EDITORIAL COMMENTS

The second in the series of invited articles is written by Dr. Tom Barnes to explain why he prefers his classical models to many of the constructs of modern physics. Dr. Barnes desires to restore causality to physics and replace probability and certain aspects of relativity. This non-mathematical paper should help some of our members who have struggled with Dr. Barnes' equations in the past.

Dr. E. Norbert Smith details the research potential at the Creation Research Society Grasslands Experiment Station. Work is continuing on plant succession studies since the availability of *original* grasslands as a base for research activities presents a unique opportunity.

The so-called ice ages seem to fascinate both laymen and professional scientists alike. Michael Oard submits a meticulous study on a uniformitarian concept of the ice ages and the evidence used in an attempt to verify the model. This detailed examination is serialized in three parts and later sections will appear in subsequent Quarterlies.

Another article to appear in parts is the biography of a Dutch creationist biologist, Duyvene De Wit. Dr. Magnus Verbaugge has collected Dr. De Wit's correspondence with Dr. George Howe and revealed some of the persecution a creationist suffered at the hands of his colleagues.

A speculative article on asteroidal impacts by David Unfred is presented in which the author appeals for a place in the creation model of science for such activity. Often these discussions can quickly leave the area of science and open the door for endless epochs of multiple catastrophism which can but confuse and muddle more reasonable approaches to catastrophism. As an antidote to Velikovskyism, the editor suggests reading a past Quarterly article.

Hanson, James N. 1978. Against catastrophic rationalism: gravitational attitude deflections of the Earth's axis, *Creation Research Society Quarterly*, 15:55-68, 72.

A special feature to appear in this and many future Quarterlies is the listing of various wrong-order geologic formations compiled by Dr. Walter E. Lammerts. These presumed overthrusts offer excellent library and field research opportunities for qualified creationists.

Dr. Jerry Bergman's in-depth book review reveals a very serious limitation of scientific activity, i.e., the human nature of scientists. This review should be required reading for anyone who worships science and scientists.

The editor earnestly hopes you will profit from many of the articles in this issue. Your constructive comments are always welcome.

Emmett L. Williams

INVITED PAPER

A UNIFIED THEORY OF PHYSICS

THOMAS G. BARNES

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Abstract

Einstein's primary aim in physics was to develop a unified field theory. It is now eighty years since Einstein introduced relativity. Modern physics still has no unified field theory. This paper shows problems with relativity and quantum theory. It proposes novel adaptations of classical physics as a means of achieving a unification of physics. The four basic types of forces in modern physics are reduced to only one kind of force, the electromagnetic force.

Problems with Einstein's Relativity

Einstein's relativity was not accepted by a number of his contemporaries. Ernest Rutherford, the father of nuclear physics, considered it to be nonsense.[1] Columbia University astronomer Charles Lane Poor, in his 1922 book *Gravity Versus Relativity*[2] and in his 1930 *Journal of the Optical Society of America* article,[3] gave a devastating refutation of the claims of Sir Arthur Stanley Eddington, that observations of the 1919 solar eclipse confirmed Einstein's predicted gravitational attraction of light. It was this "proof" espoused by Eddington that brought Einstein his first acclaim and greatest fame. Poor showed clearly that the actual observations were not what was claimed and that they did not support Einstein's prediction. This is still a strong refutation of Einstein's presumed gravitational attraction of light. It means an unanswered challenge to Einstein's general theory of relativity and his theory of gravitation. As a side issue this relegates the concept of black holes to mere fiction.

