

The solar system truly solved; demonstrating ... the sun to be an electrical space; and a source of every natural production displayed throughout the solar system / [James Hopkins].

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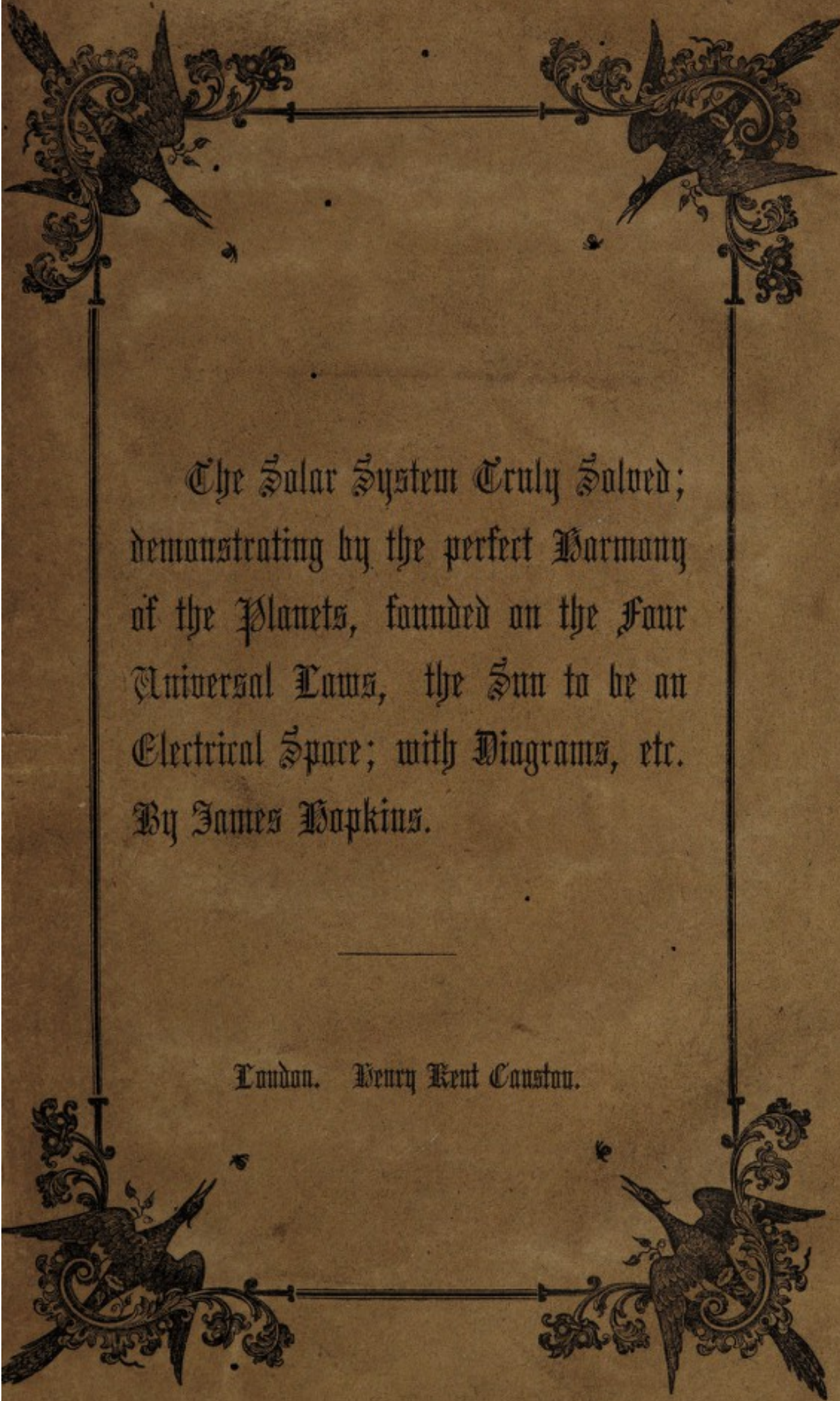
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The Solar System Truly Solved;
demonstrating by the perfect Harmony
of the Planets, founded on the Four
Universal Laws, the Sun to be an
Electrical Space; with Diagrams, etc.
By James Hopkins.

