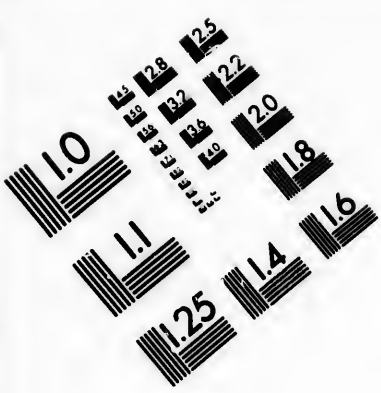

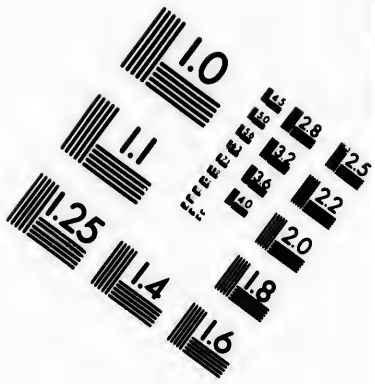

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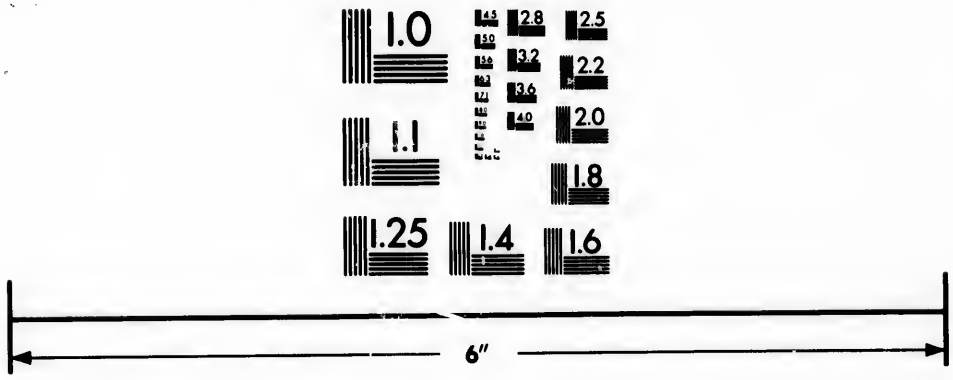

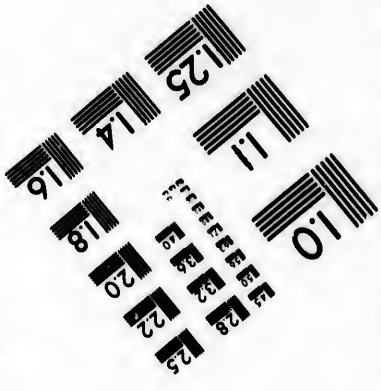

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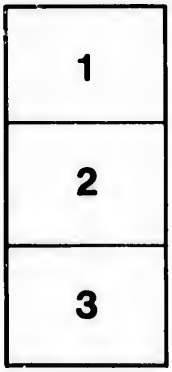

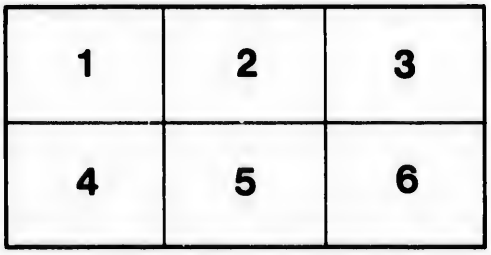

AN ATTEMPT

TO

Form a System

OF THE

CREATION OF OUR GLOBE,

OF THE

PLANETS,

AND THE

SUN OF OUR SYSTEM;

FOUNDED ON THE FIRST CHAPTER OF GENESIS, ON THE GEOLOGY OF THE EARTH, AND ON THE MODERN DISCOVERIES IN THAT SCIENCE AND THE KNOWN OPERATIONS OF THE LAWS OF NATURE,

As evinced by the discoveries of

LAVOISIER AND OTHERS IN PNEUMATIC CHEMISTRY.

By HENRY TAYLOR.

TORONTO:

PRINTED BY W. J. COATES, KING STREET.

1836.

PREFACE.

In my endeavours to reconcile the present Geological appearances of our Earth, with the Mosaic account of Creation, the only certain means that appeared to me, were, the adoption of that construction of the first verse of Genesis, which I have stated in a part of this Work, and it will be seen by an extract from the Quarterly Review of April last, inserted below, that this construction has been confirmed and sanctioned by the writings of Professor Buckland, Doctors Pusey and Chalmers, Bishop Gleig, and other eminent Divines These authorities have removed the diffidence I had long felt to publish a different construction from what has, hitherto, prevailed.

The original manuscript of this work was composed between the years 1819 & 1825. The writings of the above reverend gentlemen were published, I believe, several years afterwards, and none of them have been perused by me, until a few days since, when I met with the Review of the Bridgewater Treatise of Doctor Buckland.

In the summer of 1829, I presented a prospectus of the work to Archdeacon Mountain, and to the Bishop of Quebec. The former kindly complimented me on it, and the latter recommended my publishing it in London, for which I was soon to embark. I arrived there in October of same year, and presented the prospectus to the Lord Bishop of London, from whom I received a note by which he was pleased to commend the design of the work. I subsequently presented the prospectus to several of the principal Booksellers, who, on learning that the size of the work would be that of a pamphlet,

informed me, that the cost of advertising was so great, that no pamphlet would pay it, and my circumstances preventing me from incurring that expence, I gave up the intention of publishing.

In the mean time, a reverend gentleman of the name of Fairholme was publishing a theological work connected with geology, and I enclosed to him a copy of the prospectus, and in a letter I received from him, dated Oct. 14th, 1833, he says, "with regard to the Creation of our earth or of the sun, and other members of the Solar System I have neither found in the work of any writer, nor can I conceive the smallest grounds on which to form a consistent theory, nor indeed do I conceive that it belongs to the science of geology at all. Scripture has given us no insight into it. The existing laws of nature are equally silent, *and yet these laws must have existed from the beginning.*" He then assumes, "that the granite mass has been formed before the existence of organized beings, as their remains are never found in it," an opinion which, I think, the reader will find answered in note 2nd of this work; and the assertion that neither scripture nor the laws of nature give any insight into the Creation, appears to me so futile, that I have inserted the above extract, solely to prove, that the construction I had put on the 1st verse of Genesis, had not at the date of that letter, been *yet* made by any other writer.

By the following extract from the Bridgewater Treatise of the Rev. Doctor Buckland, published long since the date of Mr. Fairholme's letter, it will be seen *that* construction has been sanctioned and confirmed by the authorities mentioned above.

And having presented my prospectus to the persons above named, and also to the Royal Institution in Albemarle-street, London, in 1833, I consider it a duty

to myself to claim the originating of that construction, by which the general appearance of *gradual deposition* in the geology of the earth, (whose diameter must, according to the modern geologists, have existed millions of years) will, as well as this supposed age, be now reconciled and satisfactorily explained by the Mosaic account.

Extract from the Review of the Bridgewater Treatise.

"If there are any lovers of science yet ignorant of the extent and fertility of the field which Geology has laid open—of the intensity and variety of interest by which those who explore it are repaid—here is a work to astonish and delight them. If there are any persons yet deterred from the study of this fascinating science, by the once prevalent notion, that the facts, or theories if you will, that it teaches, tend to weaken the belief in revealed religion, by their apparent inconsistency with the scriptural globe,—*here*, in the work of a dignitary of the church, writing, *ex cathedra*, from the head quarters of orthodoxy, they will find the amplest assurances that their impression is not merely erroneous, but the very reverse of the truth: for that, while its discoveries are not in any degree at variance with the correct interpretation of the Mosaic narrative, there exists no science which can produce more powerful evidence in support of natural religion—none which will be found a more potent auxiliary to revelation, by exalting our conviction, of the power, and wisdom and goodness of the Creator.

"Several hypotheses have been proposed, with a view of reconciling the phenomena of geology, with the brief account of creation which we find in the Book of Genesis and others. It has been plausibly stated, that the Six Days of Creation must, each of them, be understood to imply not as now, a single revolution of the Globe, but some other cylic period of unknown extent. Dr. Buckland, however, prefers that explanation which is supported by the high authority of Dr. Pusey, the Regius Professor of Hebrew in Oxford, and has the sanction of Dr. Chalmers, Bishop Gleig, and other eminent contemporary divines,—namely, that the phrase employed in the first words of Genesis, '*In the beginning* God created the Heaven and the earth,' may refer to an epoch antecedent to the 'first day,' subsequently spoken of in the fifth verse, and that during this indefi-

nite interval, comprising, perhaps, millions and millions of years, all the physical operations disclosed by geology were going on. Many of the Fathers quoted by Professor Pusey, appear to have thus interpreted the commencement of the sacred history, understanding from it that a considerable interval took place between the *original creation of the universe*, related in the first verse, and that series of events of which an account is given in the third and following verses.

"'Accordingly,' says Professor Pusey, 'in some old editions of the English Bible, where there are no divisions into verses, you actually find a break at the end of what is now the second verse; and in Luther's Bible (Wittenburg, 1557) you have in addition the figure I placed against the third verse, as being the beginning of the account of the creation on the first day. This is just the sort of confirmation which one wished for, because, though one would shrink from the impiety of bending the language of God's Book to any other than its obvious meaning, we cannot help fearing lest we might be unconsciously influenced by the floating opinions of our own day, and therefore turn the more anxiously to those who explained Holy Scripture before these theories existed.'—*Note, p.* 25.

"Thus all difficulty arising from the immense antiquity of the Globe attested by Geology is at once removed. The circumstances related in the succeeding verses must be understood as referring to those immediate changes by which the surface of the earth was prepared for the reception of man.—Just as the facts disclosed by astronomy, without detracting ought from the credit of the inspired historian, prove that the sun, and moon, and planetary bodies must have existed previous to the 'fourth day,' on which he first mentions them as 'made,' or *appointed* to serve the office of 'signs and seasons, and days and years;' so Geology in no degree contradicts the real meaning of the text, by proclaiming the fact that the air, the earth, and the waters, were peopled by living creatures for innumerable ages before that epoch in the world's history—which the sacred historian alone contemplates."

Under the sanction of this confirmation of the construction I had put on the first verse of Genesis, in my original manuscript, formed between 1819 and 1825, (and which is now greatly enlarged by the addition of the notes containing an account of the late geological

discoveries, and observations upon them,) I now present this work to the public of Upper Canada, and conclude this preface with the sublime description of Eternal Wisdom given us in the 8th chapter of Proverbs ; and which, I trust, will justly apply to the great additional light which the modern discoveries in pneumatic science are enabled to confer on the cosmogony of the creation.

" The Lord possessed me in the beginning of his way, before his works of old.—v. 22.

" I was set up from everlasting, from the beginning, or even the earth was.—v. 23. (Say before the Combustion of the Gasses, as shown in this work.)

" When *there were* no depths, I was brought forth ; when *there were* no fountains abounding with water.—v. 24. (At the Combustion of the Gasses, as shown in this work.)

" When he prepared the heavens, I *was* there ; when he set a compass upon the face of the depth ;"—v. 27. (Say after the Combustion of the Gasses, as shown in this work.)

HENRY TAYLOR.

Toronto, Nov. 22, 1836.

AN ATTEMPT TO FORM A SYSTEM

OF THE

CREATION OF OUR GLOBE, &c.

In the year of our Lord 1819, I returned to the land of my birth, the Canadas, after an absence of nigh forty years in England and Nova Scotia, during which, I had undergone great misfortunes in an extensive line of mercantile business.

The pleasing sensations I felt on this return to my native country, may have been experienced by many; the intensity with which I felt them, may have been occasioned by so long an absence; and having now, as it were, fallen into the calm and pure resort of nature, the woods of Lower Canada, I was never more happy than in the study of her works. From early youth I had been fond of the science of chemistry; and now, some books of geology fell into my hands: with them I frequently compared the appearances I met with in my walks, which, being in unison with these books, gradually confirmed me in the opinion, that our earth was originally formed in a fluid, and was deposited from it.

In the treatise on chemistry by Professor Chaptal, I found an account of the chaotic system of creation of the ancients; by which it is supposed

that the chaotic mixture, being formed, the various substances were attracted to each other, by the laws of mutual affinity, and precipitated.

On frequent reflection, however, on this theory, and contrasting it with the general state of the depositions of the earth in strata and laminæ, it appeared to me to be totally insufficient to account for these appearances: had a chaotic mixture been formed by the Creator, containing in solution all the various geological bodies, and had nothing more been required for their formation, but the operation of their affinities and attractions, these must have taken place immediately, and they would be found deposited in homogenous, and exclusive masses, according to their various affinities and gravities: but the formations are generally found in alternate layers and laminæ of frequently mixed substances, and bear the certain marks, not only of being deposited from a fluid, but also, of a gradual and mixed deposition, at periods probably of immense distance from each other. This reflection led me to conceive that these depositions were gradually produced by some permanent and continually operating cause.

In the above mentioned work of Chaptal, I had found and been much struck with the beautiful and interesting theory he has given of the formation of the various primitive earths and many salts, metals and mineral substances, by the processes of vegetation, which are found on the decomposition of those vegetables by analysis and combustion: I was also aware, that vast tracts of the earth are formed by vegetable, animal and marine depositions, and being one day occupied in reading attentively

the account of the creation in the first chapter of Genesis, the waters there in mentioned forced themselves strongly on my attention and repeated consideration, until at last, the idea grew upon me, that the geological bodies of the earth were, somehow or other, *produced in these waters.*

That the earth was formed in a fluid, I now felt thoroughly convinced of; that a great part of it, consisted of vegetable and animal depositions, even almost to the tops of the highest mountains, as stated by the geologists, seemed to me a proof, that these marine vegetables and animals must have previously existed in waters which produced these depositions; and, as no inundation or deluge is sufficient to account for these universal appearances of the formations in the earth; therefore, the waters or oceans mentioned in the first of Genesis appeared to me the only, and the truest sources, by which we *can* account for them.

During my reading and reflections on this subject, and previous to my determining to form a Theory of the Creation, Archdeacon Paley's Evidences of Natural Religion fell into my hands, in which the atheistical doctrines of chance, and also, the notions of Buffon, of the earth's formation by a fragment knockt off by a Comet from the sun, is related, and commented on by the Archdeacon.

I shall therefore, previously to advancing any thing more on the system of Creation I had gradually formed in my own mind, beg leave to make some observations on those doctrines of chance formation, and thus endeavour to clear the way for a system, I trust, more consistent with reason, and with our religion.

"Amongst inanimate substances (says Paley in page 63 of his Theology of Nature or Evidences of Natural Religion,) a clod, a pebble, a liquid drop, *might* be, (but never was a watch a telescope, or organised body of any kind, answering a valuable purpose by a complicated mechanism,) the effect of chance: in no assignable instance hath such a thing existed without intention, some where."

Now, it appears to me very singular, that Paley, after having so clearly exposed the absurdity of this theory of chance, should have thus conceded the possibility of a *clod*, a *pebble*, or a *liquid drop*, being the product of it: a clod is a piece or part of the earth; a pebble is a fragment of some rock rounded by the waters; a liquid drop is a part of those waters. The same cause then, that produced the earth and seas, produced also the clod, pebble, and drop.

But, can there be any doubt that the earth itself contains marks of design and intelligence? That all its vegetables and animals contain marks of design, *He* has proved: now we cannot refuse the same evidence of design in the formation of the earth and seas, if it were *solely* as a *matrix* or habitation for these plants and animals; and, among the evidences of design which these last exhibit, I beg leave to mention one which I believe, has escaped the observation of the Archdeacon: it is the *amazing varieties* exhibited in every species of these plants and animals. Had they been solely the offspring of a "blind conatus," there would, probably, have been but one species of each of them. But their vast varieties shew a master and designing hand to have

directed their formation. But the evidence of design which the earth exhibits, is not confined to its own formation; this evidence is much more strong when we find and consider it as a part of a system of planets revolving in known periods round a central sun, whose light and heat are evidently the intended sustainers of the life and enjoyments of the plants and inhabitants existing on this family of planets.

It is also stated in page 92 of the above work, that Buffon considers the planets to have been "shivered off the sun by some stroke of a comet." Paley adds, "that he never could see the difference between the antiquated 'System of Atoms,' and Buffon's 'Organic Molecules;'" and that "this philosopher having made a planet, by knocking off from the sun a piece of melted glass, in consequence of the stroke of a comet, and having set it in motion by the same stroke, both round its own axis and the sun, finds his next difficulty to be, how to bring plants and animals upon it," &c.

Now, as to the solid parts of the earth; allowing glass to be composed of a variety of materials, yet, I believe no part of the interior of the earth is discovered to be vitreous, except in the vicinity of volcanic mountains, or where these have previously existed. How then has this glass, of which Buffon supposes the earth to have been formed; how has it been metamorphosed into the vast variety of mineral products which geology discovers to us? The internal substance of the earth down to its centre, is supposed to be granite or bodies of greater density; and neither granite, nor the more

external formations bear any resemblance to vitreous or volcanic matter.

