

A Non-Newtonian View of the Universe Derived from Hydrodynamic Gravitation and Expanding Earth

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Abstract

Earth Science observations and the Borexino and KamLAND geoneutrino experiments provide clues on the role of aether in the evolution of the Earth, planets, and all other universal structures. Analysis of the problem of storage of aether entering celestial bodies led to a hydrodynamic explanation of gravitation which in turn was found to be closely related to the expanding Earth and to several other phenomena. Variable radius paleogeography provides an approximate assessment of the quantity of ordinary matter added to the planet per time unit, and some inferences about the Earth's inner energy balance. The aether density, flow rate, and velocity are computed with the help of astrophysics. The origins of cosmological and gravitational redshift are unified under the single cause of gravitation. This is linked to the similar but not interchangeable concept of tired light, which was considered very plausible by cosmologists like Edwin Hubble and Fritz Zwicky. A superluminal speed was calculated for aether at the Earth's surface. INFN experiments confirm hydrodynamic gravitation and superluminal velocities, and it is possible to identify interrelations of aether parameters with the currently known cosmological parameters H_0 , G , and c . Unification of hydrodynamic gravitation and the expansion of the celestial bodies through the existence of a minor dissipative force, a non-Newtonian concept, involves a revision of the theories of physics and cosmology, in which the currently accepted laws of physics will be only considered good approximations of a more complex reality.

Keywords

Expanding Earth, Aether Central Flow, Hydrodynamic Gravity, Red Shifts, New Evolutionary Cosmology

1. Historical Perspective of the *Central Torrent*

Newton's research into gravity was never without the conviction that gravitation should be explainable by physical mechanisms. Newton (1642-1727) admitted the existence of aether pervading everything [1], and he was surrounded by scientific peers who proposed mechanical explanations of gravitation. One of his good friends and confidants, Fatio De Duillier (1664-1753; on 1690) believed gravity was caused by mechanical collisions of infinitesimal particles wandering in random directions and velocities in space. This mechanism was further developed some time later by George Le Sage (1724-1803; on 1750) [2] [3]. However, Newton preferred other hypotheses about the nature and dynamics of the aether. He defined an initial hypothesis in 1675 in a communication [4] to the Royal Society:

The vast body of the earth, which may be everywhere to the very centre in perpetual working, may continually condense so much of this spirit as to cause it from above to descend with greater celerity for a supply; [...] nature making a circulation by the slow ascent of as much matter out of the bowels of the earth in aerial form, which, for a time, constitutes the atmosphere; [...] And, as the earth, so perhaps may the sun imbibe this spirit copiously, to conserve his shining, and keep the planets from receding further from him. And they, that will, may also suppose that ... the vast aetherial spaces between us and the stars are for a sufficient repository for this food of the sun and planets. (Newton, 1675; text reproduced in [5], p. 181).

This was possibly the first proposal of a central torrent and an explanation for the rapid flow of aether towards the interior of celestial bodies. Aether as food for the Sun and planets is also a first vague prelude to the Expanding Earth concept. A few years later, he conceived a second possible mechanism for gravity. This was: an aether of increasing consistency and particle size as you moved away from the Earth [6], which started another line of research at the time by Euler (1707-1783) on a similar basis (increasing pressure instead of density). Despite conjecture on possible flows of aether towards the Earth's interior as the cause of weight, Newton and many of his successors could not accept a progressive accumulation of matter in the planet due to their philosophical and religious beliefs, instead conceiving improbable mechanisms for the elimination of aether. Newton thought that it must return to outer space, and the problematic contrast between the arrival and return mechanisms was one of the reasons that led him to give up trying to establish further hypotheses.

The Swiss scientist Johann Bernoulli (1667-1748), although well aware of the De Duillier-Le Sage-like mechanism (since he had translated De Duillier's text), proposed a true hydrodynamic flow of aether penetrating perpendicularly to the Earth's surface towards the center of the planet—which he called the *central torrent* [7]. He wrote:

The gravitation of the planets toward the center of the sun, and the weight of bodies toward the center of the earth, are not caused either by the attraction of

Newton, or by the rotary force of the vortex medium of Descartes, but by the immediate impulsion of a substance which under the form of what I call a “central torrent”, is continually thrown from the whole circumference of the vortex to its center, and consequently impresses on all bodies encountered by it in its path the same tendency toward the center of the vortex. ... And all that Newton has derived from his “attractions” are by my theory, derived from the impulsions of the central torrent (Bernoulli, 1735 [7]; translated and quoted in [8]).

Although not without contradictions and incompleteness, Bernoulli believed he was blending the best of the (incompatible) concepts of Newton (spherical symmetry of gravity) and Descartes (axial symmetry), convinced that this reproduced all aspects of Newtonian gravity, but without a rigorous formal demonstration [7] [8]. The problem of whether or not the incoming aether was stored in celestial bodies remained vague.

Pierre Simon Laplace (1749-1827), who considered hydrodynamic gravity plausible, calculated that the propagation speed of gravitation fluid had to exceed the speed of light by many orders of magnitude to make the effect of gravitational aberration negligible:

If gravitation were produced by the impulse of a fluid towards the center of the attracting body; the previous analysis, relating to the impulse of sunlight, would give the secular equation due to the successive transmission of the attractive force. [...]; we must suppose that the gravitational fluid has a speed at least a hundred million times greater than that of light [...]. Geometers can therefore, as they have done hitherto, suppose this speed to be infinite (Laplace, 1802 [9]; pp. 325-326; translated from French).

Otherwise, with aether flowing at speeds comparable to c , the planetary orbits would have destabilized within a few thousand years. Laplace does not express an opinion on the issue of final storage of aether. However, the superluminal properties of gravific fluid within the solar system seem to have been confirmed in very recent experiments (see Section 7 of the present paper).

In the nineteenth century at least two scientists again addressed the issue, James Clerk Maxwell (1831-1879) and Bernhard Riemann (1826-1866). Starting from the field of electrostatics, Maxwell offered a hydrodynamic interpretation of Faraday’s lines of force, describing them as tubes within which a fluid (but imaginary!) flowed at speeds decreasing as $1/r^2$ relative to charge [10]. The analogy between electromagnetism and gravitation was later elaborated by Oliver Heaviside (1850-1925) [11]. Riemann’s 1853 work (published posthumously) called *New Mathematical Principles of Natural Philosophy*, postulated a hydrodynamic model for an incompressible fluid aether [12], but again without suggesting where the incoming stream of aether might be stored. He wrote:

I make the hypothesis that space is filled with a substance which continually flows into ponderable atoms, and vanishes there from the world of phenomena, the corporeal world. Both hypotheses may be replaced by a single one, that in all ponderable atoms, a substance perpetually appears from the corporeal world in-

to the mental world (Riemann, 1853 [12]; pp. 505-517).

Maxwell and Riemann thus solved the storage problem in an idealistic way.

A place for aether to settle in our real world was found a few decades later in a rather obvious solution proposed by the Russian-Polish engineer and astronomer Jean O. Yarkovsky (1844-1902), best known in astronomy for a thermodynamic effect on the rotation of small celestial bodies [13] [14]. He suggested that incoming aether formed new atoms in the depths of the Earth, giving rise to various phenomena like planetary expansion, internal heat and earthquakes [15]. In the early 1900s he published a short pamphlet in Russian regarding the density of aether, giving a value eleven orders of magnitude greater than the one calculated here [16]. Without providing a bibliographic reference, he cited the value published by Lord Kelvin as erroneous (which instead is near to the order of magnitude deduced here in section 4). Yarkovsky's ideas had an affinity with those of De Duillier-Le Sage, from which it was possible to deduce the existence of a gravitational shielding effects sought without positive results during 1900s [17] [18] [19].