London. Henry Kent Causton.

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THE SOLAR SYSTEM
TRULY SOLVED.



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THE SOLAR SYSTEM TRULY SOLVED;

DEMONSTRATING,

BY THE PERFECT HARMONY OF THE PLANETS,

FOUNDED ON

THE FOUR UNIVERSAL LAWS,

THE SUN

TO BE

AN ELECTRICAL SPACE;

AND

A SOURCE OF EVERY NATURAL PRODUCTION DISPLAYED
THROUGHOUT THE SOLAR SYSTEM:

WITH

DIAGRAMS AND MATHEMATICAL PROBLEMS, CAREFULLY
LAID DOWN AND REVISED.

BY

JAMES HOPKINS.

The Heavens declare the Glory of God; and
The Firmament sheweth his handy work.—Ps. xix, 1.

Whoso is wise, and shall observe these things; even they
Shall understand the loving kindness of the Lord—Ps. cvii, 43.

LONDON:

PUBLISHED BY HENRY KENT CAUSTON,

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NAG'S HEAD COURT, GRACECHURCH STREET.

1849.

THE SOLAR SYSTEM TRULY SOLVED

BY THE PERFECT HARMONY OF THE PLANETS

THE FOUR UNIVERSAL LAWS

THE SUN



A SOURCE OF EVERY NATURAL PHENOMENON DISPLAYED
THROUGHOUT THE SOLAR SYSTEM

THEORY AND PRACTICE OF THE
LAW OF THE SUN

JAMES WOPKINS

PUBLISHED BY HENRY KENT CARRINGTON

1860

PREFACE.



IN submitting to the notice of the world the following sheets, which in a few pages propose to revolutionize the opinions that have for so long a period prevailed; and on a subject too, that has formed a large portion of the studies of so many learned men of all nations, the author might well be excused for sheltering himself under any plea that modest enthusiasm and industry in the cause of philosophical science and demonstrable truth might dictate; indeed it may honestly be affirmed that when he commenced those studies which initiated and have at length produced the present result, the author had no idea of coming before the public in any shape; much less in one of so great importance as the theory he has herein developed, and, as he believes, established beyond the power of confutation. Of this, however, he

invites the honest criticism of those who have hitherto accepted, and (perhaps without sufficient investigation and trial by proof), supported the prevailing System, which he believes he has now shewn (in certain particulars) to be not only erroneous, but unsupportable by any physical law.

It is not less remarkable than true, that among the numerous authors who have treated of the celestial bodies, how few of them have proved their assertions by actual experiment; nor is this surprising, seeing that they had not calculated with certainty, even the centre of their system; thus, as they commenced in supposition, they very naturally founded their arguments on evidence equally imaginative and insecure: hence the most useful portion of the works of very many writers, consists in unreasoned data and facts misapplied.

For his own performance, the author will briefly say, that though the book be small, the labour has been great; and that after commencing with a good heart, and progressing some way indeed in his calculations, he found the task so arduous, that he had well nigh laid it aside; yet when he considered the use that his discoveries might be to the future progress of science, he was encouraged to go forward and prosecute

his work to the end. The author does not pretend to say that he has fully discovered all the facts to which his theory may lead; but having opened the path for others to follow, he doubts not, that more able writers than himself will continue the development, to the admiration and glory of the Creator of so wonderful and stupendous a work; and to the advantageous progress of the world's stock of knowledge and wisdom.

And lest to timid minds, the theory propounded in the following pages, might seem at first view too subversive of recognized, though unestablished facts, it may be as well here to observe, that although his work frustrates the prevailing system of the Universe in so far as pertains to the sun as a body, yet the author does not assume to overthrow many other astronomical calculations: on the contrary, he has generally adopted established data as the foundation and proof of the superstructure he has thereon raised as the natural and mathematical result (hitherto overlooked as it seems), to which they lead.