In more recent times there have been a growing number of scientists who reject Einstein's relativity. One of the most noted was the late Herbert Dingle, FRS, a former President of the Royal Astronomical Society, author of two books on relativity, and author of two *Encyclopaedia Britannica* articles on Einstein's relativity. At first he subscribed to Einstein's relativity, but later came to realize that it had serious contradictions within the theory itself. The scientific "establishment" was incensed that a man of Dingle's reputation and knowledge of relativity would challenge the credibility of relativity. His articles were then systematically rejected by the leading journals. Dingle did not give up. He challenged the top scientists, in personal

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correspondence, to answer his case against relativity. Their evasiveness and failure to meet Dingle's challenge is a sad story in the history of science. Dingle documents all of this in his book, *Science At the Crossroads.*[4] This one book is sufficient to refute the whole gamut of Einstein's relativity, both the theory and the presumed observational and experimental evidences for it.

Dr. L. Essen, the world's leading scientist on time measurements and inventor of the atomic clock, rejects Einstein's relativity. He has written a book and numerous articles that expose serious errors in relativity. One article was published in the *Creation Research Society Quarterly.*[5] This article is very important in that it refutes the claim that atomic clocks flown around the world confirmed Einstein's predicted shortening of time with motion.

The well-known British scientist G. Burniston Brown has written some of the clearest refutations of relativity. His article: "What is Wrong With Relativity?"[6] is a masterpiece. He has also written a recent book that presents a classical alternative to certain areas of relativity.[7] In another publication[8] Brown states that:

> Practicing physicists and astronomers who know some history of science do not accept 'Relativity' and even a distinguished theoretician, Leon Brillouin is calling, in his book, *Relativity Re-Examined*, for a 'Painful and complete re-appraisal' which 'is now absolutely necessary.'

Rejection of Quantum Concept of Light

The particle concept of light is a quantum concept called the *photon.* Its value of energy, its quantum of energy, is given by the expression $h\nu$ where h is Planck's constant, a very small number, and ν is the frequency associated with the photon. Einstein received the Nobel prize for this particle concept of light. He assumed that a single particle of light, the quantum of light, is the source of energy that ejects an electron in the photoelectric effect. Einstein is given credit for this as an original step in the development of quantum theory. However, Einstein rejected the modern formulation of quantum theory, objecting to its dependence upon probability and chance, as noted in his famous statement: "I do not believe God Almighty throws dice!"

The three following scientists have all rejected the photon of light concept and have pointed out overwhelming experimental and theoretical arguments against it: Henri Poincaré, Herbert Ives, and H. A. Lorentz. Ives, a Bell Telephone Laboratories scientist, presented an excellent and very comprehensive case against the photon of light in his 1951 Rumford Medal lecture.[9] Incidentally, he has also done some outstanding experimental and theoretical work that refutes Einstein's special theory of relativity.[10]

Ives cites standing waves experiments in optics in refuting the particle concept of light. A standing wave pattern is formed by constructive and destructive interference between waves traveling in opposite directions. To have a standing wave pattern there must be *coherence.* Ordinary light is *incoherent.* Light radiated from different atoms is not in phase, not coherent. Experiments in optics indicate that coherence, once achieved, can persist over distances of at least one *each atom* must be more than a meter long. Each wave train has coherence over the entire coming-and-meter. This means that the *train of waves emitted by* going distance involved in standing waves. A light particle can not be going and coming at the same time. Standing waves can not be produced by light quanta.

The following series of quotes are taken from Ives' famous 1951 Rumford Medal lecture.[11] They illustrate not only the strength of Ives' position against the quantum of light but also that of H. A. Lorentz and Henri Poincaré. Ives gives this quote from a 1910 address by H. A. Lorentz:

> Nevertheless the speaker (Lorentz) holds the hypothesis of light quanta to be impossible, if the quanta are regarded as wholly incoherent, an assumption which is most natural and which is also made by Planck. . . . Lummer and Gehrke have observed interference at a phase difference of two million wavelengths; for yellow light, that corresponds to a length of one meter. If each quantum by itself should be capable of giving sharp interference, then it must also extend over that length in the direction of propagation. But, the lateral area of the quantum must also be considerable, which follows from the diffraction theory of optical instruments. Should a light quantum cover only one square centimeter of area, then it would be obviously senseless to fabricate large telescope objectives. . . .