Ott Hilgenberg (1896-1976) was a well-known scientist and Expanding Earth sustainer in Berlin from the early 1900s [20] [21]. At a late stage in his career he resumed his youthful interest in flowing aether [22] [23]. Setbacks prevented his oral presentation on hydrodynamic gravity as the cause of expansion at a conference organized by the British geophysicist Keith Runcorn in Newcastle upon Tyne. Shortly afterwards he published the text of his talk in a 16-page booklet [22] criticizing Riemann for his idealistic idea of aether simply disappearing following penetration into material bodies, and he tried to derive the density of aether with the help of the red shift of solar light. The data available at the time did not allow him to succeed, but it is notable that he followed a path that was in principle correct.

The concept of aether has never been abandoned [24] [25] [26] [27] and numerous groups or individual researchers have considered hydrodynamic gravitation [28] [29] [30] and various other concepts (a short review in [31]) but many of these studies fell within the theoretical ambit of general relativity, without considering the Expanding Earth concept. Only Wang, without considering expansion of celestial bodies as really plausible, is acknowledged that if gravity is formulated hydrodynamically, there is an implied increase in mass and a variation in G [32]. In his master thesis Ngucho observed that the existence of a thin material field leads to a slow kinetics energy loss by planets along their orbits [33]. In his long scientific activity Blinov offers a concept of gravity as a form of energy transfer from space to objects [34], a concept similar to that proposed [35] by Petry. Cahill identifies aether with flowing space [36], while Consoli and coauthors prefer a flowing aether in the form of a Bose-Einstein condensate [37]. Even Euler's idea of aether causing gravity from a pressure gradient is sustained today [38].

However, for the vast majority of the scientific community, the situation to-

day does not differ substantially from that described clearly by Riemann:

Rather, we should look to the circumstance that Newton's law of attraction has operated so long on the notions of researchers that they seek no further for explanations (Riemann, 1853 [12]; pp. 505-517).

Finally, in modern manuals and treatises on hydrodynamics, the sink and source entities are considered with dismay because of the singularities present at their centers, defined as pure theoretical abstractions. In none of these manuals is formal proof provided that singularities are eliminated by Newton's laws (see section 8 in the present paper).

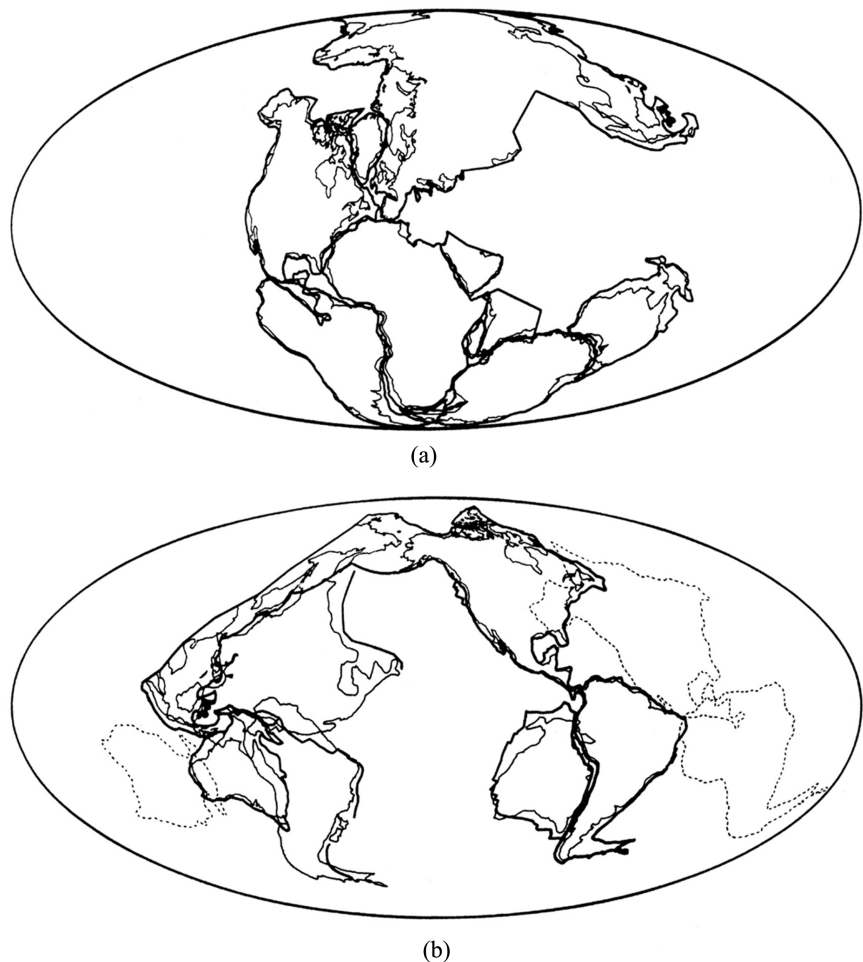


Figure 1. Cartographic experiment performed in [64] (pag. 50, **Figure 3**). (a) Reference Pangaea. The supercontinent reconstructed following the classic works [39] [40] [41]. (b) Circumpacific continental scarps (bold line) and coastlines in their modern position showing all the conformities between continents and basins [64] together with the outlines of Australia, Laurentia and South America (dotted lines) in the positions which they assume in (a) in the reference Pangaea. It is impossible to imagine how the conformities could be formed by convergence of Laurentia, South America and Australia coming from Pangea and drifting towards their modern position and towards the Pacific. The circumpacific conformities overlap adequately with the relative basins and there is reciprocal juxtaposition if the mutual position of continents is reconstructed on a half radius globe as in the next **Figure 2**.

2. The Earth's Heat Flux Budget Is Not Balanced

The Earth Sciences provide plentiful evidence for planetary expansion [21] [22] [23] [42]-[80]. All the preceding quoted papers derive from the diverse spheres of geology, paleontology, geomorphology, paleogeography, paleomagnetism, geochronology, geodetics etc. However none of them necessarily implies a link between Expanding Earth and hydrodynamic gravitation with a central torrent. Recently, from some more refined experiments including the Borexino at Gran Sasso in Italy, and KamLAND on the island of Honshu in Japan, designed to measure the radiogenic heat of the Earth from neutrino flux [81] [82] and from a series of cartographic experiments (see **Figure 1** and **Figure 2**) awareness has grown that the cause of expansion could be a flow of aether converging into the planet and transforming into ordinary structured matter (first particles and then atoms) along the journey from surface to geocenter [21].

The problem of the Earth's energy balance has been extensively debated [83] [84] without reaching a definitive solution. Today we can re-examine the issue from the new perspective of a centripetal flow of constitutive matter. To resolve the Earth's heat balance the total of 45 - 47 TW, as measured in wells and mines, should equal the sum of primeval heat—generated during the formation of the planet, which has slowly dissipated down to the modern residual heat, estimated to be between 5 TW and 15 TW—plus radiogenic heat. However, this is not the case. The exiguous tidal dissipation (≈ 0.1 TW) and gravitational potential energy released in the differentiation of crust from mantle (≈ 0.2 TW) can be neglected [85]. The geodynamic approach with its hypothesis of convective currents in the mantle would imply a faster dissipation of primordial heat, estimating values below the average of ≈ 10 TW. For the three radiogenic heat flux values predicted by the models (**Table 1**) the Borexino and KamLAND experiments [81] [82] provide result of 8 - 16 TW (best value) and 18-28 TW (best value) respectively (**Table 1**). With these values, the sum of radiogenic (average KamLAND-Borexino ≈ 18 TW, average Borexino ≈ 24 TW, maximum Borexino ≈ 28 TW) and primordial heat (mean ≈ 10 TW) differs more markedly from the surface heat flux value. Some geophysicists ([84], among others) suggest the possibility of applying the highest values allowed by standard deviations, but the problem persists and should not be underestimated.

