MEANINGLESS RELATIVITY,

A LONG ESSAY.

During the heyday of relativity Einstein published a short book entitled “The Meaning of Relativity” which tried to explain the subject in words. It is doubtful whether this book helped anyone understand the subject, and there were many subsequent attempts to explain it in words. They just made the dogma foggier. The literature is saturated with bellowing about how Einstein explained the perihelion advance of Mercury and the deflection of light by the sun. As a matter of fact he did neither. As a by product of my research in the past decade I have had occasion to study Einstein’s work in great detail, and have found numerous errors in it. Up until nine or ten years ago I had not studied general relativity, being a chemist by training. I did not assume that it was correct, I simply had not studied it. I had read books that were supposed to explain it, the best being by Pais when I was at University of North Carolina, Charlotte. However, I found that explanations in words inhibited understanding so I tended to leave these books aside.

Physics is saturated with dogma, the most rational subject is in fact the most irrational. This type of problem comes from poor historical scholarship and poor understanding of fundamentals. It is always claimed that Newton explained the three Keplerian laws of orbits with an inverse square law called universal gravitation. He did no such thing. My ancestor John Aubrey could have told you that in the seventeenth century. In the online “Brief Lives”, anyone can see that it was Robert Hooke who discovered that law. When the mathematics are carefully worked out, the inverse square law does not explain the existence of orbits at all, because it is a law of attraction. An orbiting object cannot stay in orbit if there is only a force of attraction. There must be a counterbalancing force of repulsion - common sense. In the foggy dogma or fogma this is “the centrifugal force”, which regrettably does not exist in Newtonian dynamics. So Newton did not explain orbits at all, and he did not discover the inverse square law. The strangest thing is that everyone seems to know this and still carry on chanting fogma. That is human nature. Everyone who has ridden a bike or driven a car knows that the outward force is real enough, but it does not appear in Newtonian dynamics. It is in fact due to torsion of spacetime. The “centrifugal force” as it is labelled does not come from a “centrifugal potential energy” as it should. The “centrifugal potential energy” is really the angle dependent part of the kinetic energy of a free particle moving around a plane, the rotational kinetic energy of a free particle. However, the fact that the free particle does not move in a straight line means by Newton’s first law that it has to be acted upon by an external force, an external force that must come from a potential energy by definition. However the rotational kinetic energy is part of that of a free particle, not acted upon by an external force. There is a diametric self contradiction - a free particle is not acted on by any force, but a force is needed to keep it rotating in a plane. It is free and at the same time not free. In the Newtonian dynamics of a particle moving in a straight line there can only be translational kinetic energy. The free particle cannot move in an ellipse for example, without a force being present, but this force is not present and is contrived artificially. In the fogma this rotational kinetic energy is incorrectly called a potential energy and that is that, we have a magically “effective” potential energy. The basic problem is that Newtonian dynamics deals only with straight lines, not with motions of orbits. Coriolis attempted to cure this problem but the explanation is again artificial. The real explanation for orbits is that they are generated by the torsion of spacetime itself, and torsion is something that Einstein never considered. I found out recently that if I just differentiated the functional equation of the ellipse (the observed orbit of a planet to an excellent approximation) the inverse square law

for force is obtained, with its negative sign indicating attraction, but there is nothing to counterbalance the attraction. The functional equation of the ellipse is the dependence of the radial vector on the angle, and the radial vector twice differentiated is the force divided by the mass of the planet. So what is always known in the dogma as an inverse square law of attraction is merely a re-expression of the equation of the ellipse. There is nothing to prove that there is an attraction or gravitation, these are anthropomorphic concepts, there is nothing to prove that there is an outward force. All we all left with is an observation, that the orbit is an ellipse. I suspect that this is what Newton really did, he used the techniques of his time to differentiate the ellipse twice to find an inverse square law. Newton's greatest contribution in my opinion is mathematical, the inference of differentiation and integration which he called "fluxions". When Hooke first drew Newton's attention to the problem, Newton certainly did not get the right answer, he thought the ellipse was due to an inverse r law. There is no reason to doubt John Aubrey in his classic "Brief Lives".