Having only for his object the development of truth, the author has been most scrupulous to confine himself to facts, and has carefully proved every mathematical calculation before admitting it to a place in his work. Further, the problems

and numerical calculations on which his theory is based, have been inserted, not only in proof of his allusions; but also in the hope that the following pages may be more readily appreciated by those who have not made astronomical science their particular study. And by presenting the subject in a concise, and as far as practicable, in a familiar form, the author has endeavoured to stimulate the minds of his readers to an enquiry, a perfect knowledge whereof is of the very first importance to his future attainments.

In conclusion, the author has not sought to convey his ideas in the language of embellishment; on the contrary, he has rather endeavoured to be plain, exact, and intelligible, befitting a subject which he approached with religious awe, and which he quits with reverence and admiration!

Naval Academy,

Jamaica Street,

Commercial Road, East.

THE SOLAR SYSTEM TRULY SOLVED.

&c. &c.

ANCIENT philosophers, accustomed to estimate the heavenly bodies in their sensible attributes, beheld the Sun as a glorious orb of pure fire—

—— soul of surrounding worlds.

It was worshipped as the annual revivifying parent of verdant nature, and symbolized under various forms, gave origin to superstitions that have yet to be exploded.

A succeeding age of theorists, less imaginative than material in their philosophy, required substance for the ever-blazing luminary which they saw and wondered at: it was by these sages estimated as a body “solid, and without doubt very dense—composed of such matter as is proper and necessary *pabulum* to supply the fire upon

the external parts ;"—nor were estimates wanting of the waste it would undergo by a gradual consumption, on which to erect *data* for prophetic estimation of our world's duration ;—as if the divine Creator of these his wondrous works should have illumined his universal system by a means less enduring than his perpetual organization, or that it should be within the scope of those limited powers with which he has endowed man, to estimate a period to his created work !

The result of all scientific discoveries leads to one great fact—that God has established His universal system upon laws—secondary to His Almighty will—which, self-acting and self-sustained, govern and progress the “one harmonious whole” in a regular series of continuous action, everlasting in its nature, and eternal in its motive duration !

It is by the discovery, analysis and investigation of these His secondary laws, that man is enabled, within the limits of his reason, to fathom the depths of created wisdom ; and so far as our discoveries are in harmony with each other, so far may they be taken to be true, and so far may we believe that we have ascertained the natural laws which govern this universal system.

A review of the various promulgated notions of the System of the Universe, from the projection

of the Brahmins and Boodhists,—which, as far as discoveries have gone, first obtained in the world,—to the time of their revision by Copernicus in the sixteenth century, and the valuable discoveries of Galileo about the same time,—such a review cannot but excite the remark, of how small has been the real progress of investigation and discovery, and how infinitely less their application, and the rational deductions to which they must inevitably lead. Indeed it would almost seem, notwithstanding the wonderful progress of knowledge in all other branches of natural and physical science, that the learned have accepted as final, a system which Copernicus himself, so far from insisting to be so, advanced only to the wavering indecision of his age, as more in harmony with the observed motion of the heavenly bodies than the Ptolemaic system, which had then for some season prevailed. Thus a theory not wholly in harmony with known physical laws, has been assumed as a fact; and in some measure, without question, accepted as a basis tried and proved. So in respect of the very centre of the system, one of the most accomplished of modern Astronomers has been contented, from mere ocular demonstration, to remain satisfied that the Sun was nothing else than “a very eminent, large, and

lucid planet—similar to the other globes of our system with regard to its *solidity*, its atmosphere, and its diversified surface.” In dissenting from a doctrine which has so long been received, for one more in agreement with acknowledged principles of the universal phænomena, it is neither for the sake of novelty or notoriety; nor is the theory now promulgated rashly or without long and continuous study, repeated trials and conviction, offered to the notice of the scientific world. It is offered in the sincere desire to harmonize to our common intelligence the works of Him whose works are all harmony, and wherein no discord is to be found.