It has been hypothesized that the missing heat could be provided by an exothermic process of fission in a nuclear reactor generated by the gravitational migration of the radioactive elements towards the region near the Earth's center [86]. This would produce no more than 5 - 7 TW, but some researchers reject it for various reasons, including geochemical considerations [87]. The same doubts arise for the possibility of nuclear reactors in the D'' layer, a thin shell enclosing the liquid core. Both these nuclear fission reactors hypotheses suffer from the major problem of the lack of an efficient mechanism for elimination of the nuclear fission waste that would inexorably contaminate and halt the reaction.

Table 1. Decay of radioactive elements: comparison between models and experimental results.

Cosmochemical approach	The composition of the Earth is based on the enstatite chondrites, which show a closer isotopic similarity with the mantle and an iron content high enough to explain the terrestrial metallic core	11 ± 2 TW
Geochemical approach	For the relative abundances of the lithophile refractory elements it adopts a chondritic composition, then placing limits on the absolute abundances from terrestrial samples	20 ± 4 TW
Geodynamical approach	It is based on the hypothetical energetics of mantle convection and on the observed heat flux on the surface	33 ± 4 TW
Borexino experiment	Observed best value	18 - 28 TW
KamLAND experiment	Observed best value	8 - 16 TW

The neutrino experiments suggest that the terrestrial radiogenic heat flux predicted by the convective cell geodynamic model (33 ± 4 TW) is not confirmed [21] [81] [82] (Table 1) and cannot be correct. Even taking the Borexino mean value of ≈ 23 TW, it is necessary to add a primeval heat value taken from the lower end of its estimated range, due to the higher dissipation caused by convective motions, but even conservatively adding a mean of ≈ 10 TW would be far off the 45 - 47 TW total.

Furthermore, it is important to consider that the feedback from an Expanding Earth on primeval heat evaluation would lead to a primitive heat re-evaluation much lower than 5 - 15 TW, making the lack of a plausible heat source more dramatic. This serious question of the Earth's actual evolution skews all estimates of the Earth's primordial heat, without the authors being aware since they are mainly interested in balancing the Earth's heat budget within the framework of current knowledge, in which the expansion of celestial bodies is not considered [83] [84] [85]. The budget can only be balanced by arguing the existence of an unidentified source of heat possibly linked to the unknown physical phenomenon that drives terrestrial expansion. It is therefore necessary to ask whether a part of the neutrinos detected by Borexino and KamLAND were produced by matter-genesis, and whether the unexplained missed fraction of the heat flux is due to an increase in the kinetic (thermal) energy of the Earth's core materials not due to radioactive decay but rather to the convergence of aether and its transformation into ordinary matter.

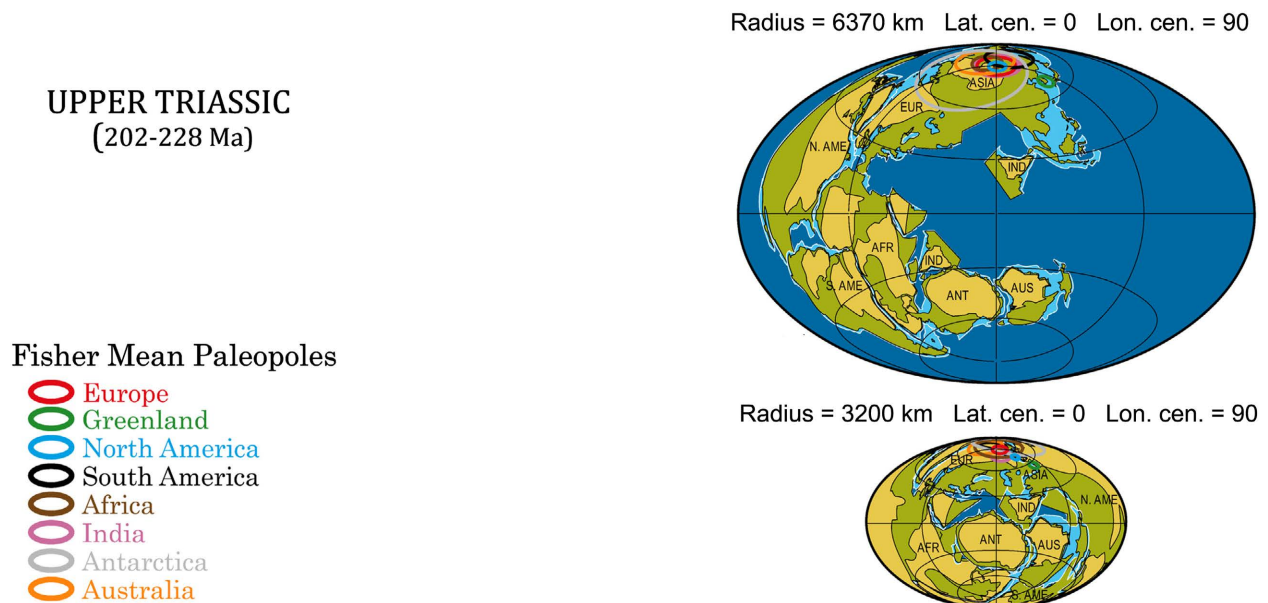


Figure 2. Paleogeographic reconstructions performed for the Triassic [21] [88], assisted by the GPMDB (Global Paleomagnetic Database) [89]. Paleopoles were traced as Fisher averages. The beige color defines the Paleozoic shields; olive green the mainland of the current continents; and light blue the modern continental shelves. More details and the lists of GPMDB data used, can be found in the Supplementary Materials file accompanying [21]. This is a typical cartographic experiment enabling estimation of the Earth's annual mass growth. It constituted also evidence for an Expanding Earth because the same selection of poles (see data lists in [21], supplementary materials) enables reconstruction of both the classical Pangea with all its exaggerations (Tethys Sea too vast, pre-Triassic Pacific crust more than hemispherical and today completely disappeared, India too isolated from Asia, etc.) and the globe of 3200 km, the Triassic terrella without oceans. If the pole selections were incorrect or biased for the 3200 km globe, then the reconstruction of Pangea with the modern radius would also be wrong, and/or the GPMDB catalog would be useless.

3. Geological Quantification of Incoming Aether

What we call the gravity field, the intensity of which decreases as $1/r^2$, is nothing more than the force exerted on a unitary mass m positioned at a given point. The force does not exist at any other point without the presence of a unitary mass m . The field is therefore a point-by-point mapping of what a unit mass m would experience if located at an infinite numbers of points in the space surrounding the central massive body with $M \gg m$. There is no perception of what really exists at all the infinite points in which m could be located, which is what exerts physical action on m (something present even without the presence of the test mass m). The Newtonian gravitational field is therefore an incomplete phenomenological description of physical reality (also true for the electromagnetic field).

We can thus start interpreting gravitation as resulting from the material field of an incompressible perfect fluid aether of density ρ , converging towards the Earth at a speed depending on $1/r^2$ (above the surface of the planet; r = distance from the geocenter). Starting from the known relationship for the force $f = \rho Qv$ (known as the dissipative term) exerted by a fluid current of uniform flow of velocity v on a sink singularity with flow rate Q , we arrive at an expression of the attractive force between two static sinks (or even between two sources) analog-

ous to the expression of Newtonian gravity [90]:

$$f = \frac{\rho}{4\pi} \cdot \frac{Q_1 Q_2}{R^2},$$

which can be compared with the force of gravity between two masses:

$$F = G \cdot \frac{mM}{R^2}.$$

Obvious dimensional problems do not allow identification of G with $\rho/4\pi$. What makes this (only apparently old) conception very attractive is that it is not a Newtonian conception, since the expression of force in the non-static case depends on the speed of the sinks or sources.