But, if even the solid parts of our earth, will not support such a theory, how are we to account by it for our waters? Is it in the midst of the molten glass of a burning sun, we are to look for them? Water, even in a state of vapour, could not exist there, but must have been driven off to immense distances, or else decomposed by the sun's fire: Water, however, is said to constitute three-fourths of the Earth's surface, and the total inability of this theory or supposition, to account for its production, appears to me decisive against its foundation in reality. (*Vide* 1*st* & 2*nd paragraph of Note* 4*th.*)

I shall now notice the opinions on Chance or Atheism, as causes to account for the productions of nature in our globe.

The Organic Molecules of Buffon are thus stated by Paley, in page 427 of the above Work, Evidences of Natural Religion, namely: "we are to suppose the universe replenished with particles endowed with life, but without organization of their own, and endowed, also, with a tendency to marshal themselves into organized forms."

It appears to me almost impossible that the author of this doctrine, if it be Buffon, could rest satisfied with this cause of Creation; because, although it should be allowed that these particles of life could infuse themselves into organized bodies, we naturally enquire, how came these particles themselves into the universe? This is the secret, undiscoverable without allowing an "unknown

cause." If Buffon would account for the existence of these particles by chance, I say, that from the time of their finding their way into these Molecules, or organized forms, there is so much, and so constantly exhibited in every one of these forms, what we call, in plain language, intelligence and design to produce good and wise ends; that the term Chance, in the sense in which it would be employed by these Atheistical writers, completely comprehends intelligence and design; for these are found inseparable from these organized forms; therefore, the Doctrine of Chance, instead of confuting, proves the existence of an Unknown Creating Cause.

Were the term Chance to be understood merely in the common acceptation of the term, as existing, for instance, in many of the events of life, it will still always be considered as too absurb and impotent to account for the productions of Nature, because it is *not* in the nature of the human mind to rest satisfied with what, I trust, may be fairly called a Buffonery system of Creation.

Now, therefore, to finish with this, and with the notion of the planets being knocked off from the Sun; to account for their Creation thereby, without an Intelligent Creator, I must say, I feel it to be a daring thing of this or any writer, to have attempted the overthrow of the established opinions of all Christian nations, as set forth in the Scriptures handed down to us from the people whom it appears to me, were chosen by the design of Heaven to preserve mankind in the faith and worship of one Creator, and which are, I believe, supported in

their principal facts by the immortal Newton, in his system of the Universe, and certainly believed by him.

Previous to thus presuming to overthrow this sacred religion, it appears to me, this author should have formed a system less replete with absurdity, but fortunately too much so, to produce extensively any evil effects. Christians, in general, are fixed in their notions of the true cause of all they see, taste, and feel around them, and of their own existence. The Jewish Nation was taught by a religion which, from the days of Adam, had been followed by mankind,—a belief in one Almighty Creator of all things. This belief had nearly, however, disappeared from the earth in succeeding ages. Men, enervated by the effects of those hot climates, and sunk in consequent sensuality, were tempted to throw off the wholesome restraints of a pure religion, and gradually fell into an idolatry, whose ministers, probably, permitted these sensual habits, to confirm their own power over these people. The Jews, alone, had preserved the worship of one AlmightyCreator, until their prosperity, after the deliverance from Egyptian bondage, sunk them into the same idolatrous practices as their forefathers.

And here I beg leave to observe, that this repeated defection of the Jews, and of the rest of mankind, from the worship of one God, appears to me a strong proof that *Deism alone*, in its purest state, is not sufficient to prevent mankind from falling into idolatrous worship. But, the Saviour promised in the Scriptures by the inspired writers,

arose at length to astonish mankind, and to bring them back for ever from that idolatry to a religion which alone is worthy of the highest degree of intelligence to which the mind of man can arrive; a religion which, while it allows him the most extended use of that intelligence in the contemplation of the works of Creation, teaches him, also, to be contented with the limits which appear to be fixed to it; and being convinced of the existence of an Almighty Protector, to feel the glowing pleasure of the adoration of Him to be among his purest and most comforting sensations.

These cheering feelings of the heart and mind, cold and joyless Atheism is void of, and thereby its errors are proved; because, the almost universal feeling of these emotions, and their cultivation by nations who have at all risen above idolatrous worship, is a proof that these emotions came from the hands of Nature and Reason, and they appear to form the links of a chain which connects this with a future state of existence.

The supporters of the Doctrine of Chance, however, disdaining to be contented with the Scriptural account of Creation, have formed various wild and futile notions to account for it, in order, no doubt, to seek for distinction by opposing the generally received doctrines; but finding, as I trust to have shewn, the total *impotence* of *Chance*, of APPETENCIES, PRINCIPLES OF ORDER, POSSIBLE COMBINATIONS OF MATERIAL FORMS, and of LAWS OF NATURE, &c. &c., to satisfy the inquisitive mind of man, they have been obliged to conclude with tell-

ing us, "that neither they nor we know any thing about the matter." (*Vide page 7 of Paley's Theology.*)

But, at that very point, where they have thus found themselves stopt in the extension of their enquiries, is seen "the God whom we worship." There, when this proud, but false philosophy finds its ignorance begin to darken it, we have the clear and powerful light of this true religion to illuminate us, and to teach us to rest satisfied with the impenetrable veil which its author has pleased to fix between Himself and His creatures in this stage of existence.

Of a kin to these doctrines of chance-Creation is the idea of the Materiality of the *Human Soul;* and previous to dismissing this part of the subject, I beg leave of the reader to offer some observations on this Doctrine of Materiality.

The Materialist supposes, that all the powers of the mind of man result from his *Organization* alone. It follows, then, as a natural consequence, that when this organization is destroyed, the mind is destroyed along with it. Materialism, then, necessarily leads to a disbelief in a future state.

Now, in no parts of Nature do we find faculties bestowed which are not generally productive of certain purposes to these parts; therefore, if man were destined solely for existence on this earth; if his thoughts were solely the effects of the organization of his frame; is it not probable his thoughts would have been confined to the actual sphere of his destined existence? Would he not have been

unable to form those high imaginations and hopes of eternal happiness in more perfect regions?

For, if we may reason from the vast body of evidence of her works, Nature does nothing, nor bestows nothing, in vain: she never appears to act with deception; therefore would not have given to man of all ages and nations those hopes of future happiness merely to disappoint them. "I am positive I have a soul," says Laurence Sterne, "nor shall all the books with which Materialists have pestered the world, ever convince me to the contrary."

The vast powers of intellect and of science, by which man has been enabled to observe and to trace so exactly, the astonishing systems of the heavenly bodies; those high passions and thoughts of future bliss which he is thereby led to hope for, in some such regions, partake too much of the nature of Spirit to suffer us to think they are solely produced by a more perfect organization than is bestowed on the horse, the mule, or the ass.

It, moreover, has been proved by the anatomy of the brain of the Ourang Outang, an animal approaching nearer to the human species than any other, that its brain exactly resembles that of the human species; and it is said, "it is surprising this resemblance is productive of so few advantages; the tongue, and all the organs of the voice are similar, and yet the animal is dumb; the brain is formed in the same manner, and yet the Creature wants reason; an EVIDENT PROOF, [as Buffon finely observes,] that *no arrangement of matter will give mind*, and that the body, how nicely soever formed,

is formed to very limited ends, when there is not infused *a soul to direct its operations ;*"—and I am the more happy in giving this quotation, as it shews that Buffon has indeed the redeeming quality of not acceding to, but of disproving, the degrading Doctrine of Immateriality. We feel indeed less surprised at the invention of such a doctrine, when we are informed who are its abetters or authors. Persons, who, in the practice of their art, having been long habituated to dissections of the human body, have thereby become more apt to form their notions from their eyes than from the reflections of their minds, have sought to make the world believe, that the superiority of the mind of man over other animals, arose merely from a more perfect organization of the brain; and such an assertion reminds us of the Alchemists who sought for the Philosophers' Stone in some of the most loathsome objects in nature. Had the Materialists watched and studied the operations of their own hearts and minds, in the hours of calm contemplation; had they allowed these parts of their frames to exert a due influence over their opinions, they would, probably, have felt the force of the great poet's assertion, " 'Tis the DIVINITY which stirs within us."

They may, indeed, have carried their anatomical science and skill to that exact point where body meets spirit; they may have discovered the precious matrix in which this "immortal spirit" is destined at present to reside; but, they would not thus have presumed to degrade its nature and its future destiny.

In fine, this material doctrine of the mind may

well be said to savour too much of the shop, and no well cultivated mind can, I think, for a moment assent to so degrading a doctrine;—and I shall conclude this subject with an observation I have made on the separate existence of mind from body, *even* in this world. When two persons converse together, the ideas of their minds pass from the organs of speech, through the air intervening between the two persons: in this passage, therefore, *mind exists separate from the body from whence it came.* It is conveyed, indeed, by the vibrations of the particles of air it passes through, but it certainly has, during that period, an existence separate from the body and organs it proceeded from. Mind, therefore, can exist separate from its matrix, and does not seem to be entirely dependent on it for that existence.

I now resume the narration of the course of thought which has led me to form the present attempt at a theory of the Creation of our system, and, by analogy, of the other systems of the heavenly bodies.

Being, as before stated, convinced the earth had been originally formed in water the enquiry, then, naturally suggested itself, what waters we had any historical account of which could produce this effect? The chaotic liquor of the ancients, I trust to have proved, is incompetent to account for the general geological appearances, and therefore fails. The waters of the Deluge can only account for certain changes in the earth's surface, which they may have occasioned, and which, no doubt, give proofs

of the reality of that Deluge. But, the proof of formation in a fluid reach far below the possible effects of an inundation which lasted only one year. The vast masses of marine depositions must have required numerous ages to accumulate, and even the granite mass gives proofs of formation in a fluid, by the chrystals and heterogeneous substances it consists of; and this stupendous mass, which is supposed to form the whole interior of the globe, must have required a correspondent time for that formation.

The only waters, therefore, with which History furnishes us to account for these phenomena, are certainly the waters of Genesis. I then proceeded to enquire if the scriptural account of these waters would warrant the conclusion that the earth was formed in them by the deposition of the strata and other rocks which the latest discoveries in the science of geology have pronounced it to consist of.

After a long and mature consideration I conceived, that the 1st verse of Genesis, "In the beginning God created the Heavens and the Earth," will not only warrant the above conclusion; but, perhaps, also a like formation of all the planets and suns of other systems; by the highly natural causes and effects of those laws, which the latest discoveries of Geology and Pneumatic Chemistry have found to exist.

I further considered, that if the scriptural account of Creation could thus be reconciled to those discoveries;—if the Geology of the whole earth could thus be brought in proof of the reality and neces-

sary existence of those waters; the doubts of the Unbeliever might yield to it, and the authority of scripture acquire new forces.

"In the beginning God created the heavens and the earth." Now, the term beginning points to *no specific point of time;* and I have therefore conceived it may have been *ages* previous to the time of the separation of the earth from the waters mentioned in the ensuing verses; and, that during *these ages,* the earth was gradually formed in these waters, as will be hereafter stated.

By the famous discoveries of Black, Priestly, Lavosier, and other chemists and philosophers, a new world has been disclosed to us. The constituent part of three-fourths of the globe, water, which was formerly considered as an element of Creation, has, by these discoveries, been proved to consist of two separate bodies, oxygen and hydrogen. Our atmosphere itself, the common air, is no longer to be considered as one of these elements: it is composed of the oxygen and of the azotic gasses; but neither oxygen nor hydrogen, nor azote, have ever been obtained separate, in a liquid state. They have yet been found only in the form of gasses, that is, combined with light and caloric. By the combustion of hydrogen or inflammable gas in oxygen gas, the caloric and light of the latter escapes, and water is formed, in a quantity exactly corresponding with the weight of the gasses employed in the combustion; and the same water may again be decomposed, and returned into the state of the gasses it was composed of. If, therefore, this be incontrovertibly proved—and I believe all philoso-

phical chemists are now agreed upon the fact—it follows, that the waters of the *Universe* recorded in Genesis, MUST have been formed by the combustion of these gasses; it follows, that if any part of these waters are composed of them, every part must; and, therefore, that the Deity, having first called these gasses into existence, *did*, either by the power of electricity, the blaze of comets, or some other means, ignite the hydrogen gas, which, by its combustion in the oxygen gas, of which the empyreal atmosphere may have been composed, produced the *Universal waters of Genesis.*

These waters must have been thus first produced in a state of vapour, which, condensing into a liquid form, would, by laws of attraction, be formed into aqueous globes, forming the matrices of our earth and planets of our system. The vast body of heat and light disengaged from this immense combustion, may have formed the Sun of our system, which, by the laws of its gravity and attraction, assumed its place in the centre of it, as we shall attempt to show in the Theory of the Sun's formation. (*See the third and fourth paragraph of Note* 4.)

These seas or acqueous globes, being brought into a state of revolution in their orbits round their central sun, (*see Note* 16) we have now to enquire in what way, and by what laws, the Creator produced, from these waters, all the solid parts of our earth?

To form the ground-work of our reasoning on this subject, we shall advert to, and consider attentively, the accounts of the Geologists of the

marine strata and productions found in the bowels of the earth, and the experiments and opinions of some eminent Chemists upon the nature and products of the processes of vegetation.

"The levels," says Cuvier, one of the most eminent Geologists of the present day, "on which marine productions are now found, are far above the level of the ocean, and at heights to which the sea could not reach by the action of any known cause. Every part of the earth, every continent. and every island, exhibits the same phenomenon. The traces of revolution become more apparent, when we ascend a little higher, and approach nearer to the great chain of mountains. Beds of shells are still found here but not of the same species as those in less elevated regions. When we ascend to greater elevations, and advance to the summits of the highest mountains, remains of marine animals grow more rare, and, at length, disappear entirely; but the chrystallization, and many other characters of these rocks, shew them to have been *formed in a fluid*, &c. &c.

"It is impossible, therefore, to deny, that the waters of the sea have formerly, and for a great length of time, covered these masses of matter which now constitute our highest mountains; and further, that for a long time, these waters did not support any living thing."

Thus we have the evidence of Geology, that every part of the earth contains marine remains, and that even the summits of the highest mountains, where these marine depositions cease to be found, give yet evidence of *formation by fluidity*.

That these marine remains are not found in these summits may,I think, be satisfactorily accounted for. Many remains are found in the same forms as when they contained the living animals; but, on taking them up, they crumble into impalpable powder.

The summits, therefore, of these mountains, have probably contained these marine remains in previous ages; but being contiguous to the earth's surface, have, by the joint action of the air and rains, lost their organization, been converted into their component substances, and been incorporated with other mineral, matallic, or earthy bodies. Thus, all marble, lime stone, and chalk are found to consist of precisely the *same materials* as every marine shell; all are formed of lime and carbonic acid; and, it is therefore evident, that when the masses of shells shall be so far acted upon by the moisture of the earth, rains, internal fires and mineral *solvents*, as to lose their forms, and be converted into powder; that these agents, acting on and percolating through them in various degrees, will reduce them into beds of chalk, or lime stone, or marble, and, I think it not improbable, the chalk and lime stone formations of the earth have been, in the course of ages formed in this manner. Again, "where the tree falls there it lays," says the Proverbs. Any person who has seen and noticed the aboriginal forests of the earth, will have observed these trees in various stages of decay—many of them reduced to a state of dust or earth; and these causes, in the course of time form hills and hillocks. In accounting for the origin of peat earth and morasses of black soil in Britain, a late writer has,

therefore, very properly, I think, assigned their origin to arise from the gradual falling and decay of trees in ancient times, which, falling in marshy or swampy places, have decayed and acquired their black colour. In a great many parts of America, it is well known large tracts of land are found in this state, being covered by masses of black earth of various degrees of consistence, from 2 to 8 feet deep. The subsoil frequently clay. In an article lately published in one of the English papers, there is an account, confirming the opinion, that part of the coast of Australia, in the South Seas, has been entirely formed by the manure of birds called the *Pettrel*, found there in such astonishing quantities, that flocks of them are seen to cover a vast extent of the atmosphere for days together.

These facts, therefore, offer corroborating testimony, that large tracts of the earth can, and have been formed, by the depositions of vegetables and aminals. (*See Note* 1.)

In a Geological work lately published in England, we have the following account of the order of succession of the different layers of rocks which compose the crust of the earth :—

	Instances where found.
A. Vegetable soil.	Mouth of the Thames and other rivers.
B. Sand, Clay, Gravel, with bones of some species as now exist.	

C. Deep beds of Gravel, large loose blocks of Sand, all containing bones of animals belonging to species now extinct.	Surface of many parts of England, and especially the east and south-western parts.

TERTIARY STRATA.

D. Sand, Clay, Pebbles, beds of Sand, white Sand-stone, many sea Shells, bones of extinct species of animals.	Hampstead Heath, Bagshot Heath, coast of Suffolk & Norfolk, the stone of which Windsor Castle is built.
E. Alternations of Lime Stone, containing fresh water Shells, Clays of different qualities, and Lime Stones containing Marine shells.	Isle of Wight in England.
F. Thick beds of Clay, many Sea Shells, beds of Lime Stone, remains of extinct species of plants and fruits, land and amphibious animals.	Many places round London, and a great part of Essex and north-east of Kent, Isle of Sheppy.