The dogmatic idea of a universal law of gravitational attraction arose from a coincidence described as follows. Using cylindrical polar coordinates in a plane consider the function of an ellipse, r as a function of theta, where r and theta are the coordinates. Differentiate the position vector r twice with respect to time using the correct rules for differentiation in this system of coordinates. The result is a negative valued linear acceleration vector inversely proportional to r squared and directed along the radial unit vector. The proportionality constant between this acceleration and the inverse square of r is made up of constants of the ellipse. These are the right magnitude and the ellipticity. Now apply the rule known as Newton's "second law", a rule which merely defines the concept of force (which first occurs in Kepler's writings) as being linear acceleration multiplied by a mass m and which is not an inference based on data as in the usual meaning of "law" in physics. Differentiating the ellipse twice therefore produces a force that is negative valued, directed only along the radial unit vector, and which is inversely proportional to r squared. In so doing the equivalence of inertial and gravitational mass m has been assumed. It has been assumed that m is the same in Newton's second law and "his" law of attraction first inferred by Hooke from the work of Kepler. If the ellipse is assumed to be the orbit of m around M then Newton's inverse square law is the force needed to maintain this motion indefinitely, or, more accurately, produced by this motion. The radial vector is the line joining m and M. Note carefully that there is only one, negative valued, acceleration and only one force. There is no "centrifugal" force and no "centrifugal" acceleration. By experimental observation, the force in the laboratory between a static mass m and static mass M is the same inverse square law with proportionality constant mMG, where G is known as Newton's constant. This is however pure coincidence, if the ellipse is made to precess the force law becomes a sum of terms, one an inverse square law in r, the other an inverse cubed law. For galaxies the force law is different again, and wholly different from an inverse square law. There is no "universal" force of gravitation.

Even worse for the dogmatist is that the negative sign of the force of attraction between static m and static M in the laboratory is merely a convention. If an apple of mass m drops to the ground the dogma claims that it is due to the negative valued force of attraction exerted by the earth, of mass M. The negative sign of the force obtained by differentiating the ellipse is a mathematical property of the ellipse, more accurately a geometrical property intrinsic to the ellipse itself. The negative sign does not originate in the same source, the two phenomena (elliptical orbit and apple falling to the ground) are different. Therefore the force between m and M of an elliptical orbit is not a force of attraction as in the dogma. If it were, m would fall into M, contrary to observation. The true source of the negative valued acceleration of the ellipse is simply the ellipse and nothing else. The ellipse may be described

as a Cartan tetrad and the spacetime torsion due to the ellipse evaluated by the first Cartan structure equation of differential geometry. The origin of the elliptical orbit is one kind of spacetime torsion. The origin of the central force between static m (apple) and static M (earth) is another, entirely different, kind of spacetime torsion. As described already the dogma asserts that an elliptical orbit is a balance of a negative valued force of "attraction" and a "centrifugal force of repulsion". Nether force exists, the former is a property of the elliptical tetrad and its negative sign does not denote "attraction" - an anthropomorphic concept. The "centrifugal force of repulsion" is confused in the Newtonian dogma with the rotational kinetic energy. The latter is merely another definition, it comes from the use of the work integral and the Newtonian definition that force is mass multiplied by acceleration.

It is easy to see with a little thought that all kind of confusion has crept into physics since the seventeenth century. It is not surprising the general relativity has also collapsed like a pack of cards. There is no purpose in obliging the student to reiterate dogma known to be incorrect or completely confused. A reform in physics education is long overdue.

So from the very beginning, Einstein set out to "correct" dogma, Einstein's theory in the solar system is a tiny correction of Newton's theory, which does not explain orbits at all, it is not possible to correct something that does not explain anything. Yet this is Einsteinian general relativity, claimed to explain nothing with ever increasing precision at suitably astronomical expense. Outside the solar system in such objects as the whirlpool galaxy, Einstein's theory does not begin to explain the velocity curve of that whirlpool galaxy. It fails hopelessly, and so does Newton's theory. The dogmatists introduced more useless dogma - dark matter, and dark indeed. In the last decade I discovered that the existence of a whirlpool galaxy is due again to spacetime torsion, which throws the stars outwards in their observed spirals. In the solar system the spacetime torsion throws the planets into a precessing ellipse. There is no gravitation and no force of attraction, which is precisely the conclusion found by differentiating an elliptical orbit of the solar system and just explained. Motions and dynamics are due to torsional motions of spacetime itself.

So how did Einstein's dogma become so entrenched? I have no doubt that there is merit in Einstein's work in relativity, merit in its basic and ancient idea that physics is geometry, but a lot of it went wrong very early on and in order to see this with clarity a little accurate history is needed. The first steps towards the idea that physics is geometry were made by the ancient peoples such as the Greeks, who had the idea that geometry is an expression of perfection and therefore of beauty. The proportions of the Parthenon were worked out according to this idea, and a flaw in the construction was put there so as not to offend the gods. Only the gods could know perfection. The kind of geometry developed by thinkers such as Euclid (a corruption of his real name) is known as geometry in space, for example a two dimensional or three dimensional space. Physics is automatically an expression of geometry because quantities of physics such as vectors are expressions of geometry. Newton wrote his Principia entirely in terms of geometry. This is a kind of relativity in space. Naturally, an object moving forward at a given speed with respect to another means that the second object is moving backward at the same speed with respect to the first. This observation is made whenever a car starts to move backwards when one is sitting in a bus until one realizes that the bus is moving forward and the car is stationary. This kind of relativity is one of those things that are accepted as obvious, until there arrives the need to change the entirely obvious, and this is how great discoveries are made.