The same attractive force would be obtained either with high flow rates Q_i and low density ρ , or low flow rates and increasing ρ , and the velocity field v also plays a part in the dissipative term. There are only clues that the density of aether must be very low [21] [32] [90], otherwise the dissipative term would be too important and the founding fathers of modern science could not have posited the principle of inertia, the concept of conservative field, of escape velocity, etc. as good approximations.

From the sciences of the Earth, using paleogeography (**Figure 1** and **Figure 2**) with awareness of its precision limits [21], the mass in the spherical shell added up to now to our globe can be evaluated and thus it is possible to approximately calculate the rate of transformation of aether into ordinary matter as energy transferred to the planet per unit of time (per second; averaging from the Triassic to Recent, 250 My; assuming a conservative terrestrial radius at the Triassic time $R_{Trias} \approx 3400$ km) [21]. The volume of the Earth (today V_T) in the Triassic was $V_{Trias} \approx 0.152 \cdot V_T$. So the volume acquired over 250 My would be $V_{acq} = V_T - V_{Trias} \approx (1 - 0.152) \cdot V_T = 0.848 \cdot V_T$.

This does not guarantee that the acquired mass was $M_{acq} \approx 0.848 \cdot M_T$ (with M_T = Earth's current mass), because a poorly known process of differentiation of materials may have been taking place in the deep planet with phase changes and large volume increases. Therefore, assuming very crudely that the acquired mass is only $M_{acq} = 0.5 \cdot (0.848 \cdot M_T) = 0.424 \cdot M_T$ and linear growth (in reality it is exponential) we can evaluate the approximate amount of energy per second absorbed at the expense of the constituent matter:

$$E_s = (M_{acq} c^2) / (2.5 \times 10^8 \text{ y} \times 3.1557 \times 10^7 \text{ s}) = 2.889 \times 10^{25} \text{ J/s}.$$

The Earth Sciences alone cannot uniquely solve the problems of establishing the density ρ of aether, aether flow rates, or its velocities $v(x, y, z)$ around sinks (celestial bodies). Perhaps this lack of definitiveness prevented Bernoulli and his successors' conception of gravity from spreading and gaining acceptance in the scientific community.

4. Help from Astrophysics

In order to establish at least an approximate value for ρ , assistance was sought

from astrophysics, an option not available in the times of Yarkovsky and Hilgenberg [16] [22]. We hypothesize that the velocity-dependent dissipative hydrodynamic term, the force $f = \rho qc$, is responsible for the phenomenon of redshift $z = (\nu_0 - \nu_1)/\nu_1$ of electromagnetic radiation coming from celestial bodies, which gives rise to Hubble's law $z = (H_0 D)/c$. This idea is similar, but not identical, with that of tired light, considered as much more plausible than the Doppler effect by cosmologists such as Edwin Hubble, Fritz Zwicky, and other colleagues who first worked on the redshift-distance relationship [91] [92].

Today it can be argued that the energy variation E of each photon emitted with frequency ν_0 and received with frequency ν_1 , $E = h(\nu_0 - \nu_1)$, is caused by the work $L = E = fD = \rho qcD$ of the dissipative term on the motion of a sink with flow rate q (the photon), over the distance D between the emitter and the observer. It can be written as follows: $\rho q = E/Dc$. The same quantity ρq can be obtained from the hydrodynamic force (equal to the Newtonian F) between a black hole of flow rate Q_{BH} and a photon of flow rate q forced to orbit around it circularly at our set distance R : $F = f_l = (\rho/4\pi) \cdot (qQ_{BH})/R^2$; from which we have: $\rho q = F(4\pi R^2)/Q_{BH}$.

By combining the previous relations, the aether flow rate of the black hole can be determined: $Q_{BH} = F(4\pi R^2)/EDc$. Knowing that the circular orbital velocity for negligible masses relative to the central one is $v_0 = \sqrt{GM/r}$, we can obtain the mass of the black hole that causes the photon to orbit around it at velocity $v_0 = c$ at our set distance R : $M_{BH} = (c^2 R)/G$, and then:

$$F = G \frac{mM_{BH}}{R^2} = G \frac{M_{BH} h\nu}{R^2 c^2} = \frac{h\nu}{R}. \quad (1)$$

Equation (1) and Hubble's law can be used to derive the constant ratio between any flow rate Q and its associated mass M , in this case between Q_{BH} and M_{BH} :

$$\frac{Q_{BH}}{M_{BH}} = \frac{Q}{M} = GF \frac{4\pi R}{Ec} D = 4\pi G \frac{h\nu}{R} \frac{R}{h\Delta v c} \frac{zc}{H_0} = 4\pi \frac{G}{H_0} = \ell, \quad (2)$$

with $\ell = 3.6 \times 10^8 \text{ m}^3/(\text{kg} \cdot \text{s})$, a universal constant, at present time, of "transfer" from the phenomenological world of masses to the real hydrodynamic world of flow rates. Finally, applying some algebra to (2) gives ρ starting from the constant ratio between flow rates and masses of black holes and photons:

$$\frac{Q_{BH}}{M_{BH}} = \frac{q}{m} = \ell,$$

from which:

$$q = \frac{Q_{BH}}{M_{BH}} m = 4\pi \frac{G}{H_0} \frac{h\nu}{c^2} = \frac{k}{c^2} \nu = \frac{\ell}{c^2} h\nu,$$

or, following a different more direct way:

$$\frac{q}{m} = \ell, \quad \Rightarrow \quad q = \ell m = \frac{\ell}{c^2} h\nu,$$

which has a degree of analogy, in the flow rates world, with Plank quantization. Reordering the Newtonian force: $m = FR^2/(GM_{BH})$, we obtain the flow rate of photons:

$$q = F \frac{Q_{BH}}{GM_{BH}^2} R^2,$$

and finally, from the latter, recalling the dissipative term, the force of the black hole on the photon and Hubble's law, we obtain the long-sought after fundamental parameter:

$$\rho = \frac{1}{4\pi} \frac{H_0^2}{G} \quad (3)$$

with the value $\rho = 0.647 \times 10^{-26} \text{ kg/m}^3$.

5. Two Roads That Should Converge

With (3) it is possible to define the velocity field $v(x, y, z)$ of the fluid (with Q_T = Earth's flow rate; R_T = Earth's radius):

$$v = \frac{Q_T}{4\pi R_T^2} = \frac{M_T \ell}{4\pi R_T^2} = \frac{M_T G}{H_0 R_T^2}, \quad (4)$$

with the value $v = 0.42 \times 10^{19} \text{ m/s}$ at the Earth's surface, 10 orders of magnitude greater than c , decreasing as $1/r^2$ similarly to the classical field of gravity g .

The value (4) obtained from astrophysics must be compatible with the value of energy per unit of time injected into the Earth by the aether and transformed into mass of ordinary matter $E_s = 2.889 \times 10^{25} \text{ J/s}$, already obtained as the averaged value over 250 My from paleogeographic reconstructions. This gives:

$$\rho \frac{dV}{dt} = \rho 4\pi R_T^2 \frac{dx}{dt} = \frac{E_s}{c^2}; \quad (5)$$

and:

$$v = \frac{dx}{dt} = \frac{E_s}{\rho 4\pi R_T^2 c^2} \quad (6)$$

with the value $v = 9.72 \times 10^{19} \text{ m/s}$ at the Earth's surface. Although different, the values (4) and (6) are in adjacent order of magnitude (there would be no reason for this if terrestrial expansion, or hydrodynamic gravitation, or both were false) confirming their link with physical reality. The value (4) should be considered closer to true, with H_0 the most uncertain parameter.