But before entering more fully into the subject, it will be convenient to elucidate it by giving a few introductory rules on the laws of motion, by which means the reader will become better enabled to form more just opinions on the propositions demonstrated in the pages following; for I consider it to involve an extent of duty on every scientific person to eradicate all assumed difficulties pertaining to the study of bodies celestial, and to expound the nature of them in every possible way that can be brought to bear on the human understanding. To impart information is the best means calculated to remove dif-

ficulties ; hence it conveys more rapid and accurate knowledge regarding the position of those bodies and their relative force with each other. These are founded on actual observation and experiment ; it thereby compels all systems to assume a definite shape, readily susceptible of direct examination, as they are in consonance with philosophical laws universally admitted ; and which may not be unattended with advantages to scientific enquiry.

Then, motion causes gravitation and attraction. The incomparable Sir Isaac Newton, by a sagacity peculiar to himself, discovered, from many observations, that this law of gravitation and attraction was universally diffused throughout the Solar system, and that the regular motions observed among the planetary bodies, were governed by this same self-evident principle. He also asserted that earth and moon attracted each other according to distance, in proportion to the squares of them ; consequently the power of attraction at double the distance was four times less ; at treble the distance nine times less ; at quadruple the distance sixteen times less ; and so on. Now according to the size of planets, so do their attraction and motion decrease or increase ; and in that respect will corroborate with my treatise.

To exemplify this still further:—If a cannon ball be fired horizontally, it will be observed to descend by gravity to the earth; but merely touching it, will fly off again into immense space; then by gravity touching the earth again, it will fly off not into such great space; and will continue this action, gradually becoming less in its rebound as its velocity decreases; hence it is shewn that as velocity decreases, so the momentum of bodies becomes more weighty; or in other terms, their gravitation becomes less in themselves and more towards the earth.

The cause of gravitation and attraction may be thus simply demonstrated: observe the rapid motion of the fans of a pair of blasting bellows, and notice, that according to the motion so do they gather or attract the air; for the same reason do planets attract each other in their respective orbits; and if it were possible to hurl a stone with greater rapidity than the motion of the earth, it would fly off into open space, and there gain a revolution of its own, because the laws for the destruction of motion, are the same as those for the generation of it; and by equal motions a body thrown directly upward with any velocity, will lose equal velocities in equal times.

If a body be projected upward with the velocity it acquired in any time by descending freely, it will lose all its velocity in an equal time, and will ascend just to the same height from whence it fell, describing equal spaces in equal times, both in rising and falling, but in an inverse order; and it will have equal velocities at any one and the same point of the line described, both in ascending and descending.

If bodies be projected upward with any velocities, the height ascended to will be as the squares of those velocities, or as the squares of the times of ascending, till they lose all their velocities; thus confirming the laws of Sir Isaac Newton, viz., that there was a law in nature, by virtue of which every particle of matter, that is, everything of which the earth is composed, draws towards it every other particle of matter with a force proportioned to its force and distance.

Now the globe of the earth is a prodigious mass of matter, to which nothing near it can bear any comparison. It draws, therefore, with great force everything within its reach, which is the cause of bodies falling; and this is called gravitation or weight. Therefore it is to motion we are indebted to our remaining on this earth; for if the Creator of this wonderful universe were to

stretch forth His Almighty hand to stay the earth's progress, it would become no longer earth, but space. These are the universal laws of motion: then why, why, I ask, are not the same laws attributable to planetary bodies? Is it to be supposed for a moment, that after the Almighty had seen that everything He had done on the face of the earth was good, that He would alter those works or vary those universal laws in respect of the planetary bodies? Is it feasible to the common sense which God has given us to investigate and admire His wondrous works, to suppose, that all things in creation are not ruled by the one great universal code of natural laws, operating together and reciprocally on each other, for the one common purpose of perpetual motion? Then by these same laws do I conclude the Sun to be Space; for motion is the law of all other laws, and nothing can be done or gained without it.