SECONDARY STRATA.

G. Chalk with Flints do. without do.	Dover Cliffs, Brighton, Hertfordshire, Hamborough Head, in Yorkshire, England.

H. *a.* Chalk Marle.	Many parts of s. coast
b. Green Sand	Many parts of Kent and Sussex.
c. Thick beds of Clay.	The Wolds of Kent, Surrey and Sussex.
d. Yellow Sand with beds of Iron.	Neighbourhood of Hastings, in the isle of Purbeck.

In an account of the Geological appearances from the Lands' End in England towards the vicinity of London, the following facts are stated:—

The principal groups of secondary rocks, from the primary strata to the Chalk group, form the upper or more recent members of the division.

The Chalk group, the Oolite group, the Red Marle group, the Coal group, the mountain Lime Stone group, the old Red Sand Stone group, the Graiwacke group, are of the following thicknesses:

Mountain Lime Stone group, 900 feet thick.
Old Red Sand Stone group, 1500 feet thick.
Coal group, 1700 feet thick.

Red Marle group contains mines of salt and marbles, alabaster and magnesia, with marine skeletons: its thickness is 2100 feet.

The Oolite group contains about twelve alternations of subordinate beds, or systems of beds, consisting of Lime Stones of different qualities, and of Clays: their united thickness being about 2600 feet, of which 1100 are formed of two beds of Clay of 5 and 600 feet each. The whole group contains a vast abundance of *animal remains, almost exclusively marine.*

The Chalk group is separated from the Oolite group by several beds of Sands, Clays, and Sand Stones, and, including them, is 1900 feet thick. It extends from Flamborough Head, in Yorkshire, to Weymouth. The whole group *abounds in organic remains* of the same classes as Winford in the Oolite group.

Thus it appears, that both the tertiary and secondary formations of the Earth, contain vast masses of the remains of marine productions, many of them belonging to species now extinct. Many of these latter are said to have been of enormous sizes.

The Chalk and Lime Stone formations, as I have above stated, may have been formed of the disintegration of marine shells, which had been deposited perhaps for ages previous to these which yet preserve their organic forms, as we daily find many of them in a state of disintegration, and their chemical analysis is precisely the same with Chalk and Lime Stone. (*See 4th paragraph of Note 2.*)

The Coal formations must probably have been produced by the decomposition of marine vegetables, as they reach far too much below the surface of the earth to suppose them to be formed by those of a terrestrial species.

Now, then, to refer to the words of Cuvier, "the levels on which marine productions are now formed, are far above the level of the ocean, and at heights to which the sea could not reach by the action of any known cause."

To what cause can we then ascribe this phenomenon, but to the substantial, plain, and simple one, the original formation of the earth? All its geological appearance give evidence of formation in a fluid. Of no waters have we any record sufficient to account for these facts, save the waters recorded in Genesis. These, therefore, forcibly press themselves on our attention, and appear to me perfectly competent to clear up all these phenomena of Creation.

But water alone, that is, holding no extraneous substances in solution, either partial or complete, *deposits nothing*. All its depositions are found to proceed from extraneous bodies. The petrifying power of certain waters, of which such fabulous opinions have formerly existed, is solely owing to the deposition of earths or salts it had previously dissolved, completely or partially.

We shall, therefore, proceed to state our humble conceptions of those laws of nature, which the Creator may have chosen for the gradual formation of our earth in the waters of Genesis, on the ground work mentioned above, regarding the 1st verse of the 1st chapter of that book.

Genesis, 1st chap. 1 verse.—"In the beginning God created the heavens and the earth."

I wish first to premise, that, as I consider this scriptural account of Creation, to be the only one by which we can, naturally and reasonably, account for the geological phenomena of our earth; so, the only thing in which I differ from the, hitherto, received opinions of that Creation is, in the construction which, (from a desire to account for these

phenomena, and to reconcile them with the scriptural account,) I have put upon the meaning of this 1st verse of Genesis.

As before observed, I had in the course of these studies of nature, been led by them, and by reading and reflection, gradually to come to such a construction of that verse as the following: that the term, "The beginnin;" *pointing to no specific time*, so it may refer to numerous ages previous to the separation of the waters from the waters mentioned in the 6th, 7th, and 9th verses; and I moreover consider, that every man hath a perfect right to form such a construction of the Word of God as his understanding, after mature reflection on His works, and a diligent study of them, may, by that understanding be led to, and more especially when his design is good, when he conceives he is, thereby, not only adding weight and authority to these scriptures, by bringing the evidence of the geology of every part of the globe to their confirmation, but, perhaps, silencing thereby the infidelity of the sceptic, and (as he may hope) exhibiting, in a stronger light, the Power, Wisdom, and Glory of his Creator.

In the 2nd verse of Genesis it is said, "And the Earth was without form, and void, and darkness was upon the face of the deep, and the Spirit of God moved upon the face of the Waters."

By this verse, it would appear, the Earth was completely covered by the Waters: otherwise, the Spirit would have been recorded as having also moved upon the land; and the 9th verse is confirmative of this circumstance, for it says, "And God said, let the Waters under the Heavens be

gathered together unto one place, and let the Dry Land appear; and it was so." This event, then, I consider to have happened many ages after the time of the 1st verse; which verse, I further consider, to point exactly to that period to which the Psalmist David, in the 102nd Psalm, 25th verse, refers: "Thou Lord in the beginning hast laid the *foundations of the Earth;*" and I consider this foundation to have been the formation of the aqueous globes of our theory.

We now proceed to our statement.

The seas, or globes of water, mentioned above to have been formed by those gasses which the modern discoveries in pneumatic chemistry prove water to be formed of, and being destined by the Creator to produce habitable Earth or Land, we shall conceive these aqueous globes to have been endowed by Him for that purpose, with amazing prolific powers of life, both of the vegetable and animal nature.

The remains of many of those marine animals, whose skeletons have been discovered in the earth, of a species never known to have inhabited our seas, are of gigantic stature and dimensions, as compared to those of any existing species.

The marine Shells, the Chalks, and Lime Stone formations, which I consider to have been produced, as above observed, by the gradual disintegration of these shells in the course of sufficient ages: the vast Coal formations, also, prove the amazing masses of animal and vegetable life, which we shall now suppose, according to our theory, to have existed in those Waters of Genesis; and for proofs of

which we accordingly refer our readers to the geological statements in the preceding pages.

To account further for the primary earths, LIME, SILEX or SAND, SAND STONES, FLINTS, GRAVELS, CLAYS or ALLUMINOUS EARTHS, TERRA PONDEROSA, MAGNESIAN EARTHS, SALT FORMATIONS, METALS, MINERAL SUBSTANCES *of all kinds*, and the ROCKS and other SUBSTANCES COMPOSED OF THEM and of the PRIMARY EARTHS, we shall now proceed to a statement of those experiments, opinions, and theories, which have been performed and maintained by several eminent chemical philosophers on this important head.

In the treatise on Chemistry by Professor Chaptal, mentioned in pages 1st and 2nd, the following facts are stated to have resulted from the analysis made by him of certain vegetables:

"The herb Patience affords sulphur: vegetables, in their analysis, likewise present us with certain metals, as Iron, Gold, and Manganese. The Iron forms nearly one-twelfth of the ashes of hard-wood. It may be extracted by the magnet; but it is seldom in a naked state, but is combined with the acids of vegetation. The Iron is not imbibed from the Earth, but is FORMED BY THE VEGETATIVE PROCESS. Lime, constantly enough, forms *seven-tenths* of the fixed residue of vegetable incineration, usually combined with the carbonic acid. Next to Lime, Alumine is the most abundant earth in vegetables: and next, Magnesia.—Silicious earth likewise exists, but less abundantly; least common of all is Barytes or Terra Ponderosa."

As an evident and sufficient proof that all the products of vegetables are produced by the water, and perhaps the air, necessary for their growth, I extract also the following observation of Professor Chaptal: "It appears proved by Van Helmont, that vegetables can live and grow with only air and water. He planted a willow weighing 59 lbs., watered it with *distilled water* five years. It increased to 169 lbs.: the earth it was grown in lost *only two ounces*." If one vegetable be thus proved to acquire its growth from water and air, the strong probability is, that, as Chaptal says, "all others do," and by the uniformity of the laws of Nature, we may conclude this law applies generally to the vegetative process. (*See Note* 15.)

Thus, although Sir Humphrey Davy supposes, but does not assert, the fact, that these earths are taken up by the vegetation from the soils around them; yet, as he does in another part of his writings admit, that all substances, before entering the tubes of vegetables in nutrition, must be reduced to a state of complete solution in a liquid before that absortion can take place; and as it is well known that argillaceous earth, or allumine, silex or sand, and magnesia, are almost insoluble in water, and that lime is only soluble in very small quantities; I have therefore concluded, that such a perfect and sufficient solution, as Davy admits to be necessary, is impracticable, and, therefore, that the assertion, grounded on the forementioned experiments by Chaptal and Van Helmont, namely, that these Earths, Metals, and Minerals, are *really and entirely* the products of the vegetative process, is

much more probable; and I am the more confirmed in this probability by the following facts and reasoning upon them:

1st. As oxygen, we know, exists in a solid state, in all the oxyds, so it is not impossible, that the bases of these oxyds, the metals, and several of the primary earths, may be formed by the vegetative process, as the French Geologist, Chaptal, asserts, "to replace the constant waste that takes place of the crust of the earth, by the rains, streams, and rivers."

One hundred pounds of Lead is, I believe, found, by calcination or oxydation, to augment in weight to one hundred and ten pounds, thus absorbing ten pounds of *solid oxygen* from the oxygenous gas of the atmosphere, which can be recovered by deoxydation. Pit Coal contains a great quantity of Hydrogen, most probably in a solid state: Pot-ash has yielded to Sir Humphrey Davy a metallic button; and is, therefore, an oxyd, and also contains oxygen in a solid state.

2nd. The Schisti, or Slate Mountains, are said also to be formed by the decomposion of vegetables, and the Coal formations, also, to consist of the residue of vegetables, probably charred by a close heat, and must, therefore, be formed of the carbo and constituent Gasses of those vegetables. If such dense substances can be thus, in part, compounded of a gazeous substance, there is an equal probability, that the gazes separated by the vegetative processes from the air and water necessary to their nutrition, may compose the Primary Earths, Salts, Minerals, and Metallic substances

obtained from them by decomposition or incineration; and I think it not improbable that future experiments may prove, that all the primitive earths, metals, and mineral substances, are composed of the primary elements, as we are now philosophically bound to consider them, OXYGEN, HYDROGEN, AZOTE, combined in proportions innumerable as these products themselves, and from which variety of proportion they receive their distinctive characteristics. (*See Note* 9.)

3rd. As an important and additional proof, that the process of vegetation *certainly* generates and produces one of the most abundant and most dense primary earths in nature, namely, Silex, Siliceous Earth, or, as I shall call it, the Sandy principle, I extract the following from the Elements of the Science of Botany, by the celebrated and indefatigable Linnæus.

"In many parts of the East Indies, there has long been a medicine in high repute, called '*Tabasheer*,' obtained from a substance found in the hollow stem of the Bamboo. It has undergone a chemical examination, and proved to be an earthy substance, principally of a flinty nature; this substance is also found in the Bamboo in England. In the hot house of Dr. Pitcairn, in Islington, subsequently to this time, there was found, in one of the joints of a Bamboo, which grew there, a solid pebble, about the size of a pea. The pebble was of an irregular form, of a dark brown or black internally: it was reddish brown, of a close dull texture, much like some martial siliceous stones. In one corner were shining particles, which appeared

to be chrystals, but too minute to be distinguished by the microscope. This substance was so hard as to cut glass. The cuticle, or exterior covering of straw, has also a portion of matter in its composition, from which, when burnt, it makes an exquisitely fine powder for giving the last polish to marble, a use to which it has been employed time immemorial, without the principle being philosophically known. In the great heat in the East Indies, it is not uncommon for large tracts of reeds to be set on fire on their motion by the wind, which I conjecture must arise from the flinty substance of their leaves rubbing against each other. These facts cannot avoid presenting to the mind at one view the boundless Laws of Nature, while a simple vegetable is secreting the most *volatile and evenescent perfumes*, it also secretes a substance, which, is an *ingredient in the primeval mountains of the globe.*"

These facts, which have produced the assent of this *Prince* of Botanists, to the formation of a first rate primary earth, by the process of vegetation, are, I think, sufficient proofs, in conjunction with those above stated, that all the primary earths, the metals, and mineral substances, and, of course, all the rocks compounded of them, have been originally formed by the process of vegetation, and animalization. (*See Note* 1, 2, 3, and 14.)

Vast tracts of the interior of the earth have, as above, been shewn to consist of the remains of marine animals.

The Chalk and Lime Stone formations I trust to have shewn, have also resulted from the same re-

mains; and also, that the Coal formations have been produced by the residue of marine vegetables and a charring heat, as well as the Schisti or Slate Mountains: as, therefore, the proofs narrated in the foregoing pages, and the Notes referring to them, are, I trust, convincing, that every part of the earth has been formed in a Fluid; that many parts are visibly the remains of vegetable and animal decomposition, and that most of the geological bodies are resolvable into the elements of vegetable and animal life; we now arrive at the conclusion, THAT THE PROCESSES OF VEGETATION, AND OF ANIMALIZATION, WERE THE MACHINERY CHOSEN BY THE FIRST CAUSE FOR GRADUALLY PRODUCING, IN THE COURSE OF SUFFICIENT AGES, IN THE WATERS OF GENESIS, THE VARIOUS GENERATIONS OF VEGETABLE AND ANIMAL LIFE, WHICH, BY THEIR GROWTH, DECAY; THEIR DEATH, DECOMPOSITION; AND DEPOSITIONS HAVE PRODUCED ALL THE GEOLOGICAL BODIES OF WHICH OUR EARTH IS COMPOSED. These Bodies, as they were depositing, have been attracted towards the centre of the aqueous globe by the great and universal law of attraction; and since the separation, have, by the effects of internal fires, convulsions, or the electric power, acquired their present appearances.

Thus, the Law of Gravity or Attraction would necessarily occasion a vast pressure towards the centre of the aqueous globes of all the particles of the geological bodies. The vegetable and animal remains of which they were formed, as stated above, would pass through various stages of fermentation. Heats, inflammable and other gasses,

would be thereby generated; and these internal fires must have been in operation, pending many of the ages required for the formation of the entire diameter of the Earth in the Waters of Genesis. Hence must have arisen, long before the separation of these waters, not only internal changes in the forms and original composition of the congregated masses of the geological bodies, but also numerous commotions in the interior parts, which have produced probably many of the mountains, and must certainly have produced those depressions on the surface of the earth, which served to form the beds of the original oceans or seas, formed at the time of the separation of the waters.

The electric agency, also, has probably had great influence in these internal changes, both previous to and since the time of the separation; and on the subject of the internal and external changes in and on the Earth, I refer the reader to the attentive perusal of the Notes, but more especially Notes 7, 10, 13, and 14.

And as it is very remarkable, that no mention is made in the 1st of Genesis of the creation of any of the Marine Plants of the Ocean, I will conclude this part of the subject with an observation on that remarkable circumstance—namely—that it appears to me indicative of the possible truth of the theory I have presumed to offer, that the first verse of Genesis refers to a *preparatory process of the Creation*, totally distinct in its time and nature from the separation of the waters and the primeval appearance of the dry land as recorded in the ensuing verses, which took place in the six days.

Because the creation of the vast body of the marine plants required for the purpose of nutriment for the marine animals of those waters, who, by their death, decay, and depositions formed part of the machinery of the Creator for producing the earth, the creation of those plants, having taken place at the beginning, as in the first verse, being the *preparatory process* of the creation, by which the Dry Land was, in subsequent ages, to be produced, no need was that mention should be made of *their* creation at the period of the separation, when the land animals and vegetables were brought into being; for and because these marine plants were included in the record of the first verse, "In the beginning," &c. (*See Notes* 7, 10 & 13.)

In the preceding System of the Creation which I have ventured to form, and to which I was determined, as observed above, on reading the ideas stated by Archdeacon Paley to have been promulgated to the world by Buffon and other philosophers, I have made some remarks on the assertion, or supposition of Buffon, that the globe we inhabit was formed by the stroke of a Comet knocking off from the Sun, as stated by Paley, a piece of molten glass, I trust to have shewn the great improbability and absurdity of this. Such a supposition would lead us to believe, that the creation of our planetary system was not the gift of an all bountiful Creator, but merely the effect of Chance; and if I have proceeded to any severe reflections on its irreligious tendency, I trust I am warranted therein by the opinions given by Paley, of this doctrine being founded on Atheistical principles; that is, if I

understand it, denying the agency of a Supreme Ruler of the Universe in the Works of Nature.

An opinion, so contrary to all our natural feelings of religion, it appeared to me, the duty of every man to refute whose understanding should dictate to him the errors of such a system—and I hope to have shewn, that as it is completely unsatisfactory to the mind of man, in the highest state of its acquirements—so, it never can be productive of general or extensive assent; and in the following compendium of my Theory of the Sun's Formation, I shall re-advert to the above supposition of Buffon.