The value of v derived from geology is however higher than that derived from astrophysics and various approaches could be hypothesized to make them converge.

1) The importance of volume increases due to phase changes in the crystal lattice may be greater. For example, it could be assumed that additional dilation phenomena occur related to a hydridic Earth [53].

2) The radius of the Triassic globe could be further increased—albeit only slightly.

3) Finally, additional special properties of aether could also be hypothesized: e.g. the “gravific” aether, of density ρ expressed in (3), may be just a component of the central flow of aether transforming into new mass within the planet. If this is really the case, then the total density of the aether flux $\rho_m > \rho$ should appear in (6), with a consequent lower value for velocity v . Alternatively a “non-gravific” aether could constitute a stationary background on which the central torrent acts germinating new ordinary matter.

All of these three possibilities could apply simultaneously, but currently there is no way to confirm or reject them.

6. Additional Improvements

As previously mentioned, while the Earth’s mass and flow rate increase with exponential regularity (ignoring depletion of aether from the space reservoir), the same cannot be said for volume, which could grow according to an irregular and even non-monotonic function. Assuming therefore an exponential increase in mass or terrestrial flow rate $M_T(t) = (Q_0/\ell) \cdot e^{t/\tau}$, it is possible to derive the value of τ (time of increase of M_T by a factor e). Initially, we proceed starting from a Triassic Earth mass equal to about $M_{Trias} \approx 0.5M_T$ of the current value (and not 0.1 as would be the case following volume increase), taking into consideration the additional processes of volume variation caused by reorganization of the crystal lattice.

This gives:

Using

$$Q(t) = Q_0 \cdot e^{t/\tau} \quad \text{and} \quad \int_{-\infty}^0 \rho \cdot Q(t) dt = M_T$$

With the values

$$Q(t) = 0 \quad \text{when} \quad t = -\infty;$$

$$Q(t) = 0.5 \cdot Q_T \quad \text{when} \quad t = -250 \text{ My};$$

$$Q(t) = Q_T \quad \text{when} \quad t = 0;$$

then:

$$Q(-250) = 1/2 \cdot Q_T = Q_T \cdot e^{-250/\tau}$$

and then:

$$e^{-250/\tau} = 1/2 \Rightarrow e^{250/\tau} = 2 \Rightarrow 250/\tau \approx 0.7,$$

and finally:

$$\tau = 250/0.7 \approx 357 \text{ My}.$$

All this will help to calibrate paleogeographic reconstructions and estimate the terrestrial paleoradius.

The effect of decreasing density of aether ρ over time due to its transfer from space to celestial bodies must be carefully evaluated in the future.

7. Old and Recent Experiments

An old experiment: as we have seen in this view of the universe, light cannot propagate engaged to aether. The speed $v \gg c$ of aether entering celestial bodies would make it impossible for light to move away from them. Light rays propagate by self-induction phenomena, and are only weakly influenced by aether, giving rise to cosmological and gravitational redshift, and the deflection of light by hydrodynamic gravity. Michelson and Morley's attempt to reveal the aether wind was a poorly conceived concept. Only one type of aether wind acting on light in one of the possible ways was studied, ignoring the others and in particular the central torrent that causes gravity.

Recent experiments: if gravitation propagated at finite speed $v_g = c$, it could be shown that planets feel the force of the sun as it was some minutes before (depending on the distance of the planet). The planets would accelerate in the direction of motion, and the orbits would expand rapidly, as forecast by Laplace.

Recently Van Flandern [93] confined the values v_g to a range greater than $2.0 \times 10^{10} c$ which are in the order of those estimated here—Equations (4) and (6), for near the Earth. An INFN experiment (in Frascati, Italy) proved that the Coulomb field of charges in motion behaves rigidly [94], a result that can be interpreted as a very high speed of propagation of the fields within their hydrodynamic formulation (more complete than the classical theory). The unrealistic exclusion of the dissipative hydrodynamic term (small but not negligible if $\rho \neq 0$) leads to theoretical results that are again unrealistic, with instantaneous propagation of the Coulomb field (the delayed potentials of Liénard-Weichert are cited in [94]), generating misleading interpretations that would justify both action at a distance and non-locality.

However, the existence of gravitational aberration is not excluded for very large distances. For example, a field velocity of 1.0 m/s is reached for the Earth at about 1.3×10^{16} m (1.4 light years), for the Sun at 7.55×10^{18} m (163 light years), for the galaxy—assuming a galactic mass of 10^{12} solar masses, at 7.55×10^{24} m (8×10^8 light years). Gravitational aberration is therefore probably important for galactic dynamics, and its contribution to the unsolved problem of the anomalous flattening of the galactic rotation velocity curve with increasing distance should be considered.

8. Aether Velocity Field into the Earth's Interior

Given the analogy between the $1/r^2$ trend of the Newtonian gravity field and the hydrodynamic velocity field moving away from the surface of the Earth, and given that it is precisely the speeds of the omnipresent fluid that produce forces identifiable with those of gravity, the same analogy must be considered for the terrestrial interior. In fact, given that g and v under the Earth's surface are both obtained as an integration of the contributions of all the elements of mass dm or flow rate dQ , the result of the integrals will have the same trend but on different scales (Figure 3).

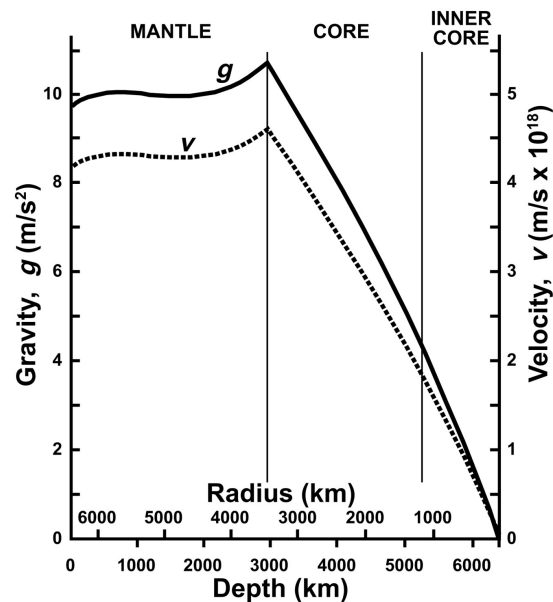


Figure 3. Variation of the acceleration of gravity (g , solid line) in the Earth's interior.

The value of both the g and v fields from the surface to the geocenter do not increase without limits towards infinite singular values (as in hydrodynamic sinks) but, starting from the core-mantle boundary, an almost linear decrease begins towards zero in the terrestrial center (**Figure 3**). The accumulation of a small amount of matter in the center is sufficient for Newton's laws to prohibit the existence of the singularities so feared by Riemann and the authors of modern fluid dynamics treatises.

In this region of the core, with the deceleration of the incoming flux, a more efficient transformation from aether to ordinary matter must be expected, with probable exothermic reactions which would constitute the unknown source of heat in the Earth's energy balance. A second zone of self-overlapping flow, which maintains an almost constant speed from depths of 700 km to about 2000 km (**Figure 3**), could be related to the maximum observed depth of earthquakes, which in the Wadati-Benioff regions is 700 km. These regions are interpreted in plate tectonics theory as lithospheric subduction zones, but in an Expanding Earth interpretation they are areas of material extrusion [21] the origin of which is now identifiable.