In his photoelectric emission experiments Ives obtained the same photoelectric equation as Einstein's equation, including the energy quantity $h\nu$, but he associates that with the molecule on which light impinges, not with a single particle of light coming into the molecule. Ives states:

> To this expression of dissent is to be added that of Henri Poincare, who in his only published reference to Einstein remarks that while Einstein would put the quantum in the incident light, he, Poincare, would place it in the molecule and he speaks elsewhere of finding the "vestibule' by which the molecule admits or releases energy in quanta.

Ives endorses that position and contends that wave theory puts $h\nu$ "in the *atom* and not in *radiation.*"

Quantum theory considers light to have a dual nature, a particle nature (photon) and a wave nature. This Dr. Jekyll and Mr. Hyde relationship is supposed to be justified by Heisenberg's indeterminacy principle. One property is presumed to dominate under certain conditions, the other property to dominate under other conditions. The wave nature is supposed to dominate during *propagation* of light. The particle nature is supposed to dominate during the *interaction* of light with matter.

Ives' research on photoelectric emission, resulting from two planes of polarized standing waves, provides strong evidence against the photon concept. This is all the more important because Einstein had cited photoelectric emission as support for the photon. Ives states that this:

> experiment showed how minutely the photoelectric emission followed the predictions made from the wave nature of light.

Ives considers the dual nature concept of light to be untenable:

> Refuge has been taken from this unsatisfactory state of affairs by using wave description for some phenomena and photon description for others, and

it is claimed that the two types of phenomena are never met in the same experiment. I submit that the last experiment . . . certainly comes very close to showing both types of phenomena in conjunction. Electrons are emitted with energy $h\nu$, but they follow minutely the orders of the standing wave patterns.

He states that it is:

extremely difficult, if not impossible, to retain the idea of light as consisting of discrete photons.

The significance of these experiments, which I wish to impress upon you, is that it is the *optical* properties of the material, and the optical conditions of the region in which the phenomena occur, which explain these outstanding effects. I stress this because other attempts at explanation which have been made from quantum mechanical considerations, have almost uniformly neglected or ignored the optical factors. These instead of being secondary or negligible, really dominate.

Back to the Classical Physics Approach

There is no question but that there is a need for better foundations for modern physics and cosmology. Vannevar Bush is reputed to have said:

It is difficult to see how we can produce fundamental thinkers when our teachers cannot detect the fallacies in Einstein's theories, paradoxes and postulates, but instead rush to climb aboard the Einstein bandwagon where further straight thinking becomes impossible.[12]

This paper gives an overview of the author's efforts to develop new foundations by the aid of novel adaptations of old principles. It picks up the trail of physics where it had reached its classical peak, just before going "modern." It retains the philosophical view of classical physics, that there is a physical cause for every physical effect.

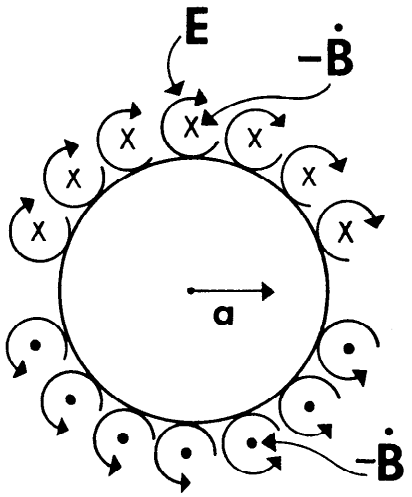
This is not a new venture for the author. He has, for years, been developing classical alternatives to various facets of relativity and quantum theory. Much of that has been published in technical papers in the *Creation Research Society Quarterly*.[13-19] His new book, *Physics of the Future—A Classical Unification of Physics*,[20] makes use of those papers and adds some new developments. Progress has been made in the effort to reduce all of the forces of physics to nothing more than electric and magnetic forces, a unified theory of physics.