THEORY OF THE SUN'S FORMATION.

I now proceed, with due humility, to present to the reader a compendium of the ideas above stated, on the Sun's Formation, at the time the primordial waters of Genesis were created, according to the construction I have put on the 1st verse of the 1st chap. of Genesis, by the combustion of hydrogen or oxygen, or other combustible gasses, created by the first cause, as stated in page 24 of this work. I have presumed that those gasses were ignited by the electric fluid, by the blaze of comets, or other igneous bodies, and that the extrication of the light and heat, formed by the combustion of these gasses, (in order to produce the formation of the aqueous

globes, destined thereafter, to originate the Earth, and the other Planets of our system,) that this light and heat formed the body of our sun, which formed the centre of the System, by the laws of His *gravity and attraction.*

If I recollect aright, heat and light have not, as yet, been discovered to have weight; but our means of ascertaining this by experience, in the usual way, is very dubious. The bulk of a grain of heat or light may, perhaps, be sufficient to fill a house; therefore, we could, perhaps, not ascertain the fact; but heat and light are certainly sensible bodies, and therefore must have weight. Heat expands and increases the dimensions of the hardest bodies in an astonishing manner. Light is said to travel from the Sun at the rate of twelve millions of miles a minute, and also penetrates the most dense substances. Although, therefore, the weight of these subtle agents be infinitely less than any other bodies we know of, they are, probably, subject to the same laws of attraction and gravity.

We may, therefore, conceive that the heat and light extricated from the combustion of these æriform substances, in the formation of the primordial waters, would unite and ascend, by the laws of their gravity and attraction, or by an original impulse of the Creator,* to their position in the regions of

* As Light is known to exist in two separate states, namely, latent and active; and as we are told in the 2nd verse of Genesis, Darkness was on the face of the deep, it is probable the Light evolved in the combustion of the gasses was diffused through the regions of space in its latent form, and was not elicited into its active and visible state until the time of the 3rd verse; and it is remarkable, that the first operation of Deity at

space, and form there the body of our Sun, and that the aqueous globes, as they were formed, and were projected by the projectile force, became subject to its attractive influences. (*Vide Note* 16.)

Whether this attraction be effected by an inherent power of the Sun, or, that it may be owing in part, to the influence of the vast stream of æriform substance, passing towards him, to supply him with fuel, I shall presently consider. I shall, however, previously make some remarks in addition to those offered above, on the idea of Buffon, of molten glass having formed our earth and the planets of our system.

It is, I consider, impossible to conceive, that glass could exist in the stupendous heat of the sun's fire, without decomposition, that is, without returning to its elementary principles.

Glass is formed in our planet of siliceous earth and pot-ash. The former we have before proved, on the authority of Linnæus, to be composed by the vegetative process; its parts are, therefore, formed of the gasses which the vegetable extracts from the water and air it imbibes for its nutrition. The latter, pot-ash, has also yielded to Sir H. Davy a metallic button. It is, therefore, an oxyd, and must contain much oxygen. Siliceous earth and pot-ash, the component parts of glass, are then, mostly composed of æriform substance.

We know that the diamond, which is, probably, much more dense than siliceous earth in other

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the time of the separation was the evolution of Light in its active and visible state, and the collection of it into one vast focus, the Sun of our system, as by the 4th verse.

forms, has been volatilized in part by burning lenses, or by streams of oxygen gas in a state of ignition. What can these heats be in comparison to the sun's fire? perhaps as an atom to a world.

I trust, therefore, it is more consistent with the sacred documents we have had handed down to us by our religion, with the operations of nature we are enabled to examine, with the admirable simplicity and order of the laws, by which the first cause has directed the operations of that nature, to believe, that *having first formed the principles, which in the present state of our knowledge, we must call elementary*, He proceeded by the combination of these principles, by combustion, to form the waters which were destined thereafter to produce our EARTH and PLANETS.

It is, indeed possible, that these elements, OXYGEN, HYDROGEN, and AZOTE, may be compounded of other final elements, of much greater energy than themselves, but the rules of science forbid us to consider *that* as the fact until we have found it by experiment. We have, therefore, only to carry our knowledge of these principles into our reflections on the construction of our system, and with humility, praise and adoration, to conceive, that as most, or all, the geological bodies we have analized, are found to consist of these principles, they may have been these with which, the FIRST CAUSE, with amazing skill and effect, has operated the wonderful system of Creation He hath bestowed on us.

In the contemplation of this Creation, and of the recent discoveries in pneumatic chemistry I trust to have

shewn the possibility, that our Sun may have been formed, at the time of the formation of the primordial waters of Genesis; and as before stated, I have considered the other planets of our system, and their moons, to have been formed in the same manner at the time when, by the creative mandate, the combustion of the gasses took place, and which, I consider, to be meant and recorded by the 1st verse of 1st chap. of Genesis. So I likewise conceive that our Sun, was formed at the same time, by the vast body of heat and light disengaged by the stupendous combustion, and that having found his position in the regions of infinite space, according to the laws of his nature, he exerted his attractive influences on the planets of our system, of which he became the centre.

We have now to consider by what laws the vast waste of the heat and light of the sun is replenished; and, as our conceptions thereon, will be found in some degree at variance with the hitherto received ideas of the nature of the spaces between the sun and planets, and the regions of infinite space, and bear also considerably on the nature of the sun's influence on those planets, we shall first make some observations on the

ATTRACTION OF MATTER.

It is said by philosophers, that all bodies are attracted to the earth's centre: all bodies thrown into the air from the earth descend to the earth's surface when the propelling force is spent, and the body is arrested by the atmosphere through which

it passes. It is said by Paley, page 449 of his Natural Theology, that "One principle of gravitation causes a stone to drop towards the earth, and the moon to whirl round it. One law of attraction carries all the different planets round the sun."—This, he says, philosophers demonstrate; and at p. 388 he adds, "Calculations were made some years ago of the mean density of the Earth, by comparing the force of its attraction with the force of the attraction of a rock of granite, the bulk of which could be ascertained, and the upshot of the calculation was, that the Earth, upon an average through its whole sphere, was twice the density of granite, or about five times that of water."

Now, respecting the principle of Attraction, I have to remark, that in Chemistry we know with certainty, that particles of matter have a mutual and elective attraction called Affinity. When an acid is united with a metal into a neutral salt by this attraction, it may be separated from it by any substance with which the acid or its particles have a greater affinity. Thus, if iron, or its oxyds, be dissolved in sulphuric acid, it forms green vitriol, commonly called copperas; but by adding an alkali to the solution, the iron precipitates, and a neutral salt is formed of the sulphuric acid and that alkali.

In a lake or pond in the isle of Anglesea, in England or Wales, the water holds blue vitriol or copperas in solution, which is a salt composed of copper and the sulphuric acid.

When iron hoops are thrown into the pond or lake, they become covered with copper scales,

which is scraped off, and found to be the purest copper in nature. This decomposition of the blue vitriol takes place because the particles of iron have a greater affinity or elective attraction for the sulphuric acid than the copper has.

The Load Stone is well known to attract iron, even in a cold state. Pieces of iron, rubbed with the Load Stone, become also magnetic: two pieces of wood, or cordage and wood, and probably many other substances, by friction to a great degree, take fire; that is to say, they become raised to that degree of temperature by that friction, that their particles attract the oxygen from the azotic gas, and from the light and heat with which they are combined in our atmosphere. Certain stones also, as flints, being struck against iron or steel, heat the particles of the steel so as to calcine them; that is, they bring these particles to the temperature at which they *also* decompose the oxygen gas of the atmosphere, and disengages its latent light and heat

Thus the attraction of Matter is *certainly* proved by Chemistry.

But how is the attraction of large and solid bodies proved in the usual temperature of the atmosphere, as in the case of the block of granite mentioned by Paley? One rock of granite, placed alongside another, will evince no attraction. It is said, indeed, that some islands, having much iron ore, have attracted a vessel from her course, which, if it be the fact, may perhaps also prove the attraction of matter of a certain description, but I know no other way by which the attraction or density of the rock of granite could be proved, but by

breaking it by some other body, and ascertaining the weight of the stroke, thus, if a hundred weight of granite required a stroke of a certain number of pounds to break it, and a rock of some other species required only a force of half that number, its attraction or density might be said to be half that of the granite; thus far, then, attraction would be proved by Chemistry and Geology also.

But, that the Creator originally fixed some such law as attraction for the cohesion of the particles of matter, appears highly reasonable, else, how should the Earth and Planets, travelling at such an immense rate in their orbits, be retained in their present forms, notwithstanding the power of such velocity of motion?

A ball of snow, when impelled by the force of the arm, if it be not rendered sufficiently dense by compressure, separates into innumerable parts, and it must have been the same with the Earth and the Planets but for some law of attraction or cohesion, to resist the attrition of their rapid motion through the heavens.

This attraction, then, of the particles of matter, seems to be indispensible to their existence as spheres, but the attraction of these for each other, though generally agreed to by the philosophers, appears more dubious and uncertain.

This doubt is supported by their immense distances; which may, indeed, be founded on a crude idea, and the doubt may perhaps be dissipated on further consideration.

The Moon is observed in its approach to occasion high risings or tides of the waters of the earth,

which recede on its retiring. This, it seems to me, is an almost incontrovertible proof that the atmosphere (for storms are often generated at the same approach of the Moon) and waters of the earth and seas are attracted by the Moon. If the Moon have this power, we may reasonably conclude that other planets have this power also, governed by certain laws of distance and dimension.

Now, as to the manner in which the Sun exerts its attractive influence on the Earth and the other Planets.

This attraction of the Sun is said, by the philosophers, to be the cause why the Earth and Planets, having been, originally, projected in a right line, do not move in that right line, but in their respective orbits round the Sun.

As to the opinions of these philosophers of the nature of the Sun's substance, I am not aware, except as above stated by Paley, that Buffon supposes it to consist of molten glass. I trust to have shewn in the foregoing pages the improbability of this, and that it is more probable to be a body of light and heat. His density, in that case, cannot be equal, bulk for bulk, to the density of the Planets, which are with reason considered to be inhabited, and must probably be formed of solid matter.—But as to the nature of the Sun's substance, I confess, I cannot conceive it possible that a body of such inconceivable heat, should consist of any thing else than gazeous substance. We know of nothing here below that can produce light and heat with more intensity, than the decomposition of oxygen gas. Why should we not reason by

analogy that the light and heat of the Sun are produced by the same means? All the other means we have of producing heat by burning glasses, or by friction, are derived from the Sun, and nothing is more remarkable in nature, in her general principles than uniformity of means. The principle of gravity is said to be the same in an apple falling to the ground, as in the motions of the heavenly bodies.

Is it not then impossible to conceive, that in the Sun's heat, solid or liquid substances, could exist undecomposed. The diamond is volatilized into vapours, and if I recollect aright, the perfect metals also, by the galvanic power. It has, indeed, been supposed by some, that the Sun may be habitable, that the heat of the particles of light is owing to their friction or attrition, in their passage to the Planets. By such a supposition, we should be forced to conclude, that the planets farthest off from the Sun were the most warm, which I imagine is totally contrary to probability, to the opinions of the greatest philosophers, and to the evidence of our own senses in the Planet we inhabit.

Now, but for the idea which has, hitherto, been adopted, that the regions of infinite space, or at least the spaces in which our Sun and Planets move, are in a state of *vacuum;* but for this idea, I should say, that the Sun is a mass of burning æriform substance, such as hydrogen gas, or some mixture thereof, which has the power of decomposing oxygen gas, and of throwing off its light and heat. The union of the bases of these gasses, oxygen and hydrogen, would form water, in the

state of vapour, which would either be directly decomposed again, by the Sun's fire, or otherwise be driven off into the heavens, and probably be in future decomposed, as happens in our atmosphere, by the electric fluid, or be otherwise condensed into aqueous globes, for the future formation of other heavenly bodies. (*See Note* 12.)

I shall now offer some observations on the above idea of the philosophers, on the existence of a vacuum in the spaces through which the planets move.

If we consider the projectile force to have been *ab origine* given to the Planets by the Creator, we may suppose, that this force was greater than what would have been required to produce their motions round the Sun, if a vacuum had existed, as thus; allowing the spaces between the Planets and the Sun, to be filled with an æriform substance, of vast tenuity, (and indeed that such immense spaces should consist of vacuum is nearly incredible) yet it would still be possible, that this æriform substance *should not impede* the motions of the planets; because, on the above supposition the projectile force would have been made so much *greater* than would have been required for moving these planets through a *vacuum only*, as the resistance of this æriform substance should render necessary to overcome that resistance by the projectile force.

Again, the force of the attraction of the Sun, allowing its substance to be æriform, and that such immense streams of gasses were continually pouring into it, as would be required to support its combustion, we shall find the force of this attraction

(hitherto so called) must be greatly increased; for, in addition to its own proper attraction, as a body of heat, light and æriform vapour, we shall perhaps find reason to conclude that this attraction must be greatly augmented by the vast streams of æriform substance, continually passing towards the centre of the Sun, for supplying its combustion and repairing the vast waste of its light and heat.

A small fire in a stove is sufficient to draw to it a strong current of air to support its combustion.

The power of currents of air on the earth and seas is well known to upset ships, trees, and houses.

The power of steam, also, will come under the same comparison; and according to its quantity, will raise almost any weight.

What, then, must be the effect and power of such inconceivable streams of gazeous substance, rushing through the heavens, as must be required to supply fuel for the Sun? And it appears to me, the power of the Sun to attract the Planets, at such immense distances, is hereby the more satisfactorily accounted for, as *they* are to be supposed solid spheres, while, as I have presumed, by my Theory of the Sun, *his substance* must be æriform, and of course, of much less density, bulk for bulk, than the Planets. If, then, we should adopt the idea that the heavenly bodies do *not* float in a vacuum, but should accede to the probability, that the intervening spaces are filled up with an æriform fluid for the purpose of supplying fuel to the Sun's fire, I humbly conceive we shall have found a satisfactory way of accounting for the influence of the Moon on our seas and atmosphere. If the fact be

certain, that the waters rise as the Moon approaches the earth, and recede as she retires from it, may not this phenomenon arise from the pressure exerted on the æriform matter above mentioned by the Moon, on its approach to the Earth, which pressure, at length reaching our atmosphere, presses on *it* also, and thereby on the Waters of the Ocean, causing them to rise and fall proportionably, and to occasion the NEAP AND DAILY TIDES?

Should we not, also, have, by the same theory, a plain and simple way of accounting for the great principle of attraction in the heavenly bodies? that, by a power similar to that which propels bodies forward on the earth and seas, or atmosphere, namely, the wind; so the heavenly bodies are propelled from their right line, and driven round their central Sun by this mighty current of æriform gasses in their courses towards the Sun?

Allowing the projectile force—(by which I understand Sir Isaac Newton to have meant the primary projectile force directly given to the heavenly bodies by their Creator)—allowing that force, and the attractive force of the Sun, to be the causes of the, nearly, circular motions of the Planets, still it appears to me clear, that this projectile force must be something very different from the species of impelling force which Paley, in his Natural Theology, speaks of in p. 390 of that work. "If it were possible," he says, "to fire off a cannon ball with the velocity of five miles a second, and the resistance of the air could be taken away, the cannon ball would for ever wheel round the Earth, instead of falling down on it." Now, if the ball were fired

off in a direction due north, it is evident, that in the course of the circle it would form, it must return by the south pole, to the place it was fired from, to north; and therefore, in every revolution, it would return in an exactly opposite direction to where it was fired off from; the force, therefore, by which it returns, could not be the force of firing off, because it returns in a line directly opposite to that force. (*See Note* 8.)

I therefore conceive the projectile force, impressed by the first cause on the heavenly bodies, is of an entirely different nature from the projectile force of a cannon ball.

May it not rather be something in the nature of the force of the current of gasses I have mentioned, as forcing the Planets into their rotatory motion round the Sun?

May not the projectile force, partake of the nature of electricity?

Referring to what we have said above as to the means by which the waste of the Sun's light and heat is replenished, we shall now make some observations on a very important sentence as to this subject, contained in Paley's Evidences of Natural Religion, page 392.

On the subject of the cause of the attraction of the Planets by the Sun, he there says: "Nor shall we find less difficulty in conceiving a conflux of particles incessantly flowing to a centre, and carrying down all bodies along with it; that centre being itself in rapid motion through absolute space; for, by what source is the stream fed, or what becomes of the accumulation?"

The principal objection of Paley, then, to the idea of a fluid or æriform substance existing in the spaces between the Sun and the Planets, and between each of themselves, is contained in his question, "By what source is the stream fed, or what becomes of the accumulation?"

If we allow, however, that the Sun is a body in a state of constant combustion, and that its ignition is supported in the same manner as terrestrial fires, (and without allowing this, we cannot, according to our knowledge of combustion, conceive how the fire of the sun is continued,) we shall meet with no difficulty in finding "by what source the stream is fed."

The spaces between the Sun and Planets, and also the regions of infinite space, if they be allowed to contain æriform fluids, (whether these be oxygen and hydrogen gasses, or a mixture of these, or of other inflammable gasses,) these inconceivable extents of space would certainly contain sufficient fuel to supply, not only our Sun, but probably all the Suns of the other systems that may exist.