9. Discussion of Alleged Problems

9.1. Criticisms of Matter-Genesis within the Earth

Some criticisms of the matter-genesis process have already been made explicit. The most frequent is that *aether would generate subatomic particles that would combine to form protons, neutrons and electrons, finally producing hydrogen. However, our planet is not made of hydrogen, while heavy elements require specific conditions for synthesis from hydrogen, conditions that do not exist inside planets like the Earth and are only found in stars and supernovas.*

The reply is that the chemical constitution of the Earth's core is still under debate and the possibility that a small or even large part of it comprises hydrogen (whether in a metallic state or not) has never been ruled out (see [95] [96]). In addition, an erroneous logical assumption is committed when claiming that the conditions for formation of heavy elements only occur inside stars and supernovae. This is based on an incomplete theory of stars that erroneously exclude a main actor: the convergent flow of aether towards the center of bodies. This flow is subject to extreme deceleration and accumulation, creating conditions and processes the details of which are unknown (see also point 3) in section 5). The specific environment (chemical, static, dynamic) in the interior of real planets is still without a complete theoretical description (see a review of the Earth's core problems in [97]). The two matter-genesis theories (stellar and aether central flow) are not incompatible but simply regard different environments and conditions.

It should be clear from the above that Expanding Earth is compatible with Laplace nebula cosmogonies, in which heavy elements have already been produced in processes described by the theory of stars and supernovae. This theory of precursory matter-genesis could be seen as producing additional and cumulative effects together with central aether flow matter-genesis, a concept that should be developed in the future.

9.2. Criticisms about Neutrino Generation within the Earth

Again it is supposed that *generation of heavy elements from elementary particles implies fusion reactions that would generate emissions of geoneutrinos. The geoneutrino flows detected in the Borexino and KamLAND experiments were not even close to what could be expected from large amounts of new matter being generated inside the Earth.*

It must be recalled once more that this kind of objection is raised within a stellar and supernovae creation context, while a theory for matter-genesis from a "central torrent" of aether does not yet exist. There is thus no clear basis for the objections of critics who compare the experimental results with non-existent theoretically predicted values.

A final criticism is that *neutrinos are generated in both nuclear fusion and nuclear fission reactions. Geoneutrinos are generated by nuclear decay of radioactive elements in the crust, mantle and core of the Earth. Therefore, the ability of detectors to measure the flux of geoneutrinos means they can discriminate neutrinos generated from different sources. If new matter was being generated inside the planet, we would expect a strong emission of neutrinos from nuclear fusion of terrestrial origin greatly in excess of the flux of geoneutrinos from nuclear decay.*

Nuclear fission generates many neutrons, which then decay by emitting anti-neutrinos $\bar{\nu}_e$ according to the reaction:



During matter-genesis inside stellar matter, neutrinos are produced by the fusion of 4 hydrogen atoms according to the reaction (99.77% prevalent compared to other reactions):



However, if new matter was generated inside the planet from convergence of aether, the process of creation could be assumed to act on a more microscopic level than the known particle level (quarks, fermions, bosons) in a chaotic environment that might partially resemble the primordial soup hypothesized during the initial phases of the expanding universe theory. The presence of this active germinating soup could constitute an as yet unknown and highly complex physical environment able to activate different processes and reactions from (7) and (8) while inhibiting or screening others, without excluding possible catalyzing effects.

9.3. Some Controversial Topics

What is certain today is just that the experimental outcomes of Borexino and KamLAND were different from those expected, and that the speculations regarding the specific provenance of neutrinos remain far short of a final stable theoretical description traceable back to physical reality. The observed discrepancy provides a further piece of evidence in the known anomalous energy emission of the giant planets (like Jupiter and Saturn, which emit 150 and 50 times the Earth's emission respectively). On 1990 this phenomenon was generalized and explained by Wang as the effect of specific thermonuclear fusion reactions [98].

While the subject is still controversial, many researchers have followed Wang [98] proposing a geo-fusion process catalyzed by heavy metals in the depths of the Earth's core [99] or thermonuclear fusion in the deep Earth as the cause for formation of nitrogen, oxygen, and water over geological time [100] [101]. Also the surface degassing from volcanic vents and lakes of ${}^3\text{He}$ and ${}^3\text{H}$ (tritium only has a 12 year half-life, and, if not replenished fed from the atmosphere, must be produced in situ in the depths of the mantle or beyond) have been ascribed to nuclear reactions in the Earth's interior [102] [103]. Finally, Makarenko [104] agreed with [98] when noting anomalous heat emission from the planets, proposing an as yet unidentified cause of cosmic origin for this surplus energy.

The presence of a stream of aether decelerating towards the Earth's core could therefore be an important missing element to help explain experimental observations or to improve modeling for catalysis of "juvenile" elements, and generation of excess heat. Critics should reflect that if aether does not reach the center of the Earth (where its velocity $v = 0$) it must necessarily be transformed along the way.

9.4. Criticisms Regarding Terrestrial Energetics

Some papers [105] [106] [107] [108] [109] indicate that expansion with a marked increase in radius would be impossible due to the lack of sufficient

energy sources to produce the necessary variation in potential energy of the materials gradually moving away from the geocenter. This argument is referenced and adopted by followers of the “slow” version of Expanding Earth [110]. The necessary energy that cannot be accounted for is equal to $E \approx 10^{31}$ J over about 400 Ma. Such an enormous quantity of energy was considered impossible to justify within the framework of commonly accepted physical theories, and constituted a crucial argument against the expansion of celestial bodies without a central aether torrent.

However, assuming the physical reality of a central flow of aether as the cause of gravitation and expansion completely overturns any such objections [105]-[110]. Indeed, the energy injected by aether into our planet from the Triassic to the Recent era is:

$$E \approx 10^{41} \text{ J} .$$

This is many orders of magnitude higher than that estimated (for a longer period of time! From 400 Ma to the Recent) by critics of Expanding Earth. The smallness of the variation in potential energy in the expansion models without convergent flow of aether can be compared to the tiny amount of energy that our arms require to lift a load of one kilogram, relative to the total energy contained in the matter of the pack according to the formula $E = mc^2$. In his paper of 1961 Beck was aware that if Earth had doubled its radius then different sources of energy must exist [106]. He wrote:

But even here the maximum expansion that can plausibly be expected is less than 1500 km. For the approximate doubling of the Earth's radius implicit in the ideas of Carey and Heezen a completely unknown source of energy must be postulated. (Beck, 1961 [106]; p. 1489)

9.5. Criticism Regarding the Stability of the Orbits of Celestial Bodies Due to Mass Increase

The Universe described in the present paper is evolutionary and stability of planetary orbits is not foreseen. Stars and planets (also galaxies etc.) are increasing in mass, and the Earth's mass is increasing exponentially with $\tau \approx 350$ Ma. The orbits of the Earth and other planets could be strongly affected in the absence of compensating influences.

However, the laws that regulate the transformation of aether into matter (or rather into additional sinks) are not known, and it is not known if the new mass is created having already a speed equal to that of the mass of the planetary body.

The process could be analogous to placing a heavy brick on a small light carriage already loaded with an identical brick, and already traveling by inertia at a constant speed with respect to the laboratory. If you put the brick down—when it is stationary with respect to the laboratory—by dropping it on the carriage the speed of the carriage is approximately halved. Conversely, if the brick's speed is first raised to that of the carriage, the carriage speed does not change when the brick is added. At the moment we have no way distinguishing between the two modes of action, although invariance of speed (the second mode) seems more

likely, otherwise the galactic (or even more general) reference system would come into play, with disastrous effects.