The following table shews the relative diameters, revolutions, and distances of the Planets, &c.:—

NAMES.	Periodical Revolution.				Mean Distance from Sun.	Diameters	Time of Rotation on Axis.			Inclination of Axis to Equator.	Hourly mo- tion in their orbits.
	yrs.	d.	h.	m.	s.		d.	h.	m.	s.	
MERCURY	0	87	23	14	33	36,973,282	3,191	unknown.			111,256
VENUS	0	224	16	41	27	69,088,240	7,630	0	23	21	0
EARTH	1	0	5	48	48	95,513,794	7,954	0	23	56	4
MARS	1	321	23	18	27	145,533,667	4,135	1	0	39	22
JUPITER	11	315	14	39	2	196,765,289	86,396	0	9	55	33
SATURN	29	164	7	21	50	911,141,442	79,405	0	10	16	1
URANUS	83	294	8	39	0	1822,575,228	34,457	unknown.			15,846

Thus it appears, that according to the orbitular distance, each planet has its peculiar work: by work is meant that each planet has a particular motion to emit its degenerated air; for they are and must be continually emitting air degenerated, as they continually gather created air by motion; for motion produces air, and with assistance of our centre, so it intermixes with our waters, which we call vegetation; and as that vegetation descends from the air, so does it fulfil its organization. Now the orbitular motion drives this degenerated air to the attraction of the next inferior planet; and thus it continues to be attracted from planet to planet, accumulating in its progress the degenerated air of each, and increasing in velocity in agreement with the progressive swiftness of their respective diurnal motion, in its course towards the centre; and there arrived, by the force of its velocity, it assumes the globular form known as the centre of our system.

By observing the orbitular motion of the planets it will appear, according to our calculation, that the nearer the centre, the swifter the motion; and the farther they recede from it, so do their velocities become less; indeed it must be plain from the foregoing reasoning, that the nearer the planets' orbits are to the centre, the

more of this degenerated air it has to encounter; consequently, the greater velocity it has to proceed with in getting rid of it; or in other words, the attractive power becomes more or less, according to the distance. Now supposing there to be seven different forces to one main power acting for each other, the seventh force has not that power to the sixth, that the sixth has to the fifth; nor the fifth such difficulty to the fourth as the fourth has to the third; and so on, owing to the struggling of the fourth with her power, combined with the power of the other three: precisely in the same manner does each planet surmount its work; consequently each planet's heat, light, and vegetation depend on its diurnal motion; for it is the diurnal motion that continually feeds its centre or sun. The duty they have to perform revolutionary, will evidently appear from this consideration,—that as they are of matter, and violently whirled on their axis, as an effect of course, the degenerated air tends to fly off like water from a trundled mop; and this degenerated air, round the equator, by reason of the great space, has the greater tendency to fly off.

To exemplify this, let me ask, whence does the created air produced by motion go? for certainly air is created by motion: then by allowing this,

it must also be allowed that, like a *chrysalis*, it goes through all its varieties and changes; and when in its last change it becomes inflammable, and is driven off by the orbitular motion of the planets, to the attractive portion of each others forces, (which forces are in exact accordance with their respective orbitular motion,) it is conveyed to that space called the Sun,—for it is incredible to suppose it to be a body; for God so formed and placed the different planets to afford their own light, (which light caused heat and vegetation) and to work one with the other to all eternity; thereby acting in accordance to His will; that is, they act perpetually: then, as they act in perpetual motion, one with the other, their motion would not be perpetual, if aided by any stationary body; for when it is considered that the weight of all the planetary bodies is tantamount to nothing in their orbits; when I consider that gravitation in themselves is caused wholly by motion, I am led to believe that God has said “*motion is my nature*,” for we find within ourselves there is not one thing done or performed without it. It is to motion we owe all the principles of organization, and it is motion that causes the sun to be fed by degenerated air, repulsed by the planetary bodies; for the greater velocity of diurnal

motion, the more gravitation, the more air, the more light, the more heat, and the more vegetation.