Electric Theory of Intertial Mass

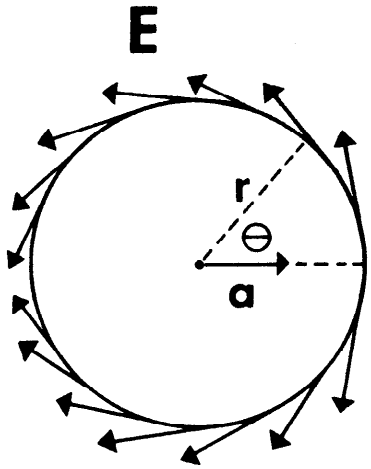
Newton's *third law* refers to an interesting physical phenomenon, to which there is no known exception: *For every action there is an equal and opposite reaction. Action* is the force applied to a body by some external source. *Reaction* is the force the body exerts back against the source. This reaction force is also called the *inertial* reaction, because *inertia* is that property of a body that reacts against being accelerated. If one should kick a brick with his bare toe he would be painfully aware of the brick's inertia. *The quantitative measure of inertia is mass.* Mass may be computed from this form of the equation for Newton's second law: F = ma, where F is force, m is mass, and a is acceleration. Knowing the force and the acceleration, one can compute the mass.

There is a law in electricity and magnetism which describes a somewhat similar reaction force, *Lenz's law*. If a copper ring is pushed over the *end* of a bar magnet, an electric current is induced in the ring. A *magnetic* reaction force acts backwards on the ring. That magnetic force is precisely equal to the action force when the ring is moving with *constant velocity*. If the ring is *accelerated* the action and reaction forces are equal, but the reaction force is the sum of this magnetic reaction and the conventional inertial reaction. This leads one to wonder whether or not the conventional inertial reaction force is also some kind of electric or magnetic force. The answer seems to be yes!

Using nothing more than classical electric and magnetic theory, the author derived the electric reaction force acting backwards on an accelerated classical electron.[21] When that force is divided by the acceleration, it yields the precise value of the mass of the elec-



a. Directional sense of curl E induced by changing magnetic field during charge acceleration. E — electric intensity B — magnetic induction a — acceleration of charge.



b. Resulting electric field, E, acting backwards on the charge during acceleration. r — radius θ — angle between acceleration and radius vectors.

Figure 1.

tron, as one would expect from Newton's second law. The electromagnetic mechanism for this Newtonian reaction force is illustrated in Figure 1. Those familiar with Maxwell's equations will recognize in Figure 1a the induced "curling" electric field **E** generated by the changing magnetic field **B**, as the electron is accelerated. Figure 1b shows the direction of that induced electric field acting on the various locations of the charge (a surface charge). The vector summation (integration) of the elementary electric field forces over the whole charge yields the total reaction force on the electron. The resulting expression for the mass of the electron is

$$m = \frac{\mu q^2}{6\pi r} \qquad (1)$$

where q is the electric charge in coulombs, μ is the magnetic permeability, and r is the radius of the electron, and the mass is in kilograms.

Here one has not only an electric equation for mass but also a physical explanation of Newton's third law for this case.

The author has not carried out this type of physical derivation to include the increase in inertial mass with speeds approaching the speed of light. However, he was co-author in a previous paper that did derive, without relativity, the same equation as the conventional relativistic equation for mass with velocity up to the speed of light.[22] In that paper the emphasis was on energy. The author now chooses to put the emphasis on the inertial property of mass, showing that a distinction can be made between mass and energy.

Equation (1) works for a positive charge as well as a negative charge. It is also the electric equation for the inertial mass of a *proton*. The proton has the same value of charge but has 1,836 times as much mass as the electron. In view of Equation (1) the proton must have a 1,836 times smaller radius. This makes physical sense. The electric field and induced electric reaction force will certainly be that much stronger on this smaller sphere of equal charge.

In a previous paper an *electric* model of the neutron was proposed.[23] The neutron consists of an electron and a proton. All bodies are electrical in nature. That makes it possible to explain the inertial reaction force and associated inertial mass of all bodies as an electric property.