It is, I think, proved above, that resisting medii may be contained in the planetary spaces, without retarding the planetary motions. Hydrogen gas, being thirteen times lighter than atmospheric air, and being very combustible, that is, easily uniting with oxygen, and thus setting free its latent heat and light, may therefore be supposed to form a great portion of these æriform medii, (*See Note* 12.) In fact, as we know of no such thing as a vacuum in any part of Nature around us, it seems difficult to conceive that the vast spaces between the heav-

enly bodies are in that staie, and this has no doubt suggested to the ancients the idea of the "*abhorrence of Nature of a vacuum.*"

By what means, then, a sufficient quantity of this æriform fluid can be found is, I trust, evident, and the question of the Archdeacon. "By what source is the stream fed," is answered. And the end to which the stream is applied, namely, the support of the Sun's waste by combustion, will also answer the other question, "What becomes of the accumulation? I answer, *it is consumed by the Sun's fire.*

If the medii then of the planetary and infinite spaces may be supposed to consist of hydrogen, oxygen, or other inflammable gasses, or a mixture of these, the hydrogen and the oxygen gasses, being drawn into the Sun, would be immediately decomposed, giving out their latent light and heat, and water would be formed in the state of vapour, which would either be also decomposed by the Sun's fire, or driven off into the heavens by its own elasticity, and there condensed into globes of water, destined thereafter, to form new Planets or Worlds, like those of our own system, and evincing the unceasing tendency of nature, in obedience to laws by which it is endowed by the Creator, to give life and enjoyment to countless myriads of beings; in which novel subject I shall treat in the sequel. (*See Note* 17.)

If the fact be founded, that the attraction of a Planet is formed by the attraction of its parts, and that therefore the power of its attraction is in proportion to the density of the Planet; then, if

we allow the Sun to be a body of æriform matter in combustion, its attraction must be much less, in porportion to its bulk, than the attraction of each of the solid Planets; and although its greater bulk may compensate for its inferior density; but, the current of æriform fluids which, to use Paley's words, "would be powerful enough to carry bodies down with great force towards a centre," will it not also account, in whole or in a part, for the attraction the Sun exerts on the Planets? As to these fluids being, as he says in another place, "powerless with respect to the motions which result from the projectile impulse;" I trust I have explained before, that the resisting force of these æriform fluids may have been counteracted by an additional power having been given to the projectile force to overcome that resistance; whereby it has happened, that, as he says again in page 393, "that resistance has had no sensible effect on the Moon's motion for two thousand five hundred years," and, I may add further, that these fluids *never* can have any such effect; and I trust to explain this more fully hereafter.

We now recur to Paley's observation in page 388 of his Theology of Nature, that "by a comparative calculation with the force of attraction of a rock of granite, the Earth was said to have twice the density of that rock, or about five times that of water."

Has the mode of ascertaining the force of this attraction of the Earth been grounded on the supposed force of the attraction of the Sun on the Earth and Planets? Has the Earth's attraction

in the above experiment been come at by calculating its proportionate bulk to that of the Sun, and assigning it therefrom its proportionate attraction? If so, and it should be conceded that the theory I have ventured to propose of the Sun's power of attraction, being created or increased by the streams of æriform fluid passing towards his centre, to supply him with fuel; if this theory be correctly founded in nature, it is evident the above experiment in the attraction of the Earth, cannot be correct in its results. The force of attraction of a body is composed of the united attraction of its parts; but, if the Sun's density have hitherto been considered by philosophers to be according to his powers of attraction, and it should be agreed to that the streams of æriform fluid have a great influence in producing that attraction, the density of the Sun must, in this case, be much less than it has hitherto been estimated at, and of course the density of the Earth also if it have been grounded on this supposed density of the Sun.

I now conclude the theory of the Sun's formation by some observations on the following extract from Paley's work, p. 380. Speaking of the intervening spaces between the Planets, he says, "that the intervals between them are made devoid of any inert mater, either fluid or solid, because such an intervening substance would, by its resistance, destroy those very motions which attraction is employed to preserve."

I have before endeavoured to shew, that there may be such æriform substances existing in these spaces, which would indeed resist these motions

of the Planets, but that this resistance is sufficient only to diminish the velocity of these motions. To explain this more fully.—May not the Moon have been originally projected by the Creating Cause to move in its orbit or course at the rate of three thousand miles an hour? and, supposing the resistance of the medii or æriform fluids of my theory to be equal to one thousand miles per hour, this resistance would only diminish the rate of the Moon's motion to two thousand miles per hour, which is about the actual rate she is said to travel in her course. (*See Note* 5.)

In fine, the theory of the Sun's being replenished with fuel by means of æriform fluids, is supported by another observation of Paley's. In page 350 of the above work, he says, "The light and heat of the Sun follow the same laws, and, to us, appear nowise different from the light of a candle and the heat of a coal fire." Why, then, may not this heat and light of the Sun be supplied in the same manner as that of the candle and coal fire?

In our Planet, this heat is now known to be produced by the decomposition of oxygen gas by those combustible bodies, and the consequent extrication of its latent light and heat; but if the light and heat of the Sun be generated by the same laws, and, as there is probably some physical cause for the attraction of the Planets by the Sun, as it is possible his great magnitude would not require less than the spaces between him and the Planets, and between each of them, to supply the æriform fluid for his combustion: and as this amazing current must have a great physical influence on the motion

of those planets round their central Sun, and may therefore throw additional light on the great principle of his attraction: I, therefore, humbly submit the foregoing Theory of the Sun's Formation and the means of supplying the waste of his combustion, to the scrutiny of a candid and enlightened world; and being sensible of my incompetence, in respect of that profound degree of scientific knowledge, required in the attempt I have made to reconcile and explain the account of the Creation, handed down to us by our religion, with the great discoveries in the science of geology, chemistry, and pneumatics; I have only to hope, I may, at all events, have exalted the *utility* of these sciences, by shewing their tendency and power to diminish or quiet the doubts of scepticism, and to open greater sources of our admiration of the GOODNESS, POWER, WISDOM, AND GLORY OF THE GREAT FIRST CAUSE. (*See concluding Note.*)

Having thus concluded my attempt on the system of Creation of our Earth and Planets, and of the formation of their Central Sun; with the means which I conceive may have been adopted by the Creator, to supply the vast waste of his combustion, we now proceed to the last part of our prospectus, namely, the Dissolution of our Globe, with the possible changes, which the present state of our knowledge would lead us to presume, would be the result of that

DISSOLUTION OF OUR EARTH.

By the authority of scripture, we are informed that the Globe we inhabit is doomed to dissolution

by the element of fire. We cannot, indeed, presume to say that the nature of this conflagration shall be the same, and be governed by the same laws, as those which take place at present, but judging from the hitherto immutable nature of those laws, we shall proceed to consider the principal changes which, according to them, would take place at this general conflagration. There are, indeed, many parts in the external and internal phenomena of the earth, which subject it continually to change and decomposition. The probable effects also, of its continual motion in the heavens, and the possible contact of other heavenly bodies, perhaps igneous, appear to confirm the destiny recorded in the scriptures.

The late discoveries, however, in pneumatic chemistry, have proved to us, that what had hitherto been considered as destruction by fire, is only a *change* or decomposition of the various combustible bodies, into the elements of which they are composed. A great proportion of the vegetable world, is found to be reduced by combustion, into elastic vapour, called gasses; and, it is not improbable, at least, if we assent to the facts stated by, and the opinion of Professor Chaptal, which I have before stated, on the productions of the vegetative process; and also, the still higher authority of Professor Linnæus, quoted above, whereby many of the primary earths and metals are proved to be the products of vegetation. I say, therefore, if we assent to these facts, it is not impossible, that the various earths and metals, and their combina-

tions, may hereafter be found to consist of compounds of the bases of the gasses of oxygen, hydrogen, azote.

In the foregoing system of Creation, I have stated that lead is found to gain an accession of weight by oxydation of nearly ten pounds in one hundred pounds, by the absorption of oxygen from the atmosphere. This oxygen, must therefore, exist in the oxyd in a solid state. Pit Coal and Pot-ash, are found also to contain oxygen and hydrogen in the same state, and the Schisti or Slate Mountains are also said to have been composed by the decomposition of vegetables, which are primarily composed of these gasses, and these Schisti therefore, probably in part consist of solid oxygen, &c. In fine, from these facts, and many others stated in the foregoing pages we have in the theory of Creation come to the conclusion, that the processes of vegetation and of animalization, were the machinery chosen by the First Cause, for the gradual production of all the geological bodies of which our earth is composed.

Now the marine vegetables of the waters or oceans of Genesis, can have imbibed their nourishment from these waters *only*, and must have had the power conferred on their natures, to decompose these waters, and to recompose by the process of vegetation (as we find to be the case in terrestrial vegetables,) a vast variety of new productions, all of which, however dense, must have possessed the constituent elements of water, *oxygen and hydrogen*. for their *final* elements.

The depositions then, of the marine vegetable

world, having formed a certain, and very great proportion of the geological bodies of the earth; the remainder of them we have conceived to have been formed by the depositions of the marine animals. The habitations or shells of these, we have shewn in various parts of the foregoing theory to compose a considerable portion of the earth, and the vast generations of these animals, after their decay and decomposition have, no doubt, according to their affinities and gravities by their depositions, formed or entered into, the structure of the remaining geological products.

In the course of our theory, we have endeavoured to shew, that the vast Chalk and Lime-stone formations of the earth, may also have been the result of the decomposition or disintegration of these marine shells. On this subject, we have to add one observation, bearing considerably on our present object, namely, the *final* elements of the geological bodies. It is, that Chalk and Lime-stone, being carbonates of lime, must also, therefore, consist of a great proportion of oxygen in a solid state, their carbonic acid being compounded of oxygen and carbo. Lime itself, also has, if I mistake not, afforded Sir H. Davy a metallic button; it is therefore an oxyd, and contains oxygen in the same solid state.

The marine animals, again, of the waters of Genesis, whether they derived their nutrition directly from those waters, or from the plants contained in them, or both, must finally have been composed of the constituent elements of water, the *only* mode of nutrition of those plants. But it is

possible, and even probable, that the marine animals had the power of decomposing the imbibed air of the atmosphere, by which they would obtain another elementary principle, *Azote*. This is an æriform substance, which is always found to be produced by the remains of terrestrial, and, no doubt, marine animals also.

Thus we are led to suppose the final elements of all geological bodies, and of the marine plants and animals of the ocean, and of the vegetable and animal productions of the earth to have been *ab origine*, OXYGEN, HYDROGEN, AZOTE, HEAT, and, perhaps, LIGHT AND ELECTRICITY; and that the immense variety of proportions of these constitutes the distinctive characters of those bodies.

Now, in the event of the dissolution of the Globe by fire, the consequence would be, (as combustion is now known to be nothing but the extrication of light and heat, or caloric, by the decomposition of the oxygen gas of the atmosphere, and the subsequent absorption of its oxygen by the combustible body,) that the elements of all combustible bodies would enter into new combinations. The waters of the oceans, if not directly decomposed by this vast combustion, but, merely evaporated into vapour, would probably collect together, be finally condensed into water, be attracted together into vast bodies, and form *Oceanic Globes*, which must obey the laws of gravitation and motion, and would thus form the matrices of future planets.

On the contrary, should the watery vapours of our earth and ocean be drawn into the conflagration

at this dissolution, and be decomposed by the intensity of its heat and the contact of the combustible bodies, which is indeed probable, these vapours would thereby be resolved into their primary elements, oxygen and hydrogen, in the state of gasses. A great proportion, also, of the vegetable and animal creation would immediately be decomposed into these gasses and the azotic gas.

The earthy, mineral, and metallic substances of the globe, many of which we have shewn in the foregoing pages of our theory to contain an abundant quantity of these gasses in a solid state, would be partly decomposed into these primary elements, and the remaining more indestructible parts, if not decomposed by the heat of the conflagration, would be resolved by it into vapours, for we have found, as before stated, that even by the comparatively small degrees of heat which the art of man has discovered, the diamond, and some of the perfect metals, have been resolved into *such* vapours: and, allowing even that these metallic, earthy, or mineral vapours, should not be decomposed into their final elements even by the heat of the conflagration, they must, after the combustion, be collected into vast bodies, mix with the other gasses resulting from the decompositions above stated, and, probably, by the agency of chemical affinity, find their decomposition effected by these gasses; or, otherwise, their decomposition into the primary elements of oxygen, hydrogen, and azote, may be finally effected by the *electric fluid.*

Thus, although it may be the design of Providence to put a final period to the present state of existence

of our globe; yet, as the primary elements of which we have conceived it to be composed, are indestructible in the present state at least of our knowledge, these elements must unite to form the materials of a new state of existence; unless, indeed, counteracted by the divine ordinances, by which these very elements themselves should be annihilated.

Now, that this globe is destined to dissolution is, I have already mentioned, probable, from many facts in its external and internal phenomena.

Its pit Coal, sulphureous and nitrous combinations and the inflammable and other gasses it produces, and the tendency of these to produce earthquakes and volcanoes, may not operate sufficiently deep in the earth to produce its total dissolution. This is indeed more likely to arise, from its various motions in the heavens, and the possible contact of igneous bodies, as Comets &c., and it may form a part of the design of the Creator, that the heavenly bodies should thus be subject to continued changes: yet, would it not appear consistent with the unceasing evidences we have of His benevolence, to suppose, these changes are *not to destroy* the final elements of His creation; but to *produce* higher and better states of existence by their instrumentality?

Assuming therefore, that the conflagration we are considering, has finally decomposed and resolved by combustion, and the power of mutual affinity, or by the electric fluid, all parts of the earth and oceans, into the primary elements *Oxygen*. *Hydrogen and Azote*, or other elements, we have now

to consider how these would *recombine* to form other heavenly bodies. These primary elements, having been drawn together by the laws of affinity or attraction, would probably be soon ignited, and brought into combustion by the electric fluid, or the light and heat of the general conflagration. The hydrogen gas, would then unite with the oxygen of the oxygen gas, whose light and heat or caloric would be set free, and the formation of *watery vapours* would ensue. These condensing in the course of time, (for it is probable the light and heat of the conflagration would, by laws of its gravity, find its way to the higher regions of infinite space and form the Sun of the newly created system) while these newly formed vapours, condensing in the course of time, would form oceanic globes, which, also, in obedience to the same laws of gravity and attraction, would be attracted or driven, according to our theory, round their central Sun; and being endowed by the powerful and benevolent ordination of the first cause, with the most abundant prolific and plastic powers for the generation of plants and animals; these would, exactly in the same way (by which, as we have stated in our Theory of Creation,) the waters of Genesis produced our Earth, so the plants and animals of these new aqueous planets, would be continually tending, in the course of sufficient ages, by their vast accumulation, their death, decomposition and depositions, according to their affinities and gravities, they would be thus continually tending to form the solid parts of their globes, which, by the laws of gravity, would be attracted more or less near the centre, and these depositions would

thus accumulate, until the land should finally appear on the surface of these waters.

We must then, suppose the same benevolence and power of the Creator would be exerted to bring plants and animals on this part of its creation, endowing them with life and enjoyments of such degrees of eminence in the scale of being, as His providence might be pleased to direct.

Thus, we have cause to believe, from our evidences of the benevolence of the Deity, that the globe we inhabit, if destined to combustion, may be, thereby, changed into another, and more perfect state of existence, and its inhabitants be gifted with greater blessings, and we shall now venture to draw a conclusion from the foregoing observations on the dissolution and reproduction of the globe; namely, that although we are told in Scripture that this dissolution will take place, and the inhabitants then on earth will perish, yet as we have stated, that "it would be more consistent with the unceasing evidences we have of the benevolence of the Creator, to suppose these changes are not to *destroy the final elements* of his Creation," and, as we have accordingly supposed these elements will only assume a new state of being, we therefore now draw our conclusion, *that*, as the final elements of the corporeal substance of *man*, could only then in common, with those of other elements, assume a new state of combination; so we conceive that the benevolent Creator (having in the present life given to him these high powers of intellect, and those hopes of a better state of existence,) has also arranged some plan, by which the elements of these

bodies, and by a parity of reasoning, the elements of those who shall have died previous to the conflagration; some plan, I say, by which the elements of these bodies shall be re-united to the souls of which they formed the matrices on Earth, and that with them, they shall be endowed with a better and more perfect state of existence, as foretold and promised in the scriptures.

The elements of those human bodies, must otherwise be left to the disposal of a chance combination, and might thereby, enter into the reproduction of inanimate substance. We cannot conceive this to be part of the design of the source of truth and benevolence; and we therefore believe, that this *very indestructibility of the laws of nature*, and her eternal tendency to form (as we have attempted to shew above) new combinations of matter offer a proof, also, of the distinct destined existence, and of the immortality of the *soul of man*. (*See Note* 6.)