Then I say, upon the foregoing principle, that the SUN IS SPACE, and that each planet sends forth its food.

Now, if we admit the sun to be a body, then in the first place let me ask, what produces a continuation of heat? We cannot get a continuation without feeding that heat; strike a piece of iron continually, and that will produce heat; leave off striking and there is no more heat; but the iron may be stricken until there is no more to strike. The same with the sun; he may be continually ignited until all his matter becomes wasted, if there were nothing to feed it; for it is contrary to every principle of the universal organization to suppose that his diurnal motion would cause such abundance of heat. Again, with regard to his being a body at rest, I mean so far as orbitular motion is concerned, it is quite contrary to the laws of attraction, to the laws of mathematical reasoning, and to the laws of rationality; for it would be like drawing the circumference of a circle without a centre, after giving such demonstration of it being otherwise. If it is admitted to be a body as a centre, receiving

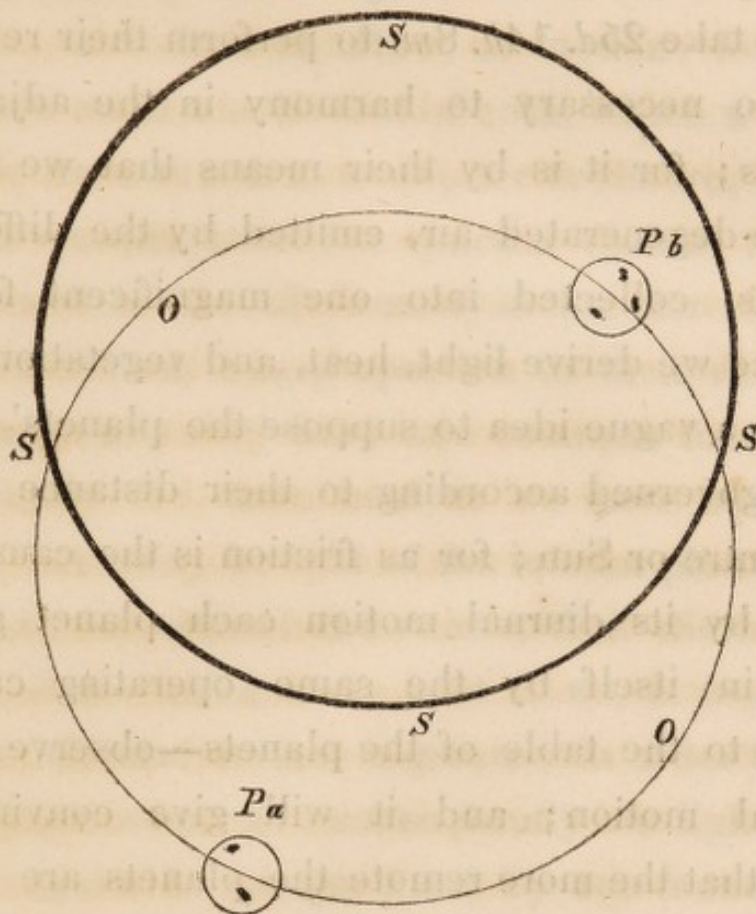
fuel from the planets, how or what cause would appertain to that body to become attractive to all the planets? Place them first on their having motion, and you will find it impossible to be attracted by the sun as a body, and to emit fuel at the same time; for that would imply a repulsive and attractive force acting in consonance with each other, which is impossible. Now let me ask the reader to pause, and consider whether it is not much better to contemplate on real than imaginary bodies.

With respect to those spots seen on the sun, and going from E. to W. in *25d. 14h. 8m.*, then appearing again in the E. in the above stated time; it is by these spots that Astronomers have computed the sun to have motion on his axis: this they must compute according to the knowledge and comprehension of the planetary bodies; they have come to