Electric Theory of Gravitation

A distinction is made between inertial mass and gravitational mass. Inertial mass is associated with Newton's second law. Gravitational mass is associated with Newton's universal law of gravitation. It requires different kinds of experiments to measure inertial mass and gravitational mass. But no one has been able to show any difference in the values of gravitational and inertial mass, so we ordinarily use them interchangeably, and make no distinction between them. An electric expression for gravitational mass has been deduced from postulates that relate to Newton's universal law of gravitation.[24] This enables one to explain the force of gravity as an electric force, an important step in the unification of physics and in making a distinction between mass and energy.

The electric force, the Coulomb law force, between electrons and protons is vastly larger than the gravitational force between them. So the gravitational force, if it is an electric force, must be due to some very small alteration in the Coulomb force not previously included in electric theory. In the new theory, the Coulomb force on an electron or proton is altered to add an additional minute attraction due to an *overloading effect*, somewhat similar to a well-known overloading effect in electronics. Arnold Sommerfeld once suggested that a correction might be needed in electric theory in the immediate neighborhood of the electron "in such manner as the theory of dilute solutions in thermochemistry."[25] We postulate overloading when the force on one elementary charge is due to a like elementary charge. For example, there is overloading when the force on an electron is due to another electron. That overloading slightly diminishes the repulsion force. This is equivalent to adding a slight attraction force.

The overloading is assumed to be proportional to the electric field strength at the surface of the electron or proton. That makes the gravitational force greater on the proton than the electron, as one would expect. One should refer to the original paper for more details. This theory yields an electric force that is equivalent to Newton's gravitational force on electrons and protons. An extension of the electric theory of gravitation to all bodies is proposed by the assumption that all bodies consist of protons and electrons.

From this electric theory of gravitation one can deduce an electric equation for gravitational mass. This equation is somewhat more complicated than Equation (1), which is for inertial mass, but both yield the same value of mass. Both types of mass are expressed in terms of electric charge. The important point is *there can be no mass, inertial or gravitational, where there is no electric charge*. Light does not contain electric charge. Contrary to the claims of modern physics, light has no mass. Gravity does not exert an attraction force on light. This conclusion is in accord with Charles Poor's findings. He concluded on the basis of his analysis of solar eclipse observations that gravity does not attract light, does not bend light rays, as has been claimed for years.[26]

Electromagnetic Hydrogen Atom Model

The Bohr model of the hydrogen atom has four serious defects, from the point of view of classical physics: 1) There can be no stable (ground) state in the Bohr atom. An orbital electron would *radiate* energy, gradually getting closer and closer to the proton until the atom dies. 2) There is no physical reason for the electron to "choose" the Bohr orbit even if it did not radiate. 3) Bohr provides no magnetic means of preventing an electron from falling straight into the proton, if the electron starts its fall from rest. 4) There is no vibratory mechanism for generating the Bohr spectral frequencies even if an electron did fall from one Bohr orbit to a lower one.

A new classical electromagnetic model of the hydrogen atom has been proposed.[27] One aim is to eliminate all of the classical defects which Bohr had in his model. The atom consists of a spinning proton and a distorted electron ring in circulatory motion as shown in Figure 2. The electron and proton are held apart by magnetic repulsion between these two electromagnets. The hydrogen spectral frequencies are generated by free vibrations of the high Q resonant modes in this electromagnetic system, once the atom has been excited by some input energy.

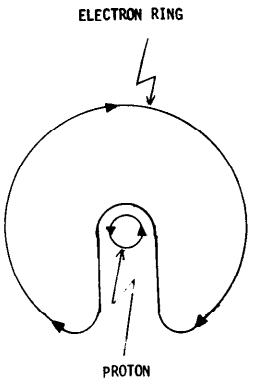


Figure 2. Model of the hydrogen atom.

