CHAPTER 1

Nature's Coded Messages

Introduction

The processes by which Nature creates the fundamental particles which combine to form atomic matter and so our whole universe determine certain numerical factors which are precisely the same whenever and wherever measured. These are known as the fundamental dimensionless constants. They are merely numbers but yet those numbers are encoded expressions which tell us that Mother Nature has, for some special reason, determined a definite relationship between certain physical quantities.

There are three such numbers that, collectively, can reveal to us the secrets of Creation, if only we can discover their physical formulation.

One is the numerical factor which relates the mass of the proton to that of the electron, an important ratio, given that the partnership of these two fundamental particles constitutes the hydrogen atom. This is the primary atomic element from which all matter evolves. The numerical factor here is 1836.152.

Another, equally important numerical factor, is that having the measured value of 137.0359. This relates the speed of light c in vacuo with the electric charge e of the electron and Planck's constant h. Planck's constant is the factor by which the frequency of an electromagnetic wave is determined as a function of the energy quanta involved. That number 137.0359 is Nature's message which says:

"Decipher me and you will understand what governs the phenomena of quantum physics as evidenced by matter at the sub-atomic level."

Thirdly, there is the numerical quantity that relates the constant of gravitation G and the charge to mass ratio, e/m_e, of the electron. Unlike the first two numbers, this does not appear in the tables of physical constants. It is not one that is measured directly, but has to be inferred from separate measurements of G as the force of attraction between two bodies of known mass, and e/m_e as by measurements using a cathode ray tube. One simply cannot hope to fathom the mysteries of Creation without an understanding of the physical processes that govern the value of G. The measurement data applicable to G and e/m_e depend upon the units physicists have chosen to use.

Concerning units, it is intended in this work, to use the system of units that prevailed during the period in history when our knowledge of physics at the fundamental level expanded by the discovery of the electron. This system, the cgs system, regards the force between two unit electric charges separated in vacuo at unit distance as being itself unity, whereas the practical system of units as used in modern physics complicates the force formulation by ascribing properties to the vacuum medium itself, properties which need expression in their own units. To use the practical system of units for the purpose of this work would over-complicate the mathematical equations and add unnecessary complexity to the project at hand, that of understanding the creative forces at work in our universe.

So, to summarize, the task ahead is to examine the factors which govern the physical actions that determine the three numerical quantities introduced above. Our object is simply to unravel, so far as we can, the secrets of Creation and, at the very least, decipher the three numbers introduced above, by which is meant the discovery of the mathematical formulae which they signify as relations between the physical quantities involved.

Historical Foundations

An appropriate starting point is provided by Newton's Law of Gravitation as seen in the context of Coulomb's Law concerning the force acting between two electric charges. Although Isaac Newton established that gravitation was governed by an inverse-square-of-distance law of force which implied the constant of gravitation G, it was not until a century later in 1797/8 that Henry Cavendish, using a delicate torsion balance for measuring the attraction of two small bodies, could quantify its value.

Joseph Priestley in 1767 proposed that the electric force acting between two charged objects was also subject to an inverse-square-of-distance law. Having been advised by his friend Benjamin Franklin that when a small charged body is placed anywhere inside a hollow charged conducting sphere, no electric force is exerted on that body, Priestley recalled that Newton had shown mathematically that the gravitational force attributable to the mass of a hollow spherical shell is zero everywhere inside that shell. This is only true if the gravitational force is inversely proportional to the square of the distance between the two interacting bodies. Therefore, Priestley reasoned that the electric interaction force must itself be of the inverse-square-of-distance form.

In 1750 an Englishman Michell had devised an instrument in which the known torsion of a thread balances an unknown force acting at the ends of a bar magnet and had used this to show that an inverse square law acts between magnetic poles. Coulomb reinvented the torsion balance and with it, in 1785, verified the law for both magnetic pole interaction and electric charge interaction.

So we see that, by the end of the 18th century, physicists were able to formulate the magnitude of the force acting between bodies as a function of their mass, their electric charge and, indeed, their magnetic pole strength, but, still two centuries later, there remains the need to decipher the messages implied by those measured quantities to understand how Nature determines their values.

In this pursuit we should find inspiration in the account above by which Priestley deduced that the electric force had to be of the inverse square form. The mathematics involved is of the kind we shall be using in this work as we explore the same force laws to probe the mysteries of Creation and this will include an account of the small but very significant modifications affecting the law of gravitation to cater for the planetary perihelion anomaly. This is a question of how energy travels between interacting bodies when their separation distance is changing.