It appears to have been Riemann who introduced the idea that the geometry of Euclid could be made into another kind of geometry which reduces to that of Euclid but is at the same time more general. Riemann introduced the metric as a measure of the way in which his geometry differed from that of Euclid, whose metric using static Cartesian coordinates is a

diagonal, three by three, unit matrix. In Riemann's geometry the object known as the metric can become different from the unit diagonal, a typical mathematician's idea one may think, devoid of all realism. These mathematical ideas have a habit, though, of becoming physics, which is the philosophy and description of nature or "natural philosophy". The greatest advances in physics are made by controlling the mathematics, so that it does not become incomprehensible. If that happens, enlightenment is lost and we are back to dark matter again, or even worse, the Higgs boson. Riemann worked in the early part of the nineteenth century and worked only with the idea of the metric.

In the eighteen sixties Christoffel introduced another way of making Euclid's geometry more general. Christoffel proceeded by developing the idea of the derivative using an object known very obscurely as "the connection". Only mathematicians would think of such an utterly obscure label. In the Euclidean geometry the derivative can be worked out with the every day Cartesian coordinates, which define a static frame of reference. If however the cylindrical polar coordinates are used, the axes themselves move in time, and the derivatives are defined with extra terms as a consequence of the movement of the axes themselves. This example encapsulates the idea of the connection, the word comes from the fact that the frame of reference itself is no longer static, the state of the frame at one point in a given mathematical space is connected to the state of the frame at another point. The simplest example is rotation of the frame in a two dimensional space, the connection is then related to a rotation matrix. Almost always, the rotation is thought to be the movement of a vector clockwise for example, with static Cartesian axes. However, the same rotation can be described by keeping the vector constant and moving the axes counterclockwise. This can be described as "rotational relativity". The rotation can be defined by a rotation matrix, and this matrix is an example of a connection matrix.

The first piece of confusion I noticed in my purely historical researches in this subject is the mis-attribution to Riemann of the concept of connection, so it is known quite wrongly as "the Riemann connection". It is the Christoffel connection, Riemann inferred only the metric, which is a symmetric tensor in contemporary language. Again, Riemann had no concept of "tensor", this idea was introduced much later by mathematicians including Levi-Civita, Ricci and Bianchi. Riemann had no concept of "vector", an idea introduced by Heaviside and Gibbs long after Riemann's time. Such confusion did not give me much confidence in the scholarship of those who claim to be experts in general relativity. The confusion about centrifugal force does not give me much confidence in school teachers who continue to befuddle their pupils with dogma, as if the teachers themselves are confused and are just doing a job to earn a salary, or even worse, drifting through a "career". The crass mis-attribution of the Hooke law to Newton is very poor scholarship by those who claim to be seeking the truth about nature. These are examples of what I call "fogma" or foggy dogma coming from a laziness of mind and in the worse case, catatonic boredom. They should have gone into another subject.

In its full glory the Christoffel connection is an object with three indices, usually written with two subscripts and one superscript. This is why it is known as the "Christ awful" connection - it looks like a hedgehog or porcupine into which no dog (short for dogmatist) would like to put its nose. The necessity for these three indices comes from the need to define a derivative in such a way that that derivative is a tensor known as the covariant derivative. With this definition the connection takes on a life of its own, it is not a tensor: under the most general kind of coordinate transformation it does not retain its mathematical structure - a nasty inhomogeneous term appears and the connection is not generally covariant. At this point most dogmatists give up because they do not go further into the mathematics as it starts to get difficult, and the dogmatist becomes just that, a person who

relies endlessly on the work of someone else, and repeats someone else's ideas endlessly without understanding or ever checking them. The dogmatist is enveloped by fog and disappears from the sight of history. I suspect that the vast majority of "experts" are dogmatists. To go into mathematics is hard work, without pay or promotion. To admit to having no knowledge of mathematics is much more honest. It is up to the physicists to explain all the obscurity in order that enlightenment may prevail, otherwise there is no purpose to what they are doing. They could get bigger salaries in other jobs and the vast majority has no sufficient knowledge of mathematics. Some have no knowledge of knowledge itself. The word "covariant" is horrible jargon. It means that the format of the covariant derivative is the same when that covariant derivative is transformed into another frame of reference. So what? One of my favourite enemies always used to fire off this question (or very common assault) without doing any work himself. The answer to those two little words is that covariance became a law of physics, a law of general relativity. It is one of the few things that have survived the scholarly criticism of the past decade, by my colleagues at AIAS and myself. Mr So What would fire off another round: physics? So what? He is long vanished into total obscurity, the archetypical career man.