The feasibility of this model of the hydrogen atom is made possible by several new developments. A new feedback theory of electrodynamics,[28] as opposed to relativistic electrodynamics, led to the realization that for certain cases where there is no feedback, speeds can exceed the speed of light. The limitation of the speed of an electron to the speed of light is due to a feedback force. The feedback occurs when there is a disturbance in the field as the electron moves by. A proton with a constant rate of spin, in the stable state of the atom, sets up no disturbance in the field and hence no feedback is generated. *The peripheral speed of the proton in this model is not subject to the speed of light constraint.*

If one takes the radius of the proton to be the classical radius, computed from Equation (1), and the published value of the magnetic moment, it can be shown that the peripheral speed of the proton will greatly exceed the speed of light.[29] What is more important, this excessive speed of the proton's charge generates a magnetic field stronger than ever before considered possible in an atom. It provides a magnetic repulsion force on the electron that is sufficient to yield the required balance between electric attraction and magnetic repulsion in the hydrogen atom.[30]

Classically there can be no radiation from this electron ring while it is in the ground state of the atom. In order to have radiation there must be a disturbance set up in the field. There is no disturbance set up in the field because the configuration of the electron does not change. The field does not "see" any net positional change in the charge. Whereas the point electron in the Bohr orbital motion continually changes its position, setting up disturbances in the field. That is the reason it would continually radiate energy in the presumed stable state of the Bohr atom. The aforementioned new feedback theory of electrodynamics included a deformable electron, in accordance with the forces acting on it. The source of the forces that deform a spherical electron into the ring electron will be considered in the next section, where another of the quantum theory postulates will be rejected.

Induced Spin in the Hydrogen Atom

The quantum theory of modern physics imposes a constraint on the spin of an electron or proton, requiring the spin of the electron and proton to have a fixed value. Nothing is supposed to be able to change the value of spin of the electron or the proton. On the basis of theoretical arguments by Lorentz and experimental results at the Argonne National Research Laboratory, this quantum constraint is rejected.[31] The laws that work so well in electrical engineering are assumed to hold for the proton and the electron.

The proton is assumed to have an intrinsic spin, but its value of spin is altered by electromagnetic induction when it is subjected to an external magnetic field. The electron is assumed to have no intrinsic spin. It gains all of its spin as a result of electromagnetic induction. As the electron falls in toward a proton to form the hydrogen atom, the magnetic field of the spinning proton induces a curling electric field which causes the electron to spin. The electron's resulting magnetic field causes additional spin in the proton. This mutual coupling process between the two provides a continuing build up of spin until their final magnetic strengths are reached. The final spins of the two are assumed to yield magnetic moments (strengths of the magnets) equal to those listed in the literature.

The centrifugal force on the spinning electron causes it to stretch out of its spherical form into an electron ring as it approaches the proton. The magnetic force on that part of the ring closest to the proton causes an inward bulge in the ring as shown in Figure 2. This reduces somewhat the net electric attraction of the electron to proton because parts of the electron ring are below the proton while other parts are above the proton. It also provides a closer magnetic coupling, with perhaps 25 percent of the proton's magnetic flux linking the electron ring. The size of this electron ring is approximately the same as that of the Bohr orbit. In other words, the size of this model of the hydrogen atom is about the same as that of the Bohr model.

Spectral Radiation

The "natural" tendency for the electron ring to move into its stable position (ground state) is due to the *perfect diamagnetic property* of the electron. A diamagnetic body (electron ring) tends to be magnetically repelled toward the weakest region of the external magnetic field (the proton's). The electric Coulomb force attracts the electron, but the electron's diamagnetism balances out that attraction and guides the ring into the stable position (Figure 2) about which it can have many vibratory modes.

