technique of manufacturing cannon balls by dropping a quantity of molten lead from a height of l40-150 feet in a shot tower. By the time the lead reached the quenching vat below it had become a round cannon ball. (One of the few remaining shot towers in America is a tall, round, red brick landmark in Baltimore, Maryland, used during the Civil War.)

Both accreation mechanisms, *external accretion and internal expansion,* result from the mechanism of gravity, and from this I deduce that gravity can be defined as: *The attractive force exerted in every direction by the sum total of all atoms in any given body (possibly expressed as total atomic weight)*. Any assertion that gravity is the *weak* force can be dismissed as nonsense when it is a well-known fact that the Sun s massive gravitational power controls all bodies in the solar system and extends well beyond the orbit of Pluto. [My speculation is that gravity is linked to, or an integral part of, the massive binding force of the atom, but this is a question for investigators competent in molecular physics. *LSM*]

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The Incompatibility Between Special Relativity and Particle Dynamics

Special relativity is incompatible with the dynamics of a system of interacting particles. A more realistic modelling, of a physical system requires potential (or configurational) energy, structured particles, and strictly speaking, one inertial frame of reference only in which global conservation laws hold.

1. Introduction

As the division of Einstein s famous 1905 paper (Einstein 1905) into a kinematical and an electrodynamical part shows, special relativity was conceived as *a new kinematics, i.e.* a time-dependent geometry, or rather, a four-dimensional geometry in which the space and time coordinates (x,y,z,t) are treated on an equal footing. In one spatial dimension, the self-consistency of this fictitious kinematics relies upon ist (commutative) group structure. As already realized by Poincaré (1905), a group structure in three spatial dimensions is possible only if one adds rotations to the Lorentz boosts . Special relativity (SR) fails strikingly in the face of the basic dynamical ingredients: initial and boundary conditions (de Bothezat 1936), inertial frame of reference (Galeczki 1994*a*, 1996), energy and momentum conservation (Phipps 1986), equality of action and reaction (Newton s *third principle*), conservation of angular momentum, and so on. Here we focus on its incompatibility with both Newton s *second* principle, the *force law* and the *velocity dependent mass*.

2. The force equation

It was repeatedly pointed out (Galeczki 1994*b*) that Newton s equation:

$$\mathbf{F} = \mathrm{d}\mathbf{p}/\mathrm{d}t \tag{1}$$

with $\mathbf{p} = m\mathbf{v}$ is neither a principle nor a law , but rather the *definition* of force.

When it comes to practical operational matters, the pre-Newtonian form

$$\mathbf{F} = m\mathrm{d}\mathbf{v}/\mathrm{d}t = m\mathbf{a} \tag{2}$$

is usually preferred since acceleration $\mathbf{a}$ is easier to measure than a change in linear momentum. There is, however, a basic difference between these two expressions for Newton s law: assuming constant mass, (2) makes sense in every frame of reference including the particle s proper frame of reference (PFR), whereas (1) is valid only in an inertial frame of reference (IFR) within which the particle moves with a velocity $\mathbf{v}$, i. e. (1) requires a *finite* (*non-zero*) momentum for the measurement of the force. This basic difference notwithstanding, a traditional special relativistic procedure passes from $\mathbf{F}_o = m_o\mathbf{a}_o$ to $\mathbf{F} = \mathrm{d}(\gamma m_o\mathbf{v})/\mathrm{d}t$ with $\gamma = \sqrt{(1 \quad v^2/c^2)}$ the Lorentz square root by applying the transformation to $\mathbf{a}_o$ in the PFR. This is wrong from the very beginning, since the PFR of a particle moving under the influence of a force is *per definitionem* non-inertial; therefore, the Lorentz transformation from a particle s PFR to an IFR is not allowed. For about half a century, this basic limitation to the transformation was simply ignored. Later, as some (more or less) honest special relativists realized the importance of the matter, it was stipulated that locally a non-inertial frame moving with velocity $\mathbf{v}$ and acceleration $\mathbf{a}$ is equivalent to a IFR having instantaneously the uniform velocity $\mathbf{v}$. In particular, the integration of the proper time defined for constant velocity only! along a curvilinear path was equated with the time measured by ideal physical clocks. The procedure was later christened clock hypothesis (Marder 1971; Kilmister and Tonkinson 1993).