The idea of the by now familiar vector appears to have been introduced in the latter part of the nineteenth century by a predecessor on the Civil List in Britain, Oliver Heaviside, who used vectors to simplify the earlier Maxwell equations of electrodynamics. Maxwell himself did not use vectors - he used Hamilton's quaternions, Hamilton being another predecessor on the Civil List. Gibbs also played a leading role in the development of vectors. I always refer to the equations of electrodynamics as the Maxwell Heaviside equations abbreviated to MH. These can be written as four vector equations, two are homogeneous, two are inhomogeneous. The homogeneous equations deal with the electromagnetic field itself, and are the Gauss law of magnetism and the Faraday law of induction. The two inhomogeneous equations deal with the interaction of the field with material matter, notably one electron. They are the Coulomb law and the Ampere Maxwell law. The latter is named after Ampere and Maxwell because the latter modified the Ampere law with the Maxwell displacement current. These four laws were firmly based on experiments, and they first appeared as four laws in Heaviside's analysis. In Maxwell's earlier analysis there are many equations, much more difficult to apply and to understand than those of Heaviside. In addition to the four laws there are constitutive equations which introduce polarization and magnetization. For the purposes of this long essay, the key idea is that the MH equations are equations of special relativity. The modern era ideas of relativity originate in the MH equations. They are not equations of general relativity in the fogma (or "received opinion", to be as polite as possible), but in ECE theory they are correctly relativistic in general, a well recognized triumph of ECE theory.

In the absence of a relatively simple and completely successful unified field theory such as the twenty first century Einstein Cartan Evans (ECE) unified field theory, the twentieth century wandered mistily along on two different legs, one for electrodynamics, the other for gravitation, the former being special and the latter general relativity. So physics prior to ECE became incomprehensible and meaningless, it was two different philosophies riddled with errors. It is miraculous how expensive experiments were designed to test these errors and come up with triumphant precision. This failing of human nature existed in ancient and mediaeval times, and has not changed one iota. It is a supplication to dense fog, one foot looking for the other. The idea of relativity emerged from the structure of the MH equations because Newtonian ideas do not apply in these equations. In Newtonian dynamics a velocity is added to another to give the sum of velocities. "Common sense" in the seventeenth century. Common sense has a habit of being anthropomorphic, the sense is common because it is

human, and by “sense” what is really meant is fogma. In Newton’s time, adding one linear velocity to another could go on indefinitely, so that the result could ultimately reach infinity. Something could go infinitely fast. A signal from earth could reach a distant star immediately, and in the terribly obscure, seventeenth century language of physics there could be action at a distance. Having based his work on this idea, Newton proceeded to reject it in that letter to Bentley: “Pray do not ascribe etc.” Newton could be as dogmatic as anyone, and was not a particularly pleasant politician in his spare time from minting coins.

In electrodynamics however it was realized by Maxwell that all that does not work, light has a speed c which is thought still to be a constant in the vacuum to an excellent approximation. The latest claims, made at incredible expense, are that it may vary by a tiny amount from c in the vacuum. Maxwell realized that light is made up of electromagnetic waves which travel at c in a vacuum, but not in a material. That was Maxwell’s greatest contribution to physics in my own opinion. His equations are essentially unworkable, and it took a genius like Heaviside to unravel them at no expense at all. Maxwell realized that light does not travel faster than c. The first relativists, Heaviside Fitzgerald and Lorentz, realized that it cannot travel faster than c, and threw Newton away. The word “relativity” came into fashion because of the Lorentz transform, needed to explain the results of the Michelson Morley experiment. Although challenged by a few contemporary thinkers, and they may be right, the Michelson Morley experiment is to most physicists reproducible and repeatable. In the Michelson Morley experiment light is proven to be the same whether or not it travels with the earth’s rotation. The linear velocity v of the earth’s surface does not add to c, there is no v plus c.

To the best of my knowledge, relativity as an idea started in correspondence between Fitzgerald and Heaviside, and after that with Lorentz. Neither Heaviside nor Fitzgerald had a clear way of putting their ideas into mathematics, but Fitzgerald wrote a half page article introducing the idea that was used almost immediately by Lorentz in his mathematical work. Fitzgerald proposed it in words, Lorentz put it into mathematical format. The most famous part of that correspondence is the Lorentz transform. In my opinion relativity began with the Lorentz transform although Heaviside came very close to the right answer. Fitzgerald got the right answer in words.