There is a *transformer* analog of the hydrogen atom. The spinning proton and revolving ring are analogous to the primary and secondary currents in a transformer. The energy delivered to the atom, as the electron falls in to form the atom, is transformed into magnetic energy. That magnetic energy is stored in the primary and secondary inductances and the mutual inductance. From the known magnetic moments and the dimensions of the proton and electron ring, one can compute the induced currents and the distribution of energy in the primary, secondary, and mutual inductances to confirm the feasibility of this model.[32]

A crucial factor in this model is the coefficient of coupling, which is the fraction of the proton's magnetic flux that links the electron ring. The coefficient of coupling is a function of the effective separation of the electron from the proton, and the orientation and configuration of the electron ring. An assumed functional relation for this coupling in one of the simplest modes of vibration has been shown to yield a resonant vibra-

tion frequency in the Balmer spectral frequency range of the hydrogen atomic spectrum.[33]

This model of the hydrogen atom has an extremely high Q. It is a perfect radiator in the sense that it has no ohmic loss. This extreme efficiency assures sharp spectral lines and wave trains long enough to satisfy the phase coherence required in the optical standing wave experiments.

$$Q = \frac{2\pi \text{ energy stored}}{\text{energy lost per cycle}} \qquad (2)$$

The smaller the percentage of energy lost per cycle the more efficient the system, the higher its Q. A useful equation, $n = Q/2\pi$, tells the number of cycles, n, that a system will continue to oscillate before its oscillatory energy has been diminished to 1/eth (37%) of its original value. It is reasonable to assume that this model of the hydrogen atom may have efficiencies as high, or higher, than $Q = 2\pi \times 10^6$ for some of its vibrational modes. This would mean that there are more than one million wavelengths in the wave train emitted by one atom for that spectral frequency.

Much more work must be done before the exact configuration and dimensions are established and the various modes of vibration and precise spectral frequencies can be determined. Nevertheless this model appears to have much promise.

Summary

The innovations included in these new foundations for modern physics and cosmology include the following: 1) There is ordinary time and space, as opposed to relative time and space. There is neither a fourth dimension nor curved space. 2) Light is propagated in an "ether" medium that provides the mechanism for electromagnetic feedback which affects a moving charge's shape, mass, and associated field energy. 3) Electromagnetic induction works within the atom and provides the mechanism for Newton's third law as well as his second and first laws. There is no quantum constraint that forbids electromagnetic induction of spin. 4) The electron is a perfect diamagnetic body. There is no heat loss within this body. Its induced magnetic field always tends to repel the source magnet. Any magnetic flux linking the electron provides an induced current that persists, an important factor in the third law reaction for both the dynamic and static cases. 5) Bodies in constant rotation and with no altered "appearance" during that rotation will not radiate. The peripheral speed is not limited to the speed of light. This opens the way for a classical atom. 6) Lifting the relativity constraint on spin speed opened the way for stronger magnetic fields within the atom. That provides a classical means of holding the electron apart from the proton in both the atom and in the neutron. It also provides the force for holding two protons within the nucleus of an atom. 7) New classical models of the atom are made possible by the deformability of the electron and the increased magnetic field strength. The new configurations and force functions provide a multitude of new vibrational modes. These "new" free vibrational modes, together with the no internal loss characteristics, provide a classical means of yielding the atomic spectral frequencies. Spectral radiation occurs when the various free vibrational modes are excited. 8) Mass has charge. Light has no charge. It is massless and independent of gravitational attraction. This means that there is a distinction between mass and energy. Light has energy but no mass. 9) The presumed four forces of modern physics: *electromagnetic, gravitational,* and the nuclear and atomic forces called the *strong force* and *weak force,* are all reducible to nothing more than electromagnetic force (electric and magnetic force). 10) Light is an electromagnetic wave, never a particle. It can exert pressure, as is true of acoustic waves, but it is not a stream of particles. The $h\nu$ in the photoelectric effect is the total wave energy absorbed by the atom at vibrational frequency ν.

The philosophical consequences of a return to classical physics are tremendous. It affects not only physics, but all of the disciplines, because of the widespread spill-over of relativism and indeterminancy. Causality is restored as a foundational postulate of science. Fortuitous chance is no longer considered to be the architect of the universe. Common sense is reinstated as an aid to progress and straight thinking, even in science.