Just as Newton was able to prove mathematically that there is no gravitational force acting on a body within a spherical shell of uniform mass density per unit area of the spherical surface, so we shall prove, on the same assumption, that the interaction component of the field energy of two electric charges separated by a distance R sums to zero within a sphere of radius R centred on either charge [See Appendix I]. It is analysis of this kind that can point to the connecting links between electric, magnetic and gravitational laws of force and provide the elements of a unified theory by which to comprehend how Nature regulates the values of those dimensionless constants already mentioned.

As to the historical picture, take note that the electron did not present itself as something whose electric charge and mass could be measured until another hundred years or so had passed. J. J. Thomson in 1897 made progress in his cathode ray tube measurements by which the charge to mass ratio of the electron was measured and by 1911 Millikan, by his falling-drop technique of measurement had discovered how we can measure electron charge and so separate it from the mass of the electron.

Early in the 20th century, therefore, and especially after the introduction of wave mechanical theory with the advent of the photon, physicists had all that was needed to decipher Nature's messages, the subject of this work. Yet, the task has, it seems, been left to this author, whose interest was aroused when engaged on

Ph.D. research in 1950-3 on the subject of anomalous energy losses found in electrical steels when reacting to oscillating magnetization. The reaction phenomena associated with magnetization of electrical conductors has an analogy with the reaction which must of necessity exist when a magnetic field acts across space devoid of matter. It was the study of that reaction that opened the door leading to the pathways we are to explore in this work.

So how shall we proceed? Well, it seems appropriate to present at the outset a glimpse of what lies on the far horizon, the answers to our deciphering exercise. Hopefully, this will allow the reader to anticipate some on the onward steps as the theory develops and so share some of the excitement which this task arouses. There is, however, one preliminary historical feature that must be presented first. This concerns the 'Thomson electron'.

The Thomson Electron

There has to be a starting point from which one can build a picture of the electrical structure of the space medium and matter which sits in that medium. The electron is the embodiment of the unit of electric charge in physical theory. It is the appropriate foundation for our exploration of the electrical properties of the medium that pervades all space, it being well established that the vacuum medium has properties by which it can store electrical energy.

The reader well versed in modern physics will now wonder how one can possibly justify the need to refer to this space medium in terms which seek to revive what amounts to the old-fashioned notion of the aether. After all, every physicist today is indoctrinated in the belief that space is a four-dimensional medium referred to as 'space-time' and subject to the relativistic principles which Albert Einstein introduced between 1905 and 1916. $E=Mc^2$ is taken as a sufficient testimonial in proof of Einstein's theory and no one can

argue with the experimental evidence which gave birth to the atomic bomb.

Indeed, quoting from p. 287 of *'Science since 1500'* by H. T. Pledge, a 1939 Ministry of Education publication then available from the U.K. Stationery Office:

> "With Einstein's work, the old substantial aether vanished from higher physics. In spite of the internal difficulties which had dogged it, it was long mourned by the older school of physicists, who found the reasoning of Einstein perilous - and hard to follow."

Well, it is this author's submission that it is due time for the younger physicists of today to visit the graveyard where the aether was put to rest and consider its reincarnation. That visit takes us back to the year 1904, one year before Einstein launched his theory. In that year 1904 a book entitled *'The Recent Development of Physical Science'* was published in its second edition. Its author was W. C. D. Whetham, a Fellow of Trinity College, Cambridge and so a close associate of J. J. Thomson, the discoverer of the electron, who had entered Trinity College in 1876 at the age of 20 and who remained there for another sixty-four years, becoming Master of Trinity College from 1919 to his death in 1940.

In now quoting a section of text from that 1904 book, one can see that it gives basis for one to wonder why our modern generation is so impressed by Einstein's $E=Mc^2$ contribution. This is a quotation from pages 283-284 of Whetham's book, which include the table below:

> "The property of mass, the most fundamental property of matter for dynamical science, is explained by the electron theory as an effect of electricity in motion. Forasmuch as a moving charge carries its lines of electric force with it, it possesses something analogous

to inertia in virtue of its motion. The quantitative value of this effect has been calculated by Thomson, Heaviside and Searle. Definite experimental evidence has been given by Kaufmann, who finds that the ratio e/m of the charge to mass of the corpuscles ejected by radium diminishes as their velocity increases. The charge is almost certainly constant, and thus the mass must increase with velocity. Theory shows that, for a slowly moving corpuscle, the electric inertia outside a small sphere of radius *a*, surrounding the electrified particle, does not depend upon the velocity, and is measured by $2e^2/3a$ where e is the electric charge on the particle. But when the velocity of light is approached, the electric mass grows very rapidly; and, on the assumption that the whole of the mass is electrical, Thomson has calculated the ratio of the mass of the corpuscle moving with different speeds to the mass of a slowly moving corpuscle, and compared with the results of Kaufmann's experiments.