The transform deals with the relative properties of two frames of reference, and hence the words “relativity” and “relativistic”. Considering two frames of reference can be terminally boring, but not to Lorentz. He must have played around a lot with different ideas before he hit on the right one, in real life as opposed to the textbooks this occurs very often almost by accident. Foremost in his mind was the constancy of c, in any transformation from one frame to another c must be constant because of the Michelson Morley experiment. He was considering two frames of reference because Michelson and Morley had devised an experiment in which light was observed perpendicular and parallel to the earth’s direction of rotation. There could be a frame attached to the earth, our own human vantage point, but there could also be a frame outside the earth, a frame in which the earth could move. For example the earth moves with respect to an observer at the centre of the sun, which itself moves with respect to a frame at the centre of the Milky Way galaxy. Even so it took a tremendous leap of imagination for Lorentz to go any further. He had to dispense with common sense. He had to change the meaning of a frame of reference and he had to change the meaning of space itself. It could no longer be Newton’s three dimensional space unchanged for two thousand years from Euclid’s time. The space of Newton and Euclid is independent of time. The idea that Lorentz hit upon is that time, as well as distance, can vary from frame to frame, but c cannot. I can imagine a hypothetical correspondence with Newton’s wig falling off and “pray do not ascribe any more” being hastily scribed to Lorentz.

In the comfortable, two thousand year old dogma (sorry, “received opinion”)

the square of a radius vector is constant if the vector is rotated about the origin of the frame. To make this idea clearer, consider the case of rotation in the plane labelled by axes X and Y. Before the rotation, the vector is defined by components X and Y and basis or unit vectors, usually the familiar Cartesian unit vectors. After rotation, X and Y change, but the square of X added to the square of Y does not change because the length of the vector is not changed by a rotation. This familiar idea is the point from which Lorentz took off. He added the third dimension Z, and denoted the sum of X squared plus Y squared plus Z squared by r squared. Where does a constant c come in to the theory? The Lorentz transformation postulates that c squared t squared - r squared is constant in any transformation from one frame to another. This difference in terms, c squared t squared - r squared, is denoted c squared tau squared, and tau is named "the proper time" in the admittedly terrible jargon. Therefore time multiplied by c becomes a fourth coordinate, and space is transformed into spacetime. The position vector becomes four dimensional and has four components. It is denoted by (ct, X, Y, Z) instead of (X, Y, Z). This is known as a contravariant position vector. Minkowski later realized that an elegant formulation of special relativity can be achieved with the use of the covariant position vector (ct, -X, -Y, - Z). The key idea of special relativity is that time in one frame of reference is different from time in another. Special relativity reduces to one idea, that time can change from one frame to another, but c cannot. So there must be experiments that can be devised to test this idea.

The proper time tau is the square root of (1 - v squared / c squared) multiplied by t. If a particle is observed to be moving at a velocity v with respect to an observer, the latter measures a time interval delta t in the observer or laboratory frame K. The proper time interval measures the time in the frame at which the particle is at rest. For example the proper time interval is the time for a passenger on board a plane, the passenger (and his watch) is at rest with respect to the plane. The proper time interval is smaller than the observer time interval. So a watch on board a plane may record that one hour has passed, but for a watch on the ground, two hours have passed. Time on board the plane is slower than time on the ground, in other words the watch on board the plane runs slow. This phenomenon has been verified experimentally to astonishingly high precision, and this is meaningful relativity, worked out not by Einstein, but by Lorentz and others such as Voigt long before Einstein's work of 1905. The jargon is horrendous, and the phenomenon is known as "time dilatation". All it means is that the watch runs slow on board a plane. This type of relativity was developed elegantly by Lorentz and Poincare in the context of electrodynamics using the then new tensor methods of Levi-Civita, Ricci, Bianchi and others around 1900. A tensor is a kind of matrix, it can exist in one dimension as a row or column matrix and then becomes a vector. A matrix can exist in any number of dimensions.

One of the most elegant parts of the least fogmatic type of physics is the expression of the MH equations in tensor format. There is one homogeneous tensor equation and one inhomogeneous tensor equation. The electromagnetic field is expressed as a four by four antisymmetric matrix and is known as the electromagnetic field tensor. The elegance is revealed most clearly when one realizes that the Lorentz transform is worked in to the field tensor, which transforms into another frame using the transform twice (i.e. the transform applied to a tensor), and gives the Lorentz force equation. This formulation is therefore covariant, and a valid theory of special relativity. The field tensor is expressed in terms of the derivatives of the four potential, which combines the ideas of scalar and vector potential used by Heaviside. In this early theory, the Poincare Lemma can be used to show that there cannot be a magnetic monopole. Many scientists argue that a magnetic monopole can exist, but the experimental evidence is still debated. In ECE theory the existence of a magnetic monopole is left as an open question. All these great achievements were made when Einstein was still a

student, a very bright one, confident with a clear grasp of concept, but prone to mathematical errors and impatience.