However, the increase in solar mass certainly causes a shrinkage of planetary orbits which becomes significant over periods in the order of hundreds of millions of years.

9.6. Criticism Regarding the Stability of the Orbits Due to the Dissipative Term

The current kinetic energy of the Earth (disregarding spin) is:

$$E_c \approx 26.87 \times 10^{32} \text{ J}.$$

While, not considering an increase in mass, the work E_w of the dissipative term on the length D_o of a current Earth's orbit (for a current year) is:

$$f \cdot D_o = E_w \approx 39.48 \times 10^{22} \text{ J}.$$

The ratio between the annual friction work of the aether and the Earth's kinetic energy (excluding that of rotation) is:

$$E_w/E_c = 1.47 \times 10^{-10}$$

Thus the kinetic energy of the Earth could be significantly decreased (halved for example) in a time of the order of 10 billion years. The dissipative term alone has a negligible influence on the shortening of orbits compared to the effect of the increasing mass of the Sun.

10. No Relationship between the Dissipative Term and Pioneer Anomaly

A possible relationship between the dissipative term and the Pioneer Anomaly might be conjectured. Assuming the values provided by NASA for the mass and velocity of the Pioneer 10 probe ($M_{P10} = 222 \text{ kg}$; $V_{P10} = 36737 \text{ m} \cdot \text{s}^{-1}$) a value can be calculated for the additional acceleration due to aether:

$$f = \rho V_{P10} Q = \rho V_{P10} M_{P10} \ell = 18.996 \times 10^{-12} \text{ kg} \cdot \text{m}/\text{s}^2$$

$$a = f/M_{P10} = 8.557 \times 10^{-14} \text{ m}/\text{s}^2$$

Which is 4 orders of magnitude less than the anomalous acceleration measured for the probe, equal to $a = 8.47 \times 10^{-10} \text{ m}/\text{s}^2$.

Credit must therefore be given to the explanation based on recoil of the probe by thermal radiation from the circuits. The progressive attenuation over time of the anomalous acceleration value is in fact compatible with the progressive exhaustion of the on-board batteries. We can conclude that the aether's viscous force has nothing to do with the Pioneer Anomaly.

11. Compatibility of Aether Flux with Observed Polar Motion (PM)

The mass absorbed every second by Earth from gravific aether flux at the present time is:

$$M_s = \rho dV \cdot 1s = \rho dx4\pi r^2 \cdot 1s = \rho v dt4\pi r^2 = 1.387 \times 10^7 \text{ kg/s} .$$

And the mass per year:

$$M_y = M_s \times 3.1557 \times 10^7 \text{ s} = 4.377 \times 10^{14} \text{ kg/y} ,$$

which is 7.33×10^{-11} of the Earth's mass ($M_T = 5.972 \times 10^{24} \text{ kg}$).

While more refined treatments exist taking into account the viscoelastic behavior of the Earth [111], a simplified rigid behavior is assumed in the following PM computation with the aim of assessing only orders of magnitude. This is based on the consideration that the probable absence of mantle convection in the expanding Earth framework would result in a more rigid behavior of the planet as a whole.

The Earth rotation pole displacement PP' in the rigid case is (following [111] [112]):

$$PP' \approx W \cdot \frac{rm}{M_T} \sin(2\varphi) , \text{ with } W = \frac{M_T br}{2(B-A)} \approx 460 ,$$

(m = added mass; φ = colatitude; $(B - A)$ = difference between the Earth's polar and equatorial inertial moments; b = Earth's polar semi-axis; r = Earth's radius).

If hypothetically all the mass $m = M_y$ was added annually at the geographic point 30°S , 79°W (colatitude $\varphi = 60^\circ\text{S}$), near Nazca, the following Polar Motion drift would be obtained:

$$PP' \approx W \cdot \frac{rM_y}{M_T} \sin(2 \times 30^\circ) = 18 \text{ cm/y}$$

towards Nazca. A factor of ≈ 0.5 applied to M_y is then sufficient to reach the value of the observed annual Polar Motion of $\approx 10.0 \text{ cm/y}$.

At the present time only about an half of the mass injected by the gravific aether, extruded asymmetrically each year, would be enough to cause the observed PM. However, because of the consideration in point (3) of section 5, the yearly accumulated total mass could be due to an additional flow or *in situ* transformation of "non-gravific" aether, and the unbalanced asymmetrically emplaced mass would be less than 1/20 of the yearly total. A different behavior (more intense asymmetrical extrusion) in different epochs cannot be ruled out, especially during periods of the Earth's highest expansion rate.

It can be concluded that the PM values obtained starting from aether flux are compatible with those currently observed, once again suggesting that the adopted concepts are in line with physical reality.

12. An Aether Advantage: The Reappearance of Antimatter in the Universe

The rationalist attitude physics postulates that every structure would be made up of ever smaller structures in a sort of infinite regression (see Figure 4). From this perspective, particles are similar to indivisible points only because of our

temporary ignorance of what constitutes them. A general conception of aether and its infinite and increasingly microscopic levels can be framed within this scheme, open to future progress.

The nucleosynthesis and origin of chemical elements have been explained for a few decades in the scenario of an expanding universe. This starts with the fusion of baryons and leptons, within a primordial quark soup, always set in the high temperatures and pressures of the initial phases of the big-bang and then into the interior of stars. This view assumes that in the early stages of the universe matter was already constituted only by particles and not by antiparticles. However, for reasons of symmetry, the initial explosion or primitive singularity would have produced matter and antimatter in equal quantities. It is therefore necessary to hypothesize generation of surplus of matter in the first moments of expansion. After a rapid annihilation of matter with antimatter, the surplus persisted on to our time by aggregating according to the mechanisms of nucleosynthesis.

Andrei Sakharov [113] postulates three conditions that need to be satisfied for an excess of baryogenesis to occur:

- 1) Violation of the baryonic number according to laws of physics yet to be discovered.
- 2) Violation of C and CP symmetry. The hypothetical process that changes the baryon number must act to favor the production of baryons over the production of antibaryons.
- 3) Conditions far outside of thermodynamic equilibrium.

If all levels are populated according to a Boltzmann distribution, because CPT guarantees that each level with a positive number of baryons has a corresponding level with a negative baryon number, the total baryon number is zero. At equilibrium, transformations in one sense would be equiprobable to inverse transformations, but if an arrow of time acts together with thermodynamic non-equilibrium, direct and inverse processes would not be zero-sum. There is a vast literature that attempts to find sufficiently efficient processes of baryon number violation without contradicting aspects of big-bang cosmology, but yet all unsuccessful.

Instead, thinking once again in terms of aether and infinite regression opens up completely different scenarios. The universe would appear to possess infinitely more microscopic levels (**Figure 4**) and in one or more of these levels matter and antimatter could coexist—in structures unknown to us—separated by fields of emergent forces at that level. The matter we observe today at our level would therefore already contain both tiny matter and antimatter, and the “antiparticles” that we are able to produce in laboratories would also be manifestations of matter. The problem of the disappearance of antimatter in our universe would appear to be ill-posed. So, the mere persistence in “main stream” cosmology of this unresolved problem could be seen as evidence that aether and Expanding Earth are part of physical reality.