In this remarkable manner has it been possible to obtain experimental confirmation of the theory that mass is an electrical phenomenon."

velocity in cm/s	calculated mass ratio	observed mass ratio
2.36×10^{10}	1.65	1.5
2.48×10^{10}	1.83	1.66
2.59×10^{10}	2.04	2.0
2.72×10^{10}	2.43	2.42
2.85×10^{10}	3.09	3.1

That is a commentary on the state of knowledge of the electron in the year 1904 but that knowledge seems not to have been heeded by future generations of physicists. Today, if you refer to the tables of physical constants, you will find that the electron radius is not formulated according to the above formula, but rather as something that is 50% greater, a notional parameter that has no physical meaning as justified by theory that explains why the radius expressed in relation to mass, electric charge and the speed of light should have that particular value.

However, that energy quantity $2e^2/3a$ is the true measure of the electric energy of an electron of radius a and students of physics should see it as important and know how to derive this formula themselves. Just assume that the charge e is confined within a sphere of radius a. Take note that the speed of light c is also the ratio of electrostatic to electromagnetic units in the cgs system. Then assume the charge is moving in a straight line at velocity v so that it defines a current circuit element of strength ev/c and formulate the strength of the magnetic field produced by that circuit element at points distant from the charge. From that work out the magnetic field energy density at such a point and then integrate that energy over all space external to that charge sphere. You will obtain the formula $(ev/c)^2/3a$. Now equate that to kinetic energy $mv^2/2$ and the result will be that mc^2 is $2e^2/3a$.

This was, no doubt, the manner in which this result was obtained in that 1904 report, but there is another quite simple derivation that has more merit. Take note that the electric energy of a sphere of charge e and radius a, having all of its charge at the surface of that sphere, as if it were of conductive material, is $e^2/2a$, but if we do not make that assumption and simply declare that the charge e is actually distributed within that sphere of radius a so as to have uniform electric energy density or pressure inside that sphere that equals the energy density just outside the boundary radius a, then it is easily proved that the component of electric energy inside

the sphere is $e^2/6a$. Add that to the energy outside the radius a and one obtains $2e^2/3a$.

This is surely the energy of the electron that accounts for its inertial property. It is the formula referred to in this work by reference to the 'Thomson electron'. It is equal to the mass of the electron as multiplied by the square of the speed of light, as you have just seen, and yet physicists see $E=Mc^2$ as something we owe to Albert Einstein's theory of relativity that came along after 1904.

As to the so-called 'relativistic mass increase' that one also attributes to Einstein's philosophy, was this not explained in that 1904 text in deriving the data for that table presented above? The gain in energy with speed adds inertial mass and, if whoever computed that data did not use the formula $E=Mc^2$, it becomes an interesting exercise to discover how, given the measured electron speeds, the increase of mass factor could have been calculated.

The known speed of light in 1904 was much the same as it is today, very nearly $3x10^{10}$ cm/s, and using the formula for mass increase that one derives from electron theory, the same as that later obtained by Einstein's methods, one sees, using this speed of light value, that an observed mass increase by the factor 3.1 corresponds to an electron speed of $2.84x10^{10}$ cm/s. The difference between this and $2.85x10^{10}$ cm/s as listed in the above table is only marginal and probably attributable to approximations in the calculation.

In any event, the point made here is that the Thomson electron formula can be relied upon in our onward theoretical investigation. It is, however, noted that the formal derivation of $E=Mc^2$ as an expression relating the electrical energy E of a charge with its inertial mass M is possible, as this author has shown. See discussion in Appendix II. One has merely to accept that the charge, when subjected to acceleration by an electric field, will move in just such a way as to conserve its intrinsic electric field energy from being radiated.

Based on the physics of 1904, with its aether, we can now confront those messages that pertain to Creation and we do so by using the Thomson electron formula in a quite fascinating way, as will emerge in chapter 4 when we show how the proton is created.