It turns out that:

$$\mathbf{F} = m_o\gamma\mathbf{a} + m_o\gamma^3(\mathbf{a}\mathbf{v})\,\mathbf{v}/c^2 \tag{3}$$

This equation, which in the PFR reduces to $\mathbf{F}_o = m_o\mathbf{a}_o$, is the only analytical form of force compatible with the special relativistic transformation of acceleration

$$\mathbf{a} = \gamma^{-1}\,[\gamma\mathbf{a}_o \quad (\gamma \quad 1)(\,\mathbf{a}_o\,\mathbf{v})\,\mathbf{v}/c^2] \tag{4}$$

For proper forces admitting a scalar potential:

$$\mathbf{F}_o = \nabla_o\chi \tag{5}$$

where ∇_o denotes ∇ in a PFR. N. Ionescu-Pallas (1969) has shown that the equation of motion (1) takes the form:

$$\mathrm{d}(\gamma m_o\mathbf{v})/\mathrm{d}t = \mathbf{E} + [\mathbf{v}\otimes\mathbf{H}]/c \tag{6}$$

with

$$\mathbf{E} = \gamma(\nabla\chi + \mathbf{v}\partial\chi/c^2\partial t) \tag{7a}$$

$$\mathbf{H} = \gamma[\mathbf{v}\otimes\nabla\chi]/c = [\mathbf{v}\otimes\mathbf{E}]/c \tag{7b}$$

This is identical with the *force equation of Lorentz,* but was derived apparently in a *purely mechanical context*!

Here is the place to emphasize that the fields $\mathbf{E}$ and $\mathbf{H}$ prescribed in the special relativistic context are interrelated, as seen in Eq. (7b); although in practice the force of Lorentz is applied in situations where $\mathbf{E}$ and $\mathbf{H}$ have *different* sources! We shall analyze this often overlooked problem in a forthcoming article.

Summing up, the *covariance* required by special relativity imposes a very severe limitation on the possible analytical form of $\mathbf{F}$ in Eq. (1), in order to comply with the transformation of Lorentz. We immediately remark that this *covariance* is utterly different from the invariance under a Galilei transformation

$$r = r \quad Vt \tag{8}$$

of equation (2) which is limited to the form

$$m_i\mathbf{a}_i = \Sigma_j\,\mathbf{F}_{ij}((\mathbf{r}_i \quad \mathbf{r}_i),\,(\mathbf{v}_i \quad \mathbf{v}_i)) \tag{9}$$

i.e. to constant mass $m_i\mathbf{a}$ of a particle i interacting with particles j via two-body forces dependent on relative positions and velocities only. It was this *invariance* rather than the previously described *covariance* which was christened Galileian relativity by Einstein and which has led to a seeming contradiction between Newtonian dynamics and Maxwellian electrodynamics (the latter *not* being Galilei-invariant). The passage from Galileian to Einsteinian (*i.e.* special) relativity by Einstein implied a discrete *replacement of invariance by covariance*, unnoticed by the great majority. Even less noticed, the consequence was that true relativity, *i.e.* the *Machian relational theory*, depending on relative positions $(\mathbf{r}_i \quad \mathbf{r}_i)$ and their higher derivatives, valid for constant masses and global, absolute time only, was replaced by an IFR-related covariant theory which is, actually, not a relativity theory at all!