Having now finished these considerations on the Creation, Dissolution, and Reproduction of our Globe, in a new state, I shall only mention, that, reasoning from analogy, we may conceive the other systems of the heavenly bodies, to have been formed by the same laws of nature, instituted by the Omnipotent for that purpose. But we are told by a great poet, "Presume not God to scan," and as I agree with that idea, inasmuch as that we ought not to venture so to do, beyond the data and facts, which He has placed in our view, so I have limited these observations to our system; humbly conceiving I have in some measure shewn, that the geology of our globe, and our latest discoveries in

pneumatics, will warrant the conclusion I have drawn from the foregoing facts and experiments.

In the theory of the Sun I observed, that the water formed by the combustion of the hydrogen gas, in supplying him with fuel, might, perhaps, be condensed into globes of water, destined hereafter to form new worlds or planets, like those of our own system, by the means we have detailed in the theory of Creation.

I have now only to add, that we may well conceive this possible, from the incessant proofs of power, wisdom, and benevolence, we are permitted to discover in the operations of the Creator; that, in fact the recent discoveries of our astronomers, of Planets never before observed by the vigilance of those of former ages may be a proof that new formations of heavenly bodies are always taking place; and, that as we cannot presume to limit the attributes and power of a first cause, so the reproductive and plastic powers with which He hath endowed the laws of nature, may be found in continual operation for the production of other systems of heavenly bodies, and that the Almighty attributes and energies may be thus continually giving life and enjoyment, in a scale nearly infinite, and advancing, perhaps, incessantly in displays of His Goodness, Power, Wisdom, and Glory. (*See the latter part of Note* 17.

APPENDIX.

The following Notes and Illustrations are recommended to the reader's attention as illustrative of the THEORY OF CREATION, *and particularly as containing observations on the late discoveries in Geology.*

Note 1. It may, perhaps, be thought by some, that allowing the processes of vegetation and animalization in the waters of Genesis, to have produced, by their decomposition, all the materials of the Geological productions, yet, that the quantity of deposition required to form the Earth, would be more, than they can conceive, could be produced by the vegetables and animals of these seas or waters; but, one single fact, which I shall mention from an ingenious publication, on the *animals and monsters* of our oceans, will, perhaps, satisfy their doubts on this head. It is stated in that publication, "that the offspring of *one single herring*, being suffered to remain unmolested in the sea, for twenty years alone, would produce more than sufficient to form in bulk, *ten* such globes as we inhabit;" and if, according to the system I have offered, it be conceded that the design of the waters of Genesis, was to form and produce the Earth by

these depositions, we may reasonably presume, that vegetable and animal life, were abundantly prolific to produce that end.

Note 2. I here insert some observations on the composition of the granite mass, which is supposed by some geologists, to form the internal parts of the Earth or frame work of the globe.

This mass is composed of the assemblage, sometimes in thick, sometimes in very thin laminæ of various kinds of mineral substance, such as quartz, mica, jasper, &c. all of which substances, again, are composed of the various *primary* earths, lime, magnesia, silex, alumine, barytes or terra ponderosa. The granite mass, then, is ultimately compounded of these primary earths, most of which, we have shewn to be produced by the decomposition of vegetables and animals; and that this mass has been, originally formed in, and deposited from a fluid, appears to me proved by the chrystals of quartz, minute scales of mica, and its appearance of so fine a granular structure, and more especially, the visible layers and laminæ dispersed throughout that texture. I have counted above twenty layers of a white substance, in a pagment of granite a foot square.

Now, had the granite mass not been formed by the gradual decay, decomposition, and deposition of marine vegetables and animals, as we have stated in the theory of Creation; had its materials been formed at once in the waters of Genesis, the various substances composing it, (the mass) would have united according to their mutual affinities, and been

precipated according to the laws of their gravity, in vast homogenous masses; but, the visible depositions of part of it, in layers and laminæ, seems to confirm the opinion of their having been deposited in the course, perhaps, of numerous ages, from the decomposition and depositions of vegetable and animal life.

Thus, the granite mass gives, also, evident proofs of formation in fluidity, and although, from its more ancient formation, no instances of visible vegetable or animal remains may be found in its interior; yet, as we know that water of itself deposits nothing, but what it has held in previous solution, either partial or complete, and, as we know of no other source, from which the substance of this solution could be derived but the waters of Genesis, but from vegetable or animal decomposition, and as we have seen, by the foregoing theory and data, that vegetable and animal decomposition affords the materials of which the granite mass is composed. I trust, we are warranted in the conclusion, that having been deposited, and lain many ages previous to the deposition of the secondary and tertiary strata, and *that*, in a state of moisture, all its vegetable and animal organization has been destroyed from that cause, and those of compression, internal heats, and the electric fires of the Earth; and that this granite mass, has been produced by the same means, which appear to have been chosen by the Creator, for the construction of the more external parts of the globe, namely, the generation, decay, death, decomposition, and deposition of the vegetables and animals of the waters of Genesis.

Accordingly we find in the review of the third edition of Lyell's principles of geology, it is stated, that "the experiments of Watt prove that a rock need not be perfectly melted, in order that a rearrangement of its component particles should take place, and a more chrystalline structure ensue. We may easily suppose, therefore, [says Mr. Lyell,] that *all traces of shells and other organic remains* may be destroyed, and that new chemical combinations may arise, and according to these views, gneiss and mica schisti, may be nothing more than micaceous and argillaceous stones altered by heat, and certainly, in their mode of stratification and lamination they correspond most exactly. Granular quartz, may have been derived from siliceous sand stone, compact quartz from the same. Clay slate may be altered shale, and shale appears to be clay, subjected to great pressure.—Granular marble has probably originated in the form of ordinary lime-stone, having in many instances been *replete with shells and corals now obliterated*, while calcareous sands and marts have been changed into impure chrystalline lime-stones."

I have, chiefly, made the above extract from Mr. Lyell's work, in answer to the objection stated in the preface of my theory, made by Mr. Fairholme, regarding the granite mass; and I trust, it will prove, that although, this granite mass contains at present no organic remains; yet, it may have contained them originally, and that they may have been destroyed by the heats, fires and consequent change or fusion, the mass has undergone from those or, perhaps, from electricity. In fine, I must

here repeat, I find no cause, after the perusal of the latest works on geology, to vary from the theory of Creation, I now venture to present. On the contrary, I find several of the German geologists have adopted the same opinion, namely, "that vegetable and animal life have been the cause of the production of the solid portion of the Earth."

I therefore, must adhere to the opinion I have stated, in the 11th Note, that the discoveries of the marine organic remains, will be satisfactorily explained by this theory, and the necessity of supposing the Earth more ancient, that is, since the separation, than by the Mosaic account precluded; and I now conclude this note with an observation from Sharon Turner's Sacred History of the World. "Therefore, [he says,] it appears to me most probable, that whenever the *right theory* of the fabrication of our Earth, and the era and succession of its organized beings shall be discovered, it will be found to be compatible with the Mosaic cosmogony, in its most natural signification."

Happy should I be, if the theory I am now presenting to the world, should in its estimation be found to approximate to this description.

The late discoveries in geology of Baron Cuvier, Lyell, and Buckland and others, as they comprise not more than one mile of the depth of the Earth, (being no more than an eighth part of its diameter) do not in the least invalidate the theory I have formed, which comprises the entire of that diameter. I, however, repeat and extend here, the observations I have made already in these Notes.

First, that Baron Cuvier in his computation of

the distance of time, namely, 5 or 6,000 years, (at which he places the date of his revolution as the result,) does not state by what comparison or scale he arrived at his decision; and it is difficult to conceive any scale he could have had, except a known quantity or depth of deposition from rivers or lakes in a given time. If this, however, be the source on which he has founded his computation, I cannot but consider it a very insufficient one. The power of deposition of lakes or rives could no more be compared to the quantum of that power possessed by the waters of a deluge, or the primeval oceans, than the currents of those rivers or lakes could be to the almost inconceivable force of the waters of a deluge overwhelming a great part of the earth.

I should therefore humbly suggest the query, that the period at which these fossil deposits of the bones of terrestrial animals may not ascend higher than the time of the Deluge of Noah, and the circumstance of no human bones being found in the particular place of these discoveries, has been owing to those parts not being then inhabited by our species.

Or, secondly, allowing him to be correct as to the period of 5 or 6000 years, at which he dates his revolution, and which, as he says, "has buried and caused to disappear the countries formerly inhabited by man, and the species of animals now most known, that, contrariwise, it has left the bottom of the former sea dry, and has formed on it the countries now inhabited." I would ask, is not this period, which agrees very nearly with the time of the separation of the Mosaic ac-

count, equally well accounted for by *that* separation, and, therefore, instead of the countries formerly inhabited "by man having been then buried and caused to disappear," shall we not rather say, that the Earth was *then separated from the seas* in which it had, according to our Theory of Creation, been formed, and that soon after this period of the separation, *Man was created.*

This Theory will also equally account for the present appearance of those marine deposits and organic remains now found at the greatest depths of the Earth to which mankind have yet penetrated. All these marine exuviæ and organic remains, and the strata under which they are deposited, are satisfactorily accounted for by the construction of the 1st verse of Genesis we have formed as the basis of the theory of the foregoing treatise; and which construction has since been sanctioned by the eminent Geologists and writers already specified.

I have only to add some observations on the Review of Lyell's Principles of Geology, of April 1835, on the subject of the antiquity of Mount Etna. "It is thus," it is said, "that volcanic formations confirm the evidence afforded by the sedimentary strata of the immense antiquity and lengthened duration of even the most recent geological æras." But is it not probable that the eruptions of Etna were much more frequent long after the time of its first eruption than what they have been since? Is it not probable the causes which produced that first eruption have since been greatly diminished by the numerous flowings of lava; according to the force

of the cause, so must have been the number and frequency of those eruptions, and their frequency at first cannot be estimated by the eruptions which have happened in our times. The age of this mountain may, therefore, may be very far less than a computation formed on the frequency or deposits of its late eruptions would make it. The eruptions, also, may have begun long before it emerged from the waters of Genesis, and these sub-aqueous eruptions been deposited before the separation of those waters.

Note 3. It remains now to offer some observations on the Salt formations of the Earth.

These formations offer strong evidence of our theory of the waters of Genesis. This salt, occasionally called common salt, sea salt, or marine salt, is entirely a creature of the ocean: no terrestrial vegetable that I know of has ever produced it, except when growing nigh the salt water.

These vast formations, found in various parts of the Earth, must have unquestionably originated from saline waters; and one way, in which the separation of the salt from the water which held it in solution, may be accounted for is, that parts of these seas have been swallowed up by earthquakes or volcanoes, and their water exsiccated by internal fires; or, that these parts of the seas have, by some revolution, been separated, and not being replenished by any rivers, have been gradually dried up by the Sun.

But, I should suppose the quantity of salt produced by these accidental causes, would not, nearly

amount to the vast salt formations of our Earth. Some intentional operation of Providence for their production is most likely to have been the cause of the production of an article so indispensible for the use of man; and, I therefore conceive, it is more probable these formations have derived their origin from vast depositions of the marine plants of the waters of Genesis. These must have contained this salt in abundance, as do the marine plants of our seas; and the other products of their decomposition have united, according to their affinities, to form other Geological bodies.

Note 4. It seems, indeed, almost impossible (supposing for a moment the idea of Buffon were founded as to the origin of our Earth,) to conjecture, by what means its waters could have been subsequently obtained. A body of molten glass would, necessarily, assume a spherical form in the heavens; and it seems not probable or possible that such vast cavities as the beds of the seas or oceans could have been formed on it by its motions.

Again, vitreous substances do not contain the elements that produce earthquakes and volcanoes. Hydrogen or inflammable gas is probably required for that effect, which is not contained in glass; therefore, the vast cavities of the ocean could not arise from internal commotions; but, even allowing them to have been produced by some unknown cause, how is the origin of the waters to be come at? Water is, I believe, sometimes generated in our atmosphere by the combustion of hydrogen; but this is as a mere drop in the ocean compared to the

general cause that produce our rains. In fact, it could not, consistently with the safety of the productions of the Earth, or even that of their embryos at the time of their formation, have been made a general law for the purpose of producing the waters of the oceans.

On the other hand, the system of the formation of the earth, from waters generated by combustion, appears to be a more natural and satisfactory solution of the phenomena of creation.

The waters formed and endowed, as we must conceive, according to the design of the Creator, with the most prolific powers of generating plants and animals, produced gradually sufficient deposits to form the Earth.

I have stated in *Note* 1, that a single herring, unmolested for twenty years, would, as it has been computed, produce *ten* of our Globes; and, allowing it to produce only one Globe, what must the depositions of all the vegetables and animals of the waters of Genesis amount to? In fact, on a consideration of the probable powers of deposition of these waters, and of the small proportion the known parts of the land bears to our oceans, we might be inclined to conjecture that there may be vast tracts of land on the Globe yet undiscovered.

Note 5. It may be observed further respecting this resistance of the æriform medii of our Theory, that, as our system itself, and I believe also the fixed stars, are allowed by Astronomers to have some progressive motion, and which must be owing to the principle of attraction towards some

centre; therefore, the resisting æriform medii must move the same way also in their courses towards the Sun, having thus two motions; they must be thus attracted towards the same centre as our system is said to be; the resistance they give to the Earth and Planets in their rectilinear motion, though it may thereby diminish the velocity of that motion, yet it cannot "destroy it," these æriform medii being themselves under the influence of the same attraction towards an unknown centre. (See Note 8 in confirmation of this.)

This idea of a general motion of our system, and of the fixed Stars, will be found in the work I have so often quoted, Paley's Natural Theology. He states, if I rightly remember, "that the fixed Stars have certainly small motions," and considers them to be attracted to a centre; and if this be really founded in fact, it certainly offers one of the grandest ideas of the Deity the mind of Man can conceive, namely, that if all the Systems of the Heavenly Bodies thus move round one common unknown centre, may we not conceive *that* centre to be the *Empyreal Throne of God* mentioned in the 4th chapter of Revelations? from whence He beholds continually the immense operations of His hands, performing their revolutions round Him?

The above idea of universal attraction also offers another very important one, of the cause of the Projectile Force or rectilineal motion of the Planets of our system, namely, that this universal attraction to a common centre IS that cause?

Since writing this Note I have seen the substance of its last paragraph confirmed by the elo-

quent discourses of Dr. Chalmers, lately published, on the Christian Revelation in connection with the Modern Astronomy.

Note 6. The reasoning in this work, in page 47, is grounded on the idea, that the entire substance of man, including the soul, is not destined to perish with the material substances of the globe. On that idea I have supposed, that the corporeal parts of his frame, may be, by some arrangement of Deity, reunited with the soul or intelligent part; but should the future state of existence be one altogether *spiritual*, the constituent elements of the body, may then, perhaps, enter into indiscriminate combinations with other matter; all I wish to infer from the reasoning offered on this subject, is that the intelligent spirit or soul of man is *indestructible*.

Note 7. I wish, now, to call the reader's attention to the ingenious and profound researches of Mr. Cuvier in geology. It appears that as the result of these researches, he comes to the conclusion, "that if any thing be proved by the geology of the Earth, it is, that a great revolution took place on it from 5 to 6,000 years ago," anticedent too, to the existence of man on those parts at least, of the Earth, for he is said to have proved, that no vestige or organic remains of the human species has ever been discovered, among the remains of the other animals found among the strata or deposits he treats of.

The period at which he states, this revolution to have taken place, agrees very nearly with the

scriptural account of Creation. We know, therefore, that man then existed, in some parts of the Earth, though he had not spread over much of its surface. We have, in concurrence of the opinion of this great revolution, Plato's account of his Atalanta, supposed to be the extent now covered by the Atlantic ocean,which, according to Plato's opinion, was formerly dry land.

That it is possible such revolutions may have taken place since the Creation, is not to be doubted. The oceans may, in the course of time, have worn away those boundaries that had prevented their overflowing extensive tracts of the Earth, or the power of earthquakes, or volcanic fire may have produced a disruption and carried away the barriers of the ocean. It is, however, to be observed, that it is singular this opinion of Cuvier's is not supported by any account in the scriptures. Had such a great convulsion taken place soon after the Creation, is it not probable some oral tradition would have reached the time of Moses, or other scriptural writers, just as we have handed down to us the account of the deluge of Noah?

It were to be wished, therefore, this eminent Geologist had turned his attention to the waters of Genesis; as, I cannot but think, he would have therein found a more plain and easy solution of the phenomena he has so ably developed. The one mile of strata containing the remains on which he treats would, probably, have been deposited by these waters in a very limited period, previous to the separation of those waters of Genesis, which would satisfactorily account for the non-appearance

of any organic remains of the human species in these strata, because, it had not at that period been yet created, and it would equally well account for those fossil and organic remains of the marine animals he had found in those strata, and the vast period of time, namely, millions of years, he and the other late geologists conceive these strata have required for formation, would be also accounted for.

In fine, there is good and powerful reason to believe the account of Creation must have been delivered to Moses by divine inspiration. It is not likely, that he of his own ideas, or even from any traditionary account could, in those times, have possessed that extension of thought, that would have enabled him to frame such a system, or to form the conception that the Earth was produced in a globe of water.