Concerning a Theorem and the Aether

19th century physicists went adrift by assuming that the aether had certain properties, notably that of providing a universal and absolute frame of reference for the constant speed of light in vacuo. They should, instead, have studied the aether with an open mind, allowing its properties to be revealed by their experiments. First and foremost is the fact that the aether can and does store energy, electrical energy, and so it must have an electrical composition.

19th century physicists were obsessed by its properties as a medium in which electromagnetic waves propagated. They were baffled because it seemed, in one sense, to exhibit the properties of a solid medium and, in another sense, the properties of a fluid. Considered as an electrical system having structure as if it comprises electric particles formed into a kind of crystal pattern, the problem was one of stability, as was pointed out by Samuel Earnshaw, a Cambridge scientist, by presenting his famous mathematical theorem. In 1839 he read a paper before the Cambridge Philosophical Society, which was later published in their *Transactions* at pp. 97-114 of volume 7 of 1842. That paper was entitled: *'On the Nature of the Molecular Forces which regulate the Constitution of the Luminiferous Ether'*. Quoting from that paper one reads:

> "It is therefore certain that the medium in which luminiferous waves are transmitted to our eyes is not constituted of such particles (acted upon by purely inverse-square forces). The coincidence of numerical results, derived from a medium of such particles, with experiment, only shows that numerical results are no

certain test of a theory, when limited to a few cases only."

So, at the very outset of the project undertaken in this work, one has it on the authority of an eminent scientist, speaking some 164 years ago, that an aether constituted by electric particles conforming with the inverse-square-of-distance force law is an impossibility on mathematical grounds, whatever our number deciphering exercise might prove.

Earnshaw's Theorem was a basis for rejection of early attempts by this author to secure publication in the mainstream science publications and, indeed, this was how the author first came to know that there was such a theorem.

Why then are we proceeding with our quest? Well, there was something about this author's perception of the aether that made that theorem helpful rather than obstructive. Earnshaw had overstated his case. If the medium contains electric charges of like polarity governed by the inverse-square law then they can arrange themselves in a stable configuration, provided they are immersed in a uniform continuum of charge of opposite polarity. Conversely, one might say, if the evidence supports an aether having a structured form composed of electric charges governed by the inverse-square law, then, with certainty, that aether must incorporate a background continuum of electric charge which envelops those charges.

So, you see, dating from 1839, physicists seeking to understand the aether were wandering in the dark as they confronted problems of this kind and confronted an aether that had to exhibit the properties of both a fluid and a solid. The fluid crystal of modern physics with its state dependent upon electric field excitation had not been discovered and, almost as soon as the electron had been discovered and its charge and mass measured, Einstein came onto the scene and gone was all hope of salvaging the aether from the wreckage.

This author, however, having committed so much effort into the project of understanding the aether, aether of a form that overcame Earnshaw's theorem, could but soldier on without support from the physics community. By 1966 the author had published two works based on aether theory, both entitled *'The Theory of Gravitation'*, the first, dating from 1960, being only 48 pages in length and the second, dating from 1966, being an enlarged 170 page second edition.

Coincidentally, in that year 1966, as the author discovered later, a book by an author named W.T. Scott appeared with the title: *'The Physics of Electricity and Magnetism'*, published by Wiley, and this included a commentary on Earnshaw's theorem. It is relevant to mention it because Scott had also seen where the theorem fails. A passage in his book reads:

> "In a region of continuous charge distribution, a maximum or minimum could exist, but a continuous distribution is an idealization. We have to consider each electron or proton as an isolated charge, so that pure electrostatic equilibrium is impossible."

Earnshaw's theorem sought to prove stability by showing how a differential equation could have a maximum or minimum but the analysis denied that possibility for the interaction of discrete electrical charges immersed in a true void. Scott had seen what this author had seen, namely that the presence of a uniformly charged background could provide that stability. However, Scott says that involves 'an idealization'. One may answer that by saying that the aether could well be an idealization, meaning a physical medium of such ideal and simplified form that it has rather special properties not shared by matter. One may also say, given the evidence to be presented in this work, that the aether has to have that uniform background continuum of charge as a kind of sea in which the other

charged particle forms are immersed and in which a stable array of such charges can exist.

This brings us to the stage where we can begin to introduce the formulae which emerge from the deciphering of what is implied by those numerical constants and so we move on to chapter 2 and begin by exploring the factors that determine the force of gravity.