The context of SR is a hybrid pseudo-world, *i.e.* our real world supplemented by a triple infinity of *fictitious IFRs* replete with physically absurd qualities like: infinite extension; infinitely large inertial mass; zero gravitational mass; an inexhaustible supply of synchronized clocks and of rigid mesuring rods telling an observer-dependent time and displaying an observer-dependent length, respectively. The job of the special relativist is to perform *gedankenexperiments* (a weird activity aiming at respectability through the usage of the German word for an experiment performed by thought) by mentally jumping between fictitious IFRs, each enjoying equal status. For example, in order to derive the linear momentum of a particle as used in the derivation of (3) Bohm (1965) starts with the (zero) total momentum in the center-of-mass IFR and then makes use of the special relativistic velocity composition rule in order to transfer into another IFR. In both IFRs he assumes that that the total mass of the system is the (additive) sum of the individual particle masses. Besides the limitation to two particles and to one-dimensional motion, *Bohm s arguments exclude any interaction between the particles*. We cannot overemphasize that in the presence of interaction-at-a-distance like the ubiquitous Coulomb interaction as well as other interactions satisfying Eq. (5), not only the additivity of mass but the conservation of linear momentum and of energy are violated in all IFRs with one exception: the unique privileged global fundamental reference frame of our real world! This fact which is the essence of a remarkably unknown theorem by van Dam and Wigner (Rindler 1971) necessarily restricts the formula $m(v) = \gamma m_o$ to *uniform velocities* of *non-interacting particles*. In other words, the use of $m(v)$ in Newton s force equation (1) is definitely forbidden and therefore Newton s dynamics which provides the very definition of an IFR, so essential to SR and special relativistic velocity-dependent masses are incompatible! In plain language: *Particle dynamics and special relativity are incompatible*! (We hasten to add that a special relativistic velocity-dependent, *i.e.* observer-dependent, mass is a contradiction in itself from the viewpoint of dynamical principles, anyway.) The similar conclusion, namely *the Minkowski spacetime is unable to describe interactions between particles* was arrived at by Henri Bacry (1988), who also stated that in classical special relativity there is no room for potentials (*i.e.* our formula (5)). One may wonder what Bacry (1988) means by classical special relativity or when he states we

have to give up Minkowski space-time (but not special relativity, the energy-momentum space, the Poincaré invariance,...). At any rate, for some 90 years, SR was considered equivalent to the geometry of Minkowski spacetime whose four-dimensional interval is the central invariant of SR under the Lorentz transformations. Bacry s fear to openly declare that SR has to be given up is understandable if his statement is interpreted as sticking to the still useful concept of energy-momentum space in physics although Minkowski s spacetime is untenable.

Indeed, the physical invariant of particle dynamics

$$E^2 \quad c^2p^2 = (m_oc^2)^2 \tag{10}$$

is a true invariant while

$$c^2t^2 \quad r^2 = c^2\mathrm{t}^2 \tag{11}$$

is merely the definition of a fictitious parameter called proper time t, *i.e.* the time indicated by a clock co-moving with the particle . As shown by Wesley (1991), Eq. (10) can be factorized and used to derive the *physical changes* in linear momentum and in energy:

$$p_{ox} = \gamma_o\,(p_x \quad E\,v_o/c^2) \tag{12a}$$

$$E_o = \gamma_o\,(E \quad v_o\,p_x) \tag{12b}$$

$$p_{oy} = p_y \tag{12c}$$

$$p_{oz} = p_z \tag{12d}$$

with $\gamma_o \equiv \gamma(v_o)$, which have a formal resemblance with the *Lorentz transformations*. For massive particles, these changes are consistent with

$$E = \gamma\, m_oc^2 \tag{13a}$$

$$p_x = \gamma\, m_ov \tag{13b}$$

while for photons the Planck and de Broglie conditions

$$\mathbf{p} = \hbar\,\mathbf{k} \tag{14a}$$

$$E = \hbar\,\omega \tag{14b}$$

allow the derivation of the Voigt-Doppler effect which, in turn, accounts for all relevant experimental facts, including the Michelson-Morley null result.