These early achievements of the first decade or so of special relativity (about 1888 to about 1900) were clear and precise, and were not confused by failed concepts such as gauge theory introduced by Weyl much later, and then elaborated into a completely failed particle theory. To Heaviside, the electromagnetic potential was real, and also to Faraday, another predecessor on the Civil List. The achievements of 1888 to 1900 did not involve Einstein at all. In his writings, Einstein confuses matters quite frequently, as anyone who has tried to read his original papers finds out. He also had a tendency to use work without citing it. For example the famous rest energy was worked out before Einstein and published in Italian, a language in which Einstein was fluent. It is very probable that he read this paper. In my opinion the lasting contributions by Einstein in special relativity rest on his development of the idea of relativistic momentum and relativistic kinetic energy, and his development of the momentum four vector. The two Einstein principles of the fogma should really be attributed to Lorentz and before him back to Maxwell.

In about 1900, Max Planck made his own leap of imagination in introducing the idea of the quantum of energy. Planck did not name this quantity the photon, the name arrived on the scene much later, as did the name "quantum mechanics". The physics before Planck had run into difficulties, notably the inability of the Rayleigh Jeans law to describe radiation over all frequencies from heated material, known in the densest of jargon as "black body radiation". There were also difficulties in explaining the photoelectric effect using the classical theory of Maxwell and Heaviside. The MH theory had been made into an elegant expression of special relativity, but this still did not explain the phenomena of what we know now as quantum physics. The dichotomy between relativistic and quantum physics remained a problem throughout the twentieth century and produced some of the densest fog in history, the Copenhagen interpretation. The latter has been revealed as hocus pocus many times, but as usual it is more comfortable to teach it rather than learn it. It produces such amazing nonsense that it tends to make fools out of all teachers. I remember this as a student myself, my teachers at Aberystwyth openly made fun out of it, then asked us students to regurgitate it in the examinations. This kept them in a job, and human nature again. Einstein contributed to the early quantum theory, known as "the old quantum theory" by using the idea of quantum of energy (later named the "photon") to explain the photoelectric effect. In the dogma this explanation is attributed wholly to Einstein, but with the advent of google it is found in about half an hour that others worked on it and that things are not at all clear cut. Nonetheless this is the work for which Einstein was awarded a Nobel Prize. He also devised the theory for absorption and emission and in 1906 tried to merge the ideas of special relativity and the old quantum theory by asserting that the photon (as we now know it) has mass.

This seems an obvious notion - as usual in retrospect - but more than a hundred years later the mass is still not known. In fact the AIAS work of 2010 and 2011 has revealed an astonishing lack of internal consistency in the most elementary kind of particle theory throwing the idea of fixed, unchanging, elementary particle mass into doubt. At incredible expense again, it has been found that the standard physics' particle theory has collapsed, it was all built around the mythical Higgs boson, and built in a very shaky way. I have been pointing this out for years. The electron had been known since Thomson's work, or was it Tesla's work? Soon there would be evidence for alpha particles from experiments by Rutherford, first at Manchester than at Cambridge. Einstein did again contribute with merit in 1905 by using the Brownian motion to prove the existence of molecules. The Brownian motion was discovered experimentally by another Civil List predecessor, Robert Brown, a

Scottish botanist who discovered many thousands of new species of flora in Western Australia. He discovered the motion in pollen particles, which are macroscopic particles enormously larger and heavier than a molecule. The motion of the pollen particles seems to be random, not governed by Newton's ordered world of cause and effect. Many physicists a hundred years ago did not accept the atomic theory of another Civil List predecessor John Dalton, now about two hundred years old. Dalton would be described in our terms as a physical chemist. To chemists an atomic theory was proven by the periodic table of the elements, chemical reactions, valency, atomic number, and much else, but to physicists this was all dark matter or phlogiston, or horse hair. Einstein and others such as Langevin and Smoluchowski explained Brownian motion using a random or stochastic term in the Newton force law (the Langevin equation) or by using diffusion equations with stochastic terms and the ideas of Maxwell and Boltzmann in statistical mechanics. Einstein in 1905 used a diffusion equation and the idea borrowed from chemistry of the Avogadro number. It began to dawn on physicists that atoms and molecules really existed, a hundred years after Dalton.