That it has been so formed, has not been discovered by science until the present day, nigh 6,000 years after its separation from those waters; and as I have said in the body of this work, we have no historical account of *any but* the waters of Genesis, to which we can refer the phenomena of the Earth, so I trust to have proved, that the best discoveries in geology and pneumatics are calculated to shew the real and necessary existence of those waters, and to add new forces to the authenticity and authority of the holy scriptures.

It is, moreover, to be observed, that Cuvier gives us no scale, by which he has decided on the time of this revolution to have been 5 or 6,000 years; and it is very difficult to conceive what data he *could* have. The time taken by rivers or lakes to

form deposits of a known thickness would avail him nothing, as their power of deposition could not be compared to that of a deluge. May it not, therefore, be possible that the revolution he refers to, may have been that of the deluge of Noah in parts of the Earth not inhabited by the human species.

Note 8. It is said, indeed, by philosophers, that a body once put in motion, if all resistance to it were taken away, that the body would continue to move in its course forever; that is a case, however, which never can be proved by actual experiment, and it must rest solely on the opinion or arguments of those philosophers.

If, however, the above supposition of perpetual motion of bodies moving in a vacuum be founded in nature, and that the heavenly bodies are made to move in a vacuum, to obtain the object of perpetual motion; we may, in addition to what we have observed in Note 5, on the subject of universal attraction to an unknown centre, remark, that this universal attraction, (supposing our theory of the regions of space being filled with æriform medii to be correct) may be the cause which prevents the diminution of the projectile force in the courses of those heavenly bodies through those æriform medii.

Note 9. It is true, that only some of the earths and none of the metals have yet been decomposed, and are therefore considered as simple substances. Carbo, however, which would appear to be the

chiefly *solidifying principle* of the vegetative process, is well known to be susceptible of receiving the gazeous state by combination with oxygen into carbonic acid gas. If any method should ever be discovered of separating the oxygen from this carbonic acid gas, the carbo would be found again in its solid state. Chlorine gas also, when united with hydrogen by congelation, is found by a late discovery to assume the solid state, in the shape of chrystals more than one inch long. This modern experiment is of great importance, as it proves that two gazeous bodies can, by their combination, form a solid one.

As I have often repeated, also, in the body of this work, and in these Notes, all the metallic oxyds and several of the earths and alkalies must contain a great quantity of oxygen in a solid state.

The most dense nature of bodies, therefore, is no proof that they may not be composed of æriform substance, and a vast and most important field of discovery is, probably, yet reserved for pneumatic chemistry, namely, the separation of the gasses from the caloric, and the light which retains them in that form, and the obtaining *their bases in the solid state.* As a proof of the vast importance of *such a discovery,* we now suggest, that the nutritive parts of the vegetable and animal kingdom must be composed (if our theory in the foregoing work be well founded,) of the solid bases of those gasses; the discovery, therefore, of obtaining these bases separate from their heat and light, may possibly offer a mode of forming *nutritive matter* not yet known to mankind.

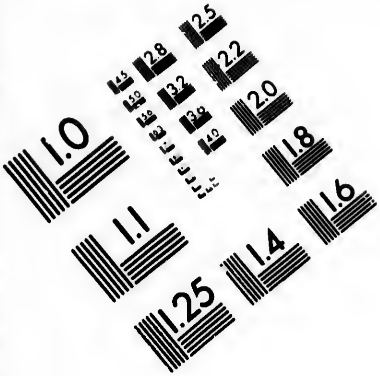
Note 10. Thus, by our construction of the 1st verse of Genesis, it would appear that the present actual state of the geological bodies, their frequent chrystallization and their gradual depositions in strata and laminæ, can be reconciled to the scriptural account. That chrystalization and these strata and laminæ must, according to the evidence of our senses, have required numerous ages for their formation and deposition. By the supposition that the time of the 1st verse was antecedent to the six days of the separation, the time required for these depositions is obtained, and they are satisfactorily accounted for; and also their having the appearance of *gradual* deposition which they present to us. As it would appear, therefore, by our theory, that the Creator has formed the Earth by these natural laws we find every where established, we shall now with humility suggest, that the true meaning of the 4th commandment is, that in six days the Lord *prepared* the Earth.

Note 11. Having just now obtained a sight of the late publication of Lord Brougham of last year, 1835, I here subjoin an extract from it, describing the late discoveries of Fossil remains by Cuvier, Buckland, and other Geologists, to which I add some observations bearing on the relation of these facts to our theory of creation. In page 33 of his work, Lord Brougham observes, "the discoveries already made in this branch of science, (Geology) are truly wonderful, and they proceed on the strictest rules of induction. It is shewn, that animals formerly existed on the globe, being unknown varieties of

species still known ; but it also appears that species existed, and even genera wholly unknown, for the last five thousand years. These peopled the Earth as it was, not only before the general Deluge, but before some convulsion, long prior to that event, had overwhelmed the countries then dry, and raised others from the bottom of the sea. In these curious enquiries, we are conversant, not merely with the world before the Flood, but with a world which, before the Flood, was covered with water ; and which in far earlier ages, had been the habitation of birds and beasts and reptiles. We are carried as it were, several worlds back, and we reach a period, when all was water and slime, and mud, and the waste without either *man or plants*, gave resting place to enormous beasts like Lions and Elephants, and River Horses, while the water was tenanted by Lizards, the size of a whale, sixty or seventy feet long, and by others, with huge eyes, having shields of solid bone to protect them, and glaring from a neck ten feet in length ; and the air was darkened by flying reptiles, covered with scales, opening like the jaws of the crocodile, and expanding wings, armed at the tips with the claws of the Leopard. No less strange, and yet no less proceeding from induction, are the discoveries made respecting the former state of the earth ; the manner in which these animals, whether of known or unknown tribes, occupied it ; and the period when, or at least the way in which they ceased to exist.—Professor Buckland has demonstrated the indentity with the Hyenas, of the animal's habits that cracked the bones which fill some of the caves, in order to

come at the marrow; but he has also satisfactorily shewn, that it inhabited the neighbourhood, and must have been suddenly exterminated by drowning. His researches have been conducted by experiments with living animals, as well as by observations on the fossil remains."

I have now to observe; it is to be regretted that the geographical position of these discoveries is not mentioned by his Lordship. If they had been found in the vicinity of the countries inhabited before the Flood, by Noah or his ancestors, it is singular that no writtten or oral tradition is given (at least that I am aware of) by Noah or his descendants, of this convulsion before the Flood. "We reach a period, says his Lordship, when all was water and slime and mud, and the waste, without either man or plants gave resting place to enormous beasts &c." If this period of time therefore, is to be supposed as having been between the Creation and the Flood, it must probably have taken place in a part of the world very remote from the country inhabited by Adam or his descendants, before the Flood, and if there were as is stated "no plants" growing in these resting places for these "enormous beasts like Lions and Elephants and river Horses," whence did these animals get their subsistence? If no subsistance were prepared for them in these resting places in the land, is it not probable these "enormous beasts" may have been marine or amphibious? I must therefore, say, that the circumstance of their being no tradition handed down to us by Noah or his descendants, of so great an event as this convulsion, coupled with the fact, admitted by the Geologists



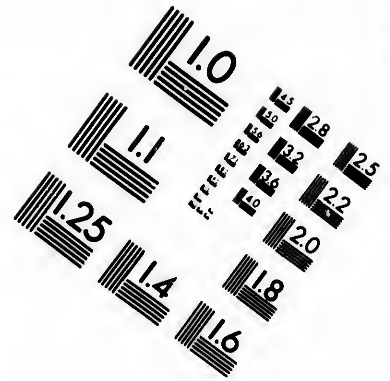
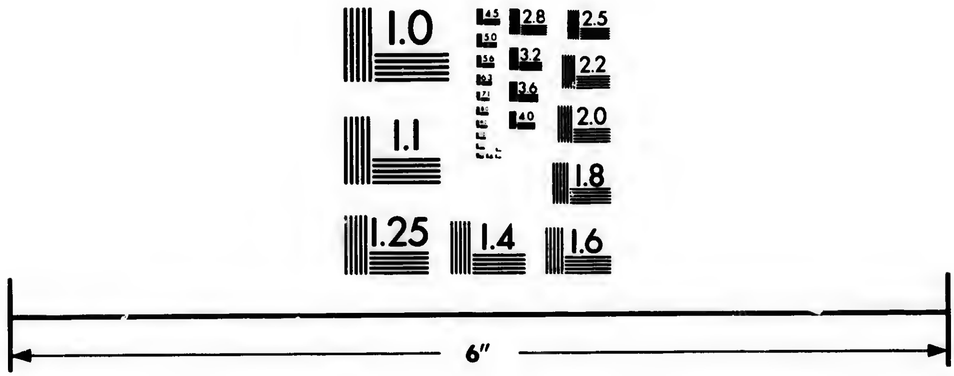
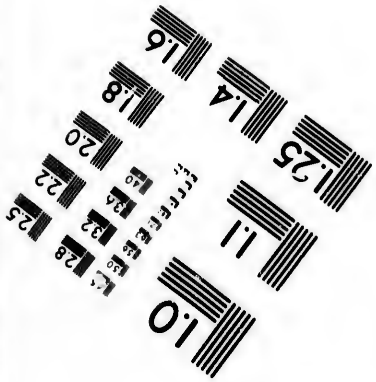
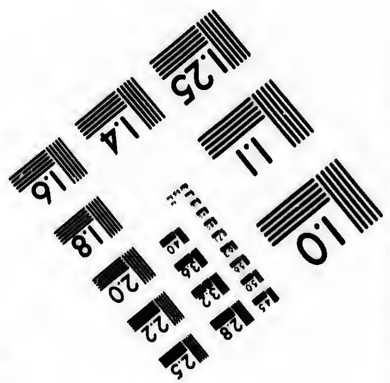


IMAGE EVALUATION TEST TARGET (MT-3)







who have narrated these discoveries, that "no plants" are found to have existed in these "resting places for the nutriment of these enormous beasts;" (for allowing them to have been animals of prey, the animals they devoured must have had means of sustenance from the productions of the earth.) therefore, these two circumstances, of no tradition of this convulsion and "no plants," would seem to warrant the opinion that these skeletons or organic remains, were those of marine animals which had been deposited at their death more or less below the present surface of the earth from the waters of Genesis, according to the Theory of Creation before the time of the separation of the waters, as recorded in the first chapter and 9th verse of Genesis, when God said, "let the waters under the Heavens be gathered together into one place, and let the dry land appear; and it was so."

As to the flying serpents, by the account itself they appear to have been marine inhabitants of the waters; and for the same reason that applies to the "enormous beasts" that "no plants" have been found in those resting places; so the "birds" mentioned in the above account must probably, have been marine or aquatic also, and have existed as above before the separation of waters at the 6 days of the creation.

There are, therefore, three facts taken from the statements and discoveries of Dr. Buckland and the other modern Geologists, which come in support of the idea mentioned above, that the "organic remains were those of marine animals which had been deposited at their death more or less below

the present surface of the Earth from the waters of Genesis, before the time of the separation of the waters, as there recorded.

The first fact is, that we have no tradition from Noah or his descendants of this great convulsion of Nature, which is said by these Geologists to have taken place before the Flood.

The second fact is, that by the accounts of these Geologists, no organic remains of the body of man have been found with those of other animals.

The third fact is, that no remains of any plants have been found among those other remains.

On the first fact we shall observe, that it is remarkable the time stated by Cuvier that this "convulsion" took place, agrees very nearly with the time of the separation of the land from the waters recorded in Genesis, namely, between 5 and 6000 years ago. The effects of this convulsion we may suppose to have been general over the greatest part of the Earth; therefore, had it taken place since the Creation, is it not equally probable so great an event would have been handed down to us by tradition, as that of the universal Deluge has been? On this fact I have further to observe, that if we consider this convulsion to have taken place previous to or rather at the time of the separation of the waters, we shall probably find it much more easily accounted for, and because the 9th verse of 1st chap. of Genesis says, "And God said, Let the Waters under the Heavens be gathered together unto one place, and let the Dry Land appear; and it was so."

Now, the effects even of the Deluge in the time

of Noah are, I believe, generally allowed to have made great changes on the face of the Earth. The effects even of common inundations which have taken place and been recorded in history, have also had the same visible effects. Is it not therefore probable that the effects of the mighty rush of waters from, over, and all round the Earth at the time of the separation, must have had a corresponding effect, and produced the convulsion described by the Geologists? and is not this effect the more likely, from the circumstance that the land must, at this period, have been in a soft and humid state, probably through its entire diameter?

On the second fact I observe, that the circumstance of no organic remains of the human species being discovered among the other fossil remains, will be completely accounted for by supposing, as above said, that the "convulsion took place at the time of the separation of the waters of Genesis," since Man was not *as yet* created.

The third fact, "that no remains of plants have been found," appears to me almost confirmative of the above suppositions; that these organic remains were produced before the separation, and deposited from the waters of Genesis; since, had this convulsion have happened since that separation, and these organic remains been in existence on the land, there must have been plants grown for their nourishment; and moreover, it is stated by Dr. Buckland, in his account of these remains, (as may be seen in the Quarterly Review of April, 1836,) that the far greater part of the organic or fossil remains of the secondary formations are marine.

The remains of terrestrial quadrupeds or other terrestrial species have of course been formed since the separation. I cannot, therefore, but be of opinion, that the geological facts described by the modern Geologists, at least as respects marine remains, will be more satisfactorily explained by the theory we have endeavoured to establish in the foregoing treatise. That the necessity of supposing that the Earth, since the separation, is more ancient than is stated by the Mosaic account, will be thus avoided, and that this Mosaic account can be thus maintained in its integrity; and I am glad to observe that Dr. Buckland has acceded to the construction of the 1st verse of Genesis, adopted by Dr. Pusey and others, as will be seen by the extract on the preface to this work.

To conclude, whether this great convulsion of nature were really one that took place since the creation, and produced the overflow of an extent of country formerly inhabited by the animals above described, and which has since then become dry land again; whether, I say, such a convulsion has taken place since the creation or not, it does not at all effect the validity of the Theory of Creation which is now offered to the world; for this theory refers alone to the *primeval formation of the entire circumference and diameter of the earth*, and is therefore *antecedent to any partial* convulsion that may have, since that formation, taken place,

I now conclude this Note with a few observations in support of the formation of the Geological bodies in the primeval oceans, drawn from the depositions

of matter and consequent formations of land which must be continually taking place in our present seas.

In the space of two or three miles in the harbor of Halifax, N.S., I have seen thousands of cart loads of kelp or sea weed collected from the shore in a season, and it is probably thrown up in the same quantities all along the sea coast of America.

In Scotland, great quantities are burnt to extract its saline matter; as also in Spain and Portugal. What must be the quantity, therefore, that annually decay and is deposited at the bottom of the ocean. In addition to this are the immense formations of coral beds; the still more immense depositions of shells, and the remains of the different animals of the seas. These depositions are probably conglomerated by the sand and earthy particles brought down by the rivers and abraded from coasts by the tides and storms. These masses must be continually augmenting, and in due course of time will probably greatly augment the proportion of land. The waters of our oceans and seas (for a vast quantity is constantly consumed in the nourishment of the marine plants) must, on the other hand, be continually diminishing; and although, if I recollect aright, Dr. Paley states in his Evidences of Natural religion, that all the evaporations return by the rains; I think it is easy to prove that not to be the case, for an immense proportion of the rains is consumed in the nourishment of terrestrial vegetables & by animal life: a large proportion of vapour is also desolved by the air, and probably decomposed by the electric fluid into its gasses. This continual increase of land and

diminution of the waters of the Earth, must it not, in the course of sufficient ages, greatly alter its specific gravity? What effect this may have on the Earth's relative attraction with the other heavenly bodies, I leave to astronomer's to determine. But it is, I conceive, possible, that a change in the degree of its attraction may be the means by which the dissolution foretold in the scriptures may be ultimately brought to pass; and it may be also possible, that the design of a Benevolent Creator, in making the proportion of water so much greater than the land, has been, to retard this dissolution for numerous ages.

If, therefore, our present seas do continually tend to the formation of land by the decay and deposition of their productions; if the natural effects of the laws of nature have led me to form a just conception that the Creator may have chosen the means stated in the foregoing theory by which to form our Earth, we are certain those means were made competent to that end, and that it is therefore probable, vegetable and animal life were diffused in far greater abundance in these primeval waters than in our present oceans.

The processes of vegetation and of animalization, therefore, we have assumed from the facts and geological appearances stated in the foregoing work to have been the means or machinery employed by the Creator in the "beginning" to produce the land of our Earth, and by analogy the land in the other planets of our system. They have probably been thus produced and continued for a long period, in a soft and humid state, and numerous

changes and decompositions have since taken place in them by the effects of the internal heats and fires they have generated. To these causes, perhaps, may be imputed the earthquakes, volcanoes, and disruptions which have produced such inequalities in the surface, and to these internal fires I conceive may also be ascribed, these rocks having no appearance of stratification, they have probably lost the stratified state by the effects of those fires, or by the power of the electric fluid.

Note 12. It may, perhaps, be objected to this idea of hydrogen, or other inflammable gasses, existing in the regions between the planets, to serve as fuel for the Sun's waste of light and heat, that such inflammable gasses, would, by taking fire from the electric fluid, endanger the safety of these planets.