3: The status of $m = \gamma m_o$

There is no need to worry that particle dynamics is incompatible with special relativity, since the mass increase with velocity was established by flesh-and-bone experiments in particle accelerators in the presence of huge (electromagnetic) forces rather than in *gedanken experiments* by special relativistic observers . The answer to the riddle: How can $m = \gamma m_o$, derived explicitly for *uniform* velocities be confirmed by experiments involving genuine *accelerated* motion? resides in the occurrence of two different velocities in the same Lorentzian square root (Galeczki 1993). SR, if applied self-consistently, has to use the so-called radar velocities , measured by means of back-reflected electromagnetic signals with (postulated) equal to and fro velocities, *c*, and operationally limited to just that signal velocity used. Lacking the possibilty to measure the very velocity of light, itself, SR has to define (!) that velocity for its purposes. Starting with Römer s brilliant idea to establish a value for *c* by observing the light coming from the moon of Jupiter at different times in a year s course, physics was lucky to possess the means of measuring *c independent* of *c*! If at all, experimental physicists measure particle velocities, *w*, by the time-of-flight (TOF) method , since the radar method is impractical in the microworld. The TOF method is not operationally limited to a signal velocity *chosen* for the purpose and it obeys the Galileian composition law $\mathbf{w} = \mathbf{w}_1 + \mathbf{w}_2$. The real problem is how to derive theoretically the analyical dependence $m = \gamma m_o$ with $\gamma = \gamma(w)$, confirmed by experiment. Moreover, it would be desirable to derive this dependence in a non-electromagnetic context, although no practical method to accelerate neutral particles to velocities close to *c* is known today. Since a purely Newtonian derivation of $m = \gamma m_o$ from $d\mathbf{E} = \mathbf{v}d\mathbf{p}$ and $dE = c^2dm$ is possible, the problem reduces to a demonstration of the (in)famous proportionality between changes in energy and changes in inertial mass, without any reference to electromagnetic radiation. The derivation given by Gordeyev (1979) and reinforced by Galeczki (1994c) is open to the criticism that it assumes dispersion in vacuum for de Broglie waves and non-dispersive propagation of light at the same time in order to arrive at the necessary connection between phase and group velocities:

$$v_{phase}\,v_{group} = c^2 \tag{15}$$

One thing, however, is certain: SR which contradicts particle dynamics, which identifies rest mass with proper mass (thereby being unable to define a *unique* value, since rest has no absolute meaning in SR) and which is unfit to handle potential energy, has nothing to do with $m = \gamma m_o$ (for variable velocity!) or with $E = mc^2$. SR which ascribes an energy $E_o = m_oc^2$ to a point-like, structureless particle at rest in its own frame of reference, is not a physical theory at all!

References

Bacry, H. 1988. *Localizability and Space in Quantum Physics* pp. 3 and 59 [Springer-Verlag, Berlin: Lecture Notes in Physics Vol. **308**]

Bohm, D. 1965. *The Special Theory of Relativity* [Benjamin Inc., New York]

de Bothezat, G. 1936. *Back to Newton* [G. Stechert & Co, New York]

Einstein, A. 1905. *Annalen der Physik* **XVII**: 891

Galeczki, G. 1993. Physics Essays 6: 11

Galeczki, G. 1994a. *Chinese J. Syst. Eng. & Electronics* **5**: 77

Galeczki, G. 1994b. *Apeiron* **20**: 26

Galeczki, G. 1994c. *Physics Essays* **7**: 83

Galeczki, G. 1996. *Il Nuovo Cimento* **B111**: 655

Gordeyev, G. V. 1979. *Int. J. Theor. Phys.* **18**: 397

Ionescu-Pallas, N. 1969. *Introducere in Mecanica Teoretica Moderna* 86 [Ed. Academiei Bucuresti 1969]

Kilmister C. and B. Tonkinson, B. 1993. *Pragmatic Circles in Relativistic Time Keeping in: Correspondence, Invariance, and Heuristics: Essays in Honor of Heinz Post* ed. by S. French and H. Kamminga [Kluwer Academic, Dordrecht 1993] pp. 207-225

Marder, L. 1971. Time and the Space Traveller: 91 [Univ. Pennsylvania]

Phipps, T. E. Jr., 1986. *Heretical Verities: Mathematical Themes in Physical Description* [Classic Non-fiction Library, Urbana]

Poincaré, H. 1905. Comptes Rendus **CXL**: 1504

Rindler, W. 1971: *Essential Relativity* 266 [Springer Texts and Monographs in Physics, IUP, New York]

Wesley, J. P. 1991. *Advanced Fundamental Physics* pp.128-133 [Benjamin Wesley, Blumberg]

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