The decade 1905 to 1915 is usually seen as the transition between special and general relativity. A principle of relativity is that the speed of light is constant in a vacuum, and is attributed by fogma solely to Einstein in 1905. However its origins go back to Maxwell as I have argued here already. The other principle of 1905 attributed to Einstein is that uniform motion is unobservable, which means that only the relative motion of inertial frames is observable and the concept of absolute rest is meaningless. The laws of physics are the same in all inertial reference frames. However, this is merely a restatement of the Lorentz transform. There are experimental claims that neither principle holds, there are claims that c is not constant and that the Michelson Morley experiment does not produce a null result. The fogma claims that in 1906, the idea of mass being equivalent to energy was proposed by Einstein, and that that led to the rest energy equation E equals m c squared. Contemporary scholarship has shown that this famous equation was proposed before Einstein in an Italian journal, as discussed already. In 1907 however Einstein made two genuine contributions, in the theory of specific heats and in the transverse Doppler effect. His specific heat theory showed that the law E is equal to h nu is a general law, and not one restricted to black body radiation. The concept of photon as particle is also due to Einstein, and not Planck, the latter's idea being restricted to the quantum of electromagnetic energy. The fogma claims that 1907 saw the first derivation of E equals m c squared, but this is now known to be false. It was derived by another scientist near the turn of the century as argued already. The fogma claims that in 1907 Einstein proposed the equivalence principle, derived light bending due to gravitation and the gravitational red shift. How could he have done that without a field equation and with the ideas of general relativity not yet crystallized even in his own mind? The ideas could only have been heuristic in the year 1907.

In 1911 Einstein proposed that special relativity and the equivalence principle hold locally, but in 1912 realized that the Lorentz transform must be generalized. This idea of 1912 is his major contribution in my opinion, because it introduces a geometrical theory of relativity - general relativity. In contemporary language the Lorentz transform becomes a special case of the general coordinate transform. The idea of gravitation being a field tensor was introduced with Grossmann in 1913 but no field equation was given in 1913. In 1914 Einstein introduced a theory based on the geodesic motion of point particles. He had been fully aware of Riemann geometry for some time, and regularly corresponded with Levi-Civita, who had introduced the idea of curvature. It becomes clear, however, that the key concept of torsion was never used in the decade 1905 to 1915 - indeed it had not been thought of by any mathematician. It was Cartan who first pointed out in the early twenties that geometry must be characterized both by curvature and torsion, in the two Cartan structure

equations. In four papers of late 1915, the fatal errors were made. The Einstein field equation appeared in November in pages 844 to 847 of that year's proceedings of the Royal Prussian Academy. A paper on the precession of Mercury appeared in pages 831 - 839, also in November 1915, and was shown to be incorrect by Schwarzschild in December 1915. Recent scholarship (available on the web) has translated Schwarzschild's criticism in his letter to Einstein of December 1915, leaving no doubt as to the incorrectness of the calculation.

The paper on the field equation, pages 844 to 847, used one idea from geometry and one from physics. The idea from geometry is the second identity of Bianchi. I have shown during the course of developing ECE theory that the second Bianchi identity rests on the incorrect assumption that there is no spacetime torsion. It was entirely natural for Bianchi to have worked without torsion, because it was not known to him. It took Cartan's genius to realize its existence, almost twenty years after Bianchi. The error made by Einstein was therefore the incorrect omission of torsion. The rest of twentieth century general relativity compounded this error, and is meaningless relativity. In 2003 the ECE theory started to include torsion and this led to a straightforward unification of physics. The idea from physics used by Einstein was the Noether Theorem, which is based on the canonical energy momentum tensor. Einstein made the second Bianchi identity proportional to the Noether Theorem through a constant k. Both the Bianchi identity and the Noether Theorem use the covariant derivative, but Einstein assumed that the quantities being differentiated covariantly could be made proportional. There appears to be no way of proving this assumption, which leads to the incorrect Einstein field equation of general relativity in which a geometrical tensor of Bianchi is made proportional to the canonical energy momentum tensor, both being symmetric tensors. The tensor of Bianchi is known as the Einstein field tensor, the gravitational field of force is thought of as geometry.

Schwarzschild must have known of the field equation prior to its publication in November 1915, because he heavily criticised Einstein in a letter of December 1915 in which he declared "friendly war", and in which he gave his solution to the field equation as mentioned already in this long essay. The rest of the fogma is entirely meaningless because it too neglects torsion. For example in 1917 Einstein is supposed to have initiated a cosmology based on big bang, one of the densest occurrences of low visibility ever to threaten enlightenment. The truth is that Einstein himself rejected big bang in 1939 as being unphysical. In 1918 Einstein is supposed to have introduced gravitational waves which are supposed to have been observed "indirectly" in binary pulsars. The truth is that gravitational waves from a mathematically incorrect equation cannot exist in nature. Einstein's search for a unified field theory was flawed from the very beginning because of his neglect of torsion. He must surely have known of the existence of torsion from his correspondence with Cartan in the twenties. However Einstein was already famous and trapped in his own fogma. Whatever the reason, he did not use Cartan geometry as given by Cartan. The latter provided the geometrical basis for a unified field theory in the early twenties - all that is needed for a unified field theory. In 1929 Einstein used Hamilton's principle in an another failed attempt at unification, and in 1950, towards the end of his life, considered the first and second Bianchi identities in a generalized theory of gravitation, but again neglected torsion. The true identity with torsion was given by Cartan and is used in ECE theory.