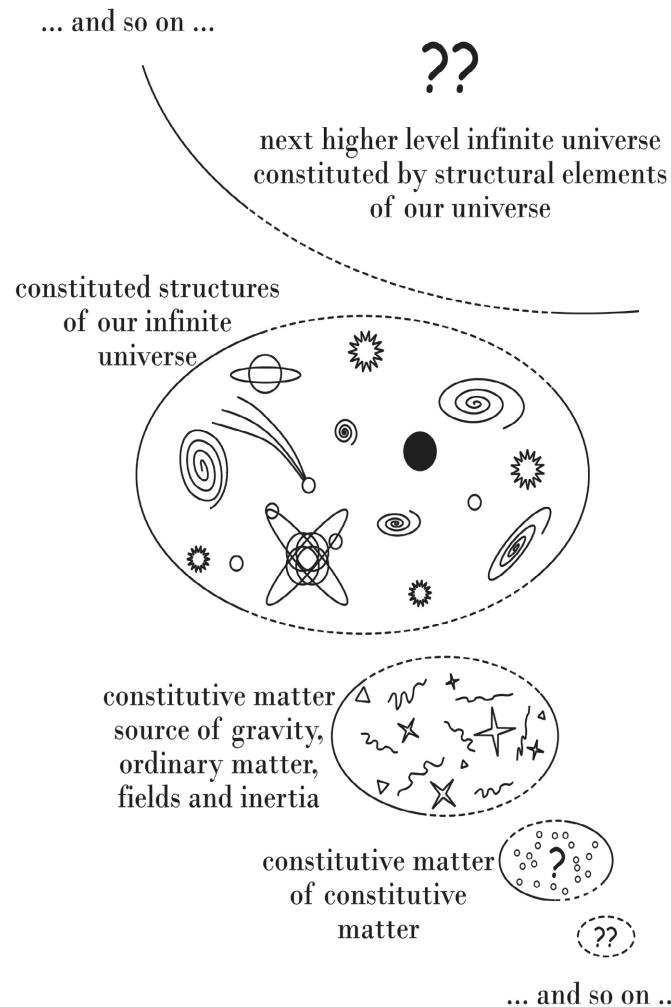


Figure 4. The evolutionary universe derived from hydrodynamic gravitation and the Earth Sciences. The universe that we can now observe directly or indirectly, from large-scale cosmic structures to microphysics, is being comprised at the expense of a constitutive material, the aether, which can be identified through the expansion of celestial bodies. This impalpable matter is being formed through absorption of a constituent material of a lower order, and so on. Our ordinary matter and its structures (micro and macro) are constituent matter (effectively an “aether”) for a universe of higher order of spatial and temporal scales immeasurably greater than ours. All these *Chinese-boxes* universes are supplied from the lower order structures and they form a continuum in mutual evolution. The boundaries between one universe and the next of major or minor order are not well defined. For example, the micro and macro boundaries of our universe are only due to our current ability to build devices and observational experiments, and they are progressively extending.

13. Concluding Remarks

The last century was a historical period in which a “virtuosic” approach to physics prevailed, moving ever further away from the will to faithfully describe reality. We are not referring here to the splendid experiments in large colliders in search of new particles, which are still an expression of microscopic vibrational properties of the aether.

With the advent of relativistic theories, *horror vaqui* has been replaced by *horror pleni*, with a consequent demonization of the concept of aether along with anyone who considered it or tried to study it. Today, however, the simple acknowledgment that the expansion of celestial bodies is a natural phenomenon once more assigns to aether a leading role in order to integrate multiple physical phenomena while simultaneously providing an interpretation for several of them:

1) Origin and action of the gravitational field, rediscovering a concept that has been around for a few centuries in Western science, without becoming established due to the limited geological and astrophysical knowledge (marginality of Expanding Earth, low awareness of redshift). More generally, it clarifies the cause of the phenomenological fields of acceleration, calling into question the material field in motion as the cause of those accelerations. It also gives rise to a formula that has the elegance of physical reality:

$$\rho = \frac{1}{4\pi} \frac{H_0^2}{G},$$

which determines the mechanism of the Universe, with mass increase and expansion of celestial bodies. A centuries-old conundrum is resolved for scientists (for example Newton, Riemann, Maxwell etc.) and authors of manuals and treatises on hydrodynamics regarding infinite speeds in the centers of sinks and sources. In real sinks (the celestial bodies), the inevitable accumulation of material around the center and Newton's laws of gravitation, mean that singularities are not created.

2) Origin of cosmological and gravitational redshift, unifying the cause of gravitation with that of redshifts. The presence of a very rarefied aether and its dissipative term gives rise to both these phenomena. The dissipative term is fundamental as a moderator, homogenizer, and large-scale stabilizer of the Universe. It is also critical in making this version of gravitation non-Newtonian. Additionally, its frequency damping effect gives rise to a plausible solution for Olbers' paradox.

3) The analogy between gravitation and forces between sinks in hydrodynamics—both with a trend of $1/r^2$ outside the bodies, extends the correspondence to the inside of planets. The area of maximum deceleration of the aether flow coincides with the liquid and solid core, where consequently the aether must transform efficiently into ordinary matter. This role of the core should generalize across planets and other celestial bodies. Unlike theoretical sink or source entities, no singularity occurs at the planetary center.

4) The superluminal speeds of aether near celestial bodies explain the apparent "rigidity" of moving Coulomb fields, as revealed by the experiments at INFN [94]. This is linked to the *querelle* on gravitational aberration resolved by Laplace through the assumption of a superluminal velocity for gravitation, a solution confirmed by [93] with its value $v_g \geq 2 \cdot 10^{10} c$, comparable with that obtained in the present text on the Earth's surface.

5) Sound waves travel by vibration of the medium they pass through and they

are transported by the medium if it is in motion. The central torrent does not carry light radiation and consequently it needs to be clarified whether a non-gravific Lorentzian aether is part of physical reality, as some evidence (see point 3 in Section 5) would appear to indicate. The universe in turn provides us with the evidence of the dipole anisotropy of the CMBR (Cosmic Microwave Background Radiation) which identifies a reference system at rest. Furthermore, observed in the deep infrared field with the Webb telescope, the Universe exhibits an infinite time axis towards the past.

6) The presence of the gravific fluid and the consequent dissipative term $f = \rho qv$ (a static fluid tends to slow down the motion of the singularities of sinks or sources) means that the principle of inertia, conservative field, escape velocity, etc., apply only as good local approximations of a more complex non-Newtonian reality. It would be possible to try and develop a hydrodynamic interpretation of the quantum world (one example—among others—in [114]). The expansion of celestial bodies is therefore inextricably linked to a general revision of the concepts of physics and cosmology, prefiguring a more unitary and realistic image, in which an upper limit to achievable speed values is no longer required.

In particular, classical field theory needs to be revised because it is formulated without the dissipative term, which, although tiny (the density of the aether is $\rho \approx 10^{-26} \text{ kg/m}^3$) and with generally negligible astronomical effects on orbits (apart from small effects on the perihelia of the planets) is of enormous importance for the structure, dynamics and evolution of the universe on a large spatial and temporal scale.

While the Expanding Earth concept is finally starting to demonstrate that it can realistically integrate multiple phenomena of physics with each other, no detailed demonstration has yet been provided of the full compatibility of the concept of hydrodynamic gravitation with relativistic effects. The present author is nevertheless confident that this will be possible, both because fields dependent on $1/r^2$ can be described by equations analogous to those of Maxwell, which are known to contain Lorentzian special relativity, and also because a vast literature exists claiming the capacity to deal with the effects predicted by general relativity, applying only classical physics. Moreover, recent papers that recalculate the drift of Mercury's perihelion with more precise methods and data do not seem to confirm the value of 42" of arc per century predicted by general relativity. All these issues, along with the study and assessment of the related literature remain for future investigation.

The present paper explains some new solutions and possible advantages of adopting the non-Newtonian concept of flowing aether derived from hydrodynamic gravitation and Earth Sciences, but many other issues must necessarily remain open.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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