It is, however, I believe allowed, that electricity pervades through all nature, and a vast quantity of hydrogen gas must be constantly exhaling in the decomposition of vegetables and animals; yet, no such effect is produced. In fact, lightning is never produced that I am aware of, in our atmosphere, but from clouds. Moisture seems therefore, indispensible for that end, and the hydrogen gas being thirteen times lighter than common air, must ascend far above the atmosphere.

Note 13. By the experiments of celebrated chemists, and more particularly by the authority of Linnæus, we trust to have proved a considerable number of the primary earths and metals to be

formed by the vegetative process of terrestrial vegetables. But, conceiving, according to the theory in the foregoing treatise, that it was the design of the Creator to produce the geological bodies by the instrumentality of the processes of vegetable and animal life, decay, death, and deposition, we may conceive also, that the marine vegetables of the universal waters of Genesis were endowed with much more various and abundant powers for the production of the geological bodies than we have even found in the terrestrial vegetables. This superior power of production would be necessary to produce the design intended, and the same remark will apply to the marine animals of those waters. (*See the last paragraph of Note* 4.)

Note 14. The substances Iodine, Brome, and above all, Silicon, lately discovered, will probably ere long throw much light on the productive powers of marine substances by combustion. Iodine, at the heat of 212 becomes a violet-coloured gas. It forms an active acid by uniting to hydrogen. Brome is a dense liquid, and forms an orange-coloured gas by a gentle heat.

Silicon is procured from Silica, or the earth of flints, by the action of potassium: it appears as a dark faun-coloured powder, which is *inflammable*, and which produces Silica or the "sandy principle," by combustion. This Silica has been in a part of this Work proved the offspring of the vegetative process. It *decomposes water and acids.* And here, therefore, we have some insight into the means by which Nature has pruduced all the sands of the Earth and the rocks composed of *siliceous* matter.

Sodium, also, a metal lately discovered by Sir H. Davy, is obtained from Soda, the basis of common sea salt. This is, therefore, entirely a marine production. The Sodium is stated by Sir Humphrey to be so very combustible, that when thrown upon water it swims on its surface, hisses violently, and dissolves; and that Silica, or earth of flints, probably contains two proportions of oxygen and one of Silicon.

As a further proof of the production of siliceous earth, by the process of vegetation, we insert the following extract from Sir Humphrey Davy's admirable lectures on agricultural chemistry, in page 54, he says on the epidermis of plants, "in the reeds, grasses, canes, and the plants having hollow stalks, it is of great use and is exceeding strong, and in the microscope seems composed of a kind of glassy net work, which is principally *siliceous earth*, and in the rattan the epidermis contains a sufficient quantity of flint to give light when struck by steel, or two pieces rubbed together produce sparks." It is known, also, that the silicified seeds of the chara, a plant which grows at the bottom of lakes, abound in the flints of Aurillac in France.

Thus it appears that the latest discoveries of the celebrated chemist Sir Humphrey Davy, confirm the existence of the siliceous earth in vegetables. In fine, having had an opportunity of perusing the best and most modern works on the geology of our Earth, I must here state that they serve to confirm my opinion stated in the theory of this work, that the processes of vegetation and animalization in the waters of Genesis, or universal ocean, are the

most highly, natural, and reasonable means, by which we can account for the original formation of the geological bodies; and that these having at that origin been deposited in horizontal strata, have in part, since been subjected to innumerable convulsions, elevations, and disruptions by the effects of internal fires, or the electric power, and consequently to great chemical changes in their component parts is beyond a doubt, and which the present appearance of almost every part of the crust of the Earth confirms. It is, therefore, probable, that a vast number of the rocks, metallic and mineral geological bodies may be combinations of the principles of vegetable and animal life deposited, as stated in our theory, which combinations have been effected by the internal fires or heats of the internal parts of the Earth, and the joint action of chemical affinities. In fine, the vegetable and animal kingdoms are already discovered by analysis to be reducible to the elementary principles oxygen, hydrogen, carbon, azote, and perhaps heat and electricity; and I think it probable, the mineral kingdom will, ere long, exhibit the same result. For who would have believed fifty years since, that from silica or the earth of flints, a combustible substance would be procured? producing silica or the sandy principle by its combustion, and consequent union with oxygen? and in fact, all the primary earths are now found to be oxyds containing oxygen as a component principle in a solid state.

Note 15. It is true that Sir H. Davy states in page 12 of his lectures on agricultural chemistry,

that the result of Van Helmont's experiment was shewn to be fallacious; but that the true use of water was unknown till 1785, when Mr. Cavendish made the discovery, that it was a compound of two elastic gasses, inflammable gas or hydrogen, and vital gas or oxygen.

Now, although Van Helmont was ignorant of this discovery, the fact he proved is still maintained, that water is the great source of nourishment of plants. In vain would any of the modern discoveries be brought forth to invalidate this great fact, since the vegetation of every part of the Earth demonstrates it. In the thickest and largest forests, in the aboriginal woods of the Earth, no sensible diminution of the soil is observable, though under the operation of so vast a vegetation; whence then can the products of it be obtained but from the surrounding elements water and air?

In fact, Sir Humphrey allows in page 211 of same work, that "when pure water only is absorbed by the roots of plants, the fluid, in passing into the leaves, will probably have greater power to absorb carbonic acid from the atmosphere, when the water is saturated with carbonic acid gas, some of this substance may be given off by the leaves, but a part of it likewise is always decomposed, which has been proved by the experiments of M. Sennebier."

Now, Carbo appears to be the great *solidifying principle* of vegetables. The other principles are found to be oxygen, hydrogen, and azote, all of which are obtainable by the vegetative process from water and the atmosphere. Accordingly in

page 259 of the same work, Sir Humphrey states, "It is evident, from the analysis of woody fibre, by M. M. Gray Lussac and Thenard, (which shows that it consists principally of the elements of *water* and *carbon*, the carbon being in larger quantities than in the other vegetable compounds) that any process, &c." Again he says, in page 211, "Many plants that grow upon rocks or soils, containing no carbonic matter, can only be supposed to acquire their *charcoal* from the carbonic acid gas of the atmosphere; and the leaf may be considered at the same time as an organ of absorption, and an organ in which the sap may undergo different chemical changes."

I shall here extract from the same work part of page 281, relating to the formation of the principles of vegetables by the vegetative process. M. Schrader and Mr. Braconnot, from a series of distinct investigations, have arrived at the same conclusions. They state, "that different seed sown in fine sand, sulphur, and metallic oxydes, and supplied *only with atmospheric air and water*, produced healthy plants, which, by analysis, yielded various earthy and saline matters, which either were not contained in the seeds, or the material in which they grew, or which were contained in much smaller quantities in the seed; and hence they conclude they must have been formed from air or water, in consequence of the agencies of the living organs of the plant." These experiments are therefore confirmative of that stated in the work performed by Van Helmont on the willow.

In page 282 Sir Humphrey gives an experiment

he made with oats to ascertain whether any siliceous earth would be formed in the process of vegetation, but he adds, "the oats grew very feebly, and began to be yellow before any flowers formed, that the entire plants were burnt and their ashes compared with those from an equal number of grains of oats, less siliceous earth was given by the plants than by the grains, but their ashes yielded much more carbonate of lime. That *there was less* siliceous earth, I attribute to the circumstance of the husk of the oat being thrown off in germination, and this is the part which most abounds in silica."

Thus it appears by his own experiment, *some* silica was actually obtained by the vegetative process from the air and the water; and had the growth of the oats in his experiment come to perfection, the quantity would probably have been much greater. Moreover, in page 162, he allows that plants consume very small portions of earth; whence then can the trees of woods and forests derive their growth but from water and air?

Note 16. The ratio of motion of the aqueous globes in their orbits, would no doubt have been infinitely less than their present ratio in their annual rotation. This ratio of velocity must have been precisely adapted to their density. Thus when first formed of water only, their ratio would have been at the lowest number. As they increased that density, by the gradual formation of earthy, metallic, and mineral substance, the ratio of motion would increase, until the entire formations of solid matter, existing at the time of the separation being

completed, these planets would then assume the ratio of rotation they now annually perform round the Sun.

The same increasing ratio may be inferred concerning the diurnal motion of the Earth and Planets.

Note 17. I have here to observe, the opinion I had formed and stated, in the Theory of the Sun's Formation, of an æriform fluid or medium existing in the regions of space, has now been confirmed by the discovery of Enckes's Comet.

It appears the Newtonians had asserted, "that either there was no such fluid, or that it was so thin and rarefied, that no phenomenon yet examined by philosophers was capable of betraying its effects." Vide p.151, Whewell's Bridgewater Treatise,1833, and same page it is said, "But the facts which have led astronomers to the conviction that such a resisting medium really exists are certain circumstances occurring in the motion of a body revolving round the Sun, which is now usually called Enckes's Comet."

It appears this body was first seen in 1786, and that the effect of the resistance of the ethereal medium, from its first discovery, (in that year to the present time, say 1833) has been to diminish the time of revolution by about two days; and the Comet is ten days in advance of the place which it would have reached, if there had been no resistance. (*See page* 154 *of Whewell's Bridgewater Treatise.*)

It will be seen in my Theory of the Sun, that it

was on the idea I had formed of the existence of the æriform fluids, oxygen and hydrogen, in the regions of space, I had founded the mode by which I conceived the Sun's waste was replenished; and I have certainly reason to congratulate myself on the idea of the resisting medium being now confirmed by this singular discovery of Enckes's Comet.

The Nebular hypothesis also appears to me to confirm or support both the theory of the combustion of the gasses which I have ventured to propose as the origin of our Earth and Planets, and also the cause and formation of new heavenly bodies by the products of the combustion of the gasses for the replenishment of the Sun's waste of light and heat, as stated in page 57 of this work.

This Nebular hypothesis is thus introduced by Mr. Whewell in his Bridgewater Treatise of 1833, page 143:

"La Place conjectures, that in the original condition of the solar system, the Sun revolved upon his axis, surrounded by an atmosphere, which, in virtue of an excessive heat, extended far beyond the orbits of all the Planets, the Planets as yet having no existence. The heat gradually diminished, and as the solar atmosphere contracted by cooling, the rapidity of its rotation increased by the laws of rotatory motion, and an exterior zone of vapour was detached from the rest, the central attraction being no longer able to overcome the increased centrifugal force. This zone of vapour might in some cases retain its form as we see it in Saturn's ring, but more usually the ring of vapour would break into several masses, and then would generally co-

alesce into one mass,which would revolve about the Sun. Such portions of the solar atmosphere abandoned successively at different periods would form 'Planets in the state of vapour.'"

Now, it does not appear that La Place has given any clue to find how or of what this solar atmosphere and vapours were formed. He does, indeed,support the idea,that Planets may be formed by vapour and subsequent condensation, which is precisely the way the oceanic globes of our theory are conceived to have been produced ;—And without infringing on the humility we wish to preserve, we may say we have presented to his consideration a real and competent cause for the production of the atmosphere and vapours of his ingenious hypothesis.

The combustion of the gasses, of which we all now know water to be formed, as stated in p. 24 of this work, and the extrication of their heat and light, will they not only account for this solar atmosphere, but also the means by which the Great First Cause produced the Sun himself?

CONCLUSION.

In the contemplation of the wonderful discoveries in pneumatic chemistry, of the gasseous bodies ,and peculiarly so of the component principles of water, I have conceived the formation of the waters of Genesis to have been produced from these elementary principles, by the creating cause at "the beginning;" but have, in the foregoing treatise abstained,

for reasons stated at the end of page 70, from carrying my speculations onward tothe other systems of the heavenly bodies, further than reasoning from analogy, that they *may* have been formed by the same laws. In this Note, however, in conclusion of this work, I purpose to offer some observations on this subject, as a comment on the 6th and 7th verses of 1st of Genesis. "And God said let there be a firmament in the midst *of the waters*,and let it divide the waters from the waters; and God made the firmament and divided the waters which *were* under the firmament from the waters which *were* above the firmament, and it was so."

These verses lead us to believe, that a Universal Ocean of waters existed over the heavens, and covering every part of them. If, therefore, our theory of the primary formation of our earth and planets in globes of water, be founded in the laws of nature, may we not conceive, that the planets of the other systems of the *universe* have also been, or will be, formed in this universal ocean by the same laws? If the appearance in the geology of the earth have led us to believe that at the time of the separation, when the solid parts of it had been duly formed, they were, in obedience to the divine command, (probably by the instrumentality of the law of their superior gravity,) were then separated from this universal ocean, attracting such parts of it as were within the sphere of the attraction of these solid parts, for the formation of their seas and oceans; and that these planets, then receiving from the Creator their projectile force, became immediately subject to their motions round their

central Sun. may we not, by analogy, also, conceive, that the planets of the other systems have been, or will be formed by the same laws? The Suns of these systems or Stars, as they are commonly called, must indeed, have existed from the "beginning" of the 1st verse, at the time of the Creation of the waters of the Universal Ocean, by the combustion of the elementary gasses of their composition. Very few of the Planets of these systems have, I believe, been yet discovered. This may be owing to their immense distance; but may it not also arise from their not being yet duly formed, and evolved from the waters of this Universal Ocean? and does not the almost annual discovery of new heavenly bodies warrant the supposition?

With deep humility, therefore, I venture to call the attention of philosophical divines and others, to the more extensive and profound contemplation of the Universal Ocean recorded in the 6th and 7th verses of the 9th chap. of Genesis. The late discoveries in Geology and Pneumatics, in application to this subject, appeal strongly to this contemplation. The unity of the laws of Providence, would almost, compel us to believe, that all the Planetary systems have, or will be formed in the same manner; and carrying with us the highest degrees of our knowledge of these laws into the contemplation of the works of the Creator, we may, perhaps, find that it will afford to us an insight into His Power, Wisdom, and Glory, far more stupendous than mankind have yet conceived.

TABLE OF GEOLOGICAL FORMATIONS IN THE ORDER OF THEIR SUPERPOSITION. BY M. AL. DE HUMBOLDT.

Tertiary formations.

- Alluvial deposites.
- Limestone formation, with millstone (meulieres).
- Sandstone and sand of Fontainebleau.
- Gypsum with bones. Siliceous Limestone.
- Coarse Limestone. (Clay of London.)
- Tertiary sandstone, with lignites (brown coal).
- Plastic clay. Molasse. Nagelfluhe.

- Chalk, { white, soft [tuffeau] chloritic. } — *Ananchites.*
- Green Sand. Wead clay. Ferruginous sand. — Secondary limestone with *lignites.*

Secondary formations

- *Ammonites Planulites.* Limestone of Jura. — Slaty beds with fish and crustacea. Coral rag. Dive clay. Oolites and Caen Limestone.
- Quadersandstein, or white sand stone, sometimes above the lias. — Marly or calcareous lias, with *gryphæa arcuata.*
- Muschelkalk. *Ammonites nodosus.*
- Marls with fibrous gypsum Arenacious layers. — Saliferous variegated sandstone.
- Product. aculeat. Magnesian Limestone. Zechstein. Coppery slate — [Alpine limestone.]
- Quartziferous porphyry. — Co-ordinate formations of porphyry, red sand stone, and coal.

Intermediary formations.

- *Transition formations.*
  Slates with Lydian stone, grey-wacke, diorites, euphotides
  Limestone with *orthoceratites, trilobites, and evomphalites.*

Primitive formations.

- *Primitive Formations.*
  Clayey slates [Thonschiefer]
  Mica slates
  Gneiss
  Granites

INDEX.

INDEX TO THE NOTES.

Mem.—The 21st and 22nd lines in page 30 transposed.

In page 54, for "Neap and Daily Tides," read "Spring, Neap, and Daily Tides."

A GLOSSARY OF TERMS IN THIS WORK.

Geology, the Science of the various substances forming the interior and the crust of the Earth.

Pneumatic Chemistry or Pneumatics, the Science of æriform bodies.

Caloric, matter of heat prevading all bodies.

Carbonic Acid, the acid of charcoal formed by burning it in open air. It escapes in an æriform state.

Oxygen Gas, a constituent element of our atmosphere, supporting combustion and life in the highest degree. It is, also, a constituent element of water. (*Vide page of* 23 *this work.*)

Hydrogen, a constituent element of all water, it is called also inflammable air or gas, and is the same that is now used for lighting cities and inflating balloons.

Azote and Azotic Gas, a constituent principle of our atmosphere, destructive to combustion and to animal life. (*Vide page* 23.)

Tertiary Strata, in Geology the strata or formation of the Earth as far as man has penetrated, are divided into three, the Primary being the lowest—Secondary being next—Tertiary being the uppermost.

Sulphuric Acid, common Oil of Vitriol.

Vacuum, a space void of matter of any kind, now known not to exist. (*Vide page* 52 *to* 61, *and Note* 17.)

Æriform Fluids, gasses or fluids resembling common air

Planets, the heavenly bodies composing our system and revolving round our Sun.

Attraction, that power in matter by which it continually tends to gravitate towards other bodies, according to the laws of its density and distance.

Silex, siliceous or sandy principle.

Alumine, pure earth or clay.

Laminæ, the appearance of many rocks in the Earth resembling the leaves of a book.

Fossil Remains, of animals or vegetables found in the [Earth.