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A REPORT OF ACTIVITY ON THE GRASSLANDS EXPERIMENT STATION FOR 1983

STEPHEN C. HAGBERG* AND E. NORBERT SMITH**

Received 23 October 1983.

Abstract

The research potential at the Creation Research Society Grasslands Experiment Station is discussed. A list of plants and animals available for study is given. Plant succession studies have been initiated.

Introduction

In years past much of the Great Plains region of central North America was covered with shortgrass and tallgrass prairies. The vast majority of this open prairie grassland has, with the advent of permanent settlement, disappeared or changed markedly due to the cultivation of crops, range grazing of livestock and the industrialization of the area. Very little land in the U.S. that was once prairie grassland now retains its original character in terms of species composition and relative abundance.

The Creation Research Society is fortunate to have access to a small plot of such original prairie grassland in southwestern Oklahoma (see cover illustration). The land is approximately seven miles southeast of the town of Weatherford, located on the extreme northwest corner of Section 11, R14W, T11N, of the soil survey map for Washita County, Oklahoma.[1] The 3.5 acre plot has never been under plowed cultivation although it has been subject to winter livestock grazing for at least 70 years.

Physical Description of the Plot and Climatological Data

The soil type is described as Quinlan-Woodward complex (5-12 percent slope).

> This complex consists mainly of small areas of shallow and moderately deep, well drained, sloping and strongly sloping soils on ridge crests and hillsides on uplands . . . The Quinlan and Woodward soils are so intermingled that they could not be separated in mapping at the scale used.
>
> Quinlan loam makes up 45 to 60 percent of each mapped area. Typically, the surface layer is reddish brown calcareous loam about 6 inches thick. The subsoil, which extends to a depth of 19 inches, is red calcareous loam. Light red calcareous sandy siltstone is below a depth of 19 inches.
>
> Natural fertility and the organic matter content are low. Permeability is moderately rapid, and runoff is rapid. The available water capacity is low, and the root zone is shallow.
>
> Woodward loam makes up 20 to 35 percent of each mapped area. Typically the surface layer is reddish brown calcareous loam about 8 inches thick. The subsoil, which extends to a depth of 32 inches, is yellowish red calcareous loam. It is underlaid by red calcareous sandy siltstone.
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> Natural fertility and the organic matter content are medium. Permeability is moderate. Runoff is medium to rapid, depending on the slope. The root zone is moderately deep.[2]

The climate for this region of southwest Oklahoma is generally characterized by precipitation averaging 28 inches of annual rainfall and eight inches of snow/sleet annually, mild winters and long, hot summers. The average length of the growing season is 210 days with the average date of the first freeze being November 2 and the last freeze April 5.[3]

Wind tends to be from the south, with northerly winds prevalent in winter months. Strongest winds are usually in March, while August is generally the calmest month.

Traditionally, the "driest" month is January, and May is the "wettest." A secondary maximum of precipitation usually occurs in September. Most of Oklahoma experiences thunderstorms on the average of 50 days each year. Tornadoes are also not infrequent in this area of Oklahoma.[4]

More detailed data are available in the table of Climatological Means and Extremes for Weatherford, Oklahoma, included in Appendix A.

Botanical Description of the Plot

Preliminary research into the types of species present on the plot, their relative abundance, and their distribution over the plot are summarized in the species list in Appendix B, and the species distribution map.

The Gramineae family (grasses) accounted for the largest estimated portion of total groundcover (Figure 1), as was to be expected. Other families well represented in their area of coverage at the plot include the Leguminosae, Compositae, and Solanaceae. See Figures 2 and 3.

The impression gained from the preliminary studies of the plot is one of two distinct floral communities, for working purposes labelled as "upslope" (below the dashed line on the species distribution map), and "downslope" (above the dashed line). These areas can be noted on the cover illustration.

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