The search for unification by Einstein is a long and heroic one, but was doomed from the outset for the reasons just given, and also because he tried to merge the Maxwell Heaviside (MH) equations with his own, sadly incorrect, field equation. This attempt resulted in the Maxwell Einstein equations as they are known, but again these neglect torsion and are meaningless. In ECE theory the MH equations are written in a spacetime with

torsion and curvature, and themselves become equations of general relativity. In ECE theory dynamics, gravitation and electrodynamics are based on Cartan geometry, and are based on torsion. In retrospect it is obvious that Einstein neglected the key and central concept of torsion. Once reinstated the unification of physics becomes relatively easy with a little bit of imagination. It is also easy to see why the initial fogmatic reactions to ECE were as they were - unification became maddeningly obvious to those tied up in strings and allergic to Ockham's Razor. Although Einstein himself had suggested photon mass in about 1905 or 1906, his twentieth century successors became bogged and befogged by the idea of the photon as a particle having no mass. This led to all kinds of difficulties that were so severe that any sensible scholar would have abandoned the theory, and would have gotten by without the funding for the sake of dignity and self respect. One of these ghastly fogmatic failures was the assertion that electromagnetic radiation in the vacuum could only have transverse polarizations, defying the existence of the third dimension for the sake of gauge invariance. Mass was supposed to have been given to elementary particles by a magical process based on what was known incorrectly as the Higgs boson. In truth it was devised by others as well as Higgs, but was in any case a failure. This year CERN has at last admitted that it does not exist, leaving us all a lot poorer, not intellectually, but in terms of extracted taxation.

In Schwarzschild's letter of December 1915 to Einstein, the former proposed a line element solution to the field equation proposed in that year by Einstein. This solution is not that commonly called the Schwarzschild metric, and in the same letter, Schwarzschild heavily criticised the perihelion calculation by Einstein. Unfortunately Schwarzschild died only a few months later, in 1916. Einstein was never able to refute the criticism by Schwarzschild, and published only one short note thereafter on perihelion precession. He never returned to the subject after that. This does not give an objective scholar much confidence in the subject of general relativity without torsion. Historical scholarship alone is enough therefore to show that neither Einstein nor Schwarzschild correctly predicted the precession of the perihelion of Mercury. The great disservice done to science resides in the endless repetition of the contrary claim that they did. Schwarzschild did not infer the line element solution commonly attributed to him. All that has to be done to confirm this is to read the two papers actually published by Schwarzschild on the subject, in 1916, and to read the English translation on the web of his December 1915 letter to Einstein.

The impression given of the years 1915 onwards to the early twenties is also negative in a historical context. It is not clear why the original solution by Schwarzschild of December 1915 was changed, and why the changed solution was attributed falsely to him. The changed solution contains a singularity at the origin and is not a well behaved mathematical function for this reason. It seems to have been chosen in order to force the Einstein theory to reduce to the Newton theory. That procedure is not objective science, which compares theory with experimental data, not with another theory. The experiment by Eddington and colleagues carried out on May 29th 1919 was based on two papers by Einstein. One of these was published in Annalen der Physik 35, 898 - 908 (1911), and the other in Proceedings of the Royal Prussian Academy of 1915(2), pages 831 - 839. This is also the paper in which the incorrect perihelion precession calculation was given. So Schwarzschild's criticism hold also for the light deflection calculation of Einstein, which was also incorrect. In UFT150 of the unified field theory series on www.aias.us the incorrectness of the light deflection calculation was shown in several ways. In UFT194 the basis for the Einstein theory was refuted conclusively in a simple way, using algebra checked by computer. In the 1911 paper Einstein produced a result for light deflection which was half that produced in the 1915 paper. Neither of these papers was refereed. In 1919 Eddington did not have the precision to test the claims by Einstein, and unfortunately a given data set was chosen which happened to

coincide with the 1915 prediction. It is now possible to measure the light deflection accurately, but it cannot be due to Einstein's incorrect theory.

Shortly after the Eddington experiment had subjectively favoured Einstein by choice of data set, Cartan and colleagues inferred spacetime torsion and showed that the geometry used by Einstein is incorrect because of its incorrect omission of torsion. Einstein was made aware of this by Cartan as discussed already, but the false impression given by the Eddington experiment meant that his curvature theory was adopted uncritically. For many years general relativity remained a relatively obscure part of physics until it was somewhat artificially elevated into cosmology by the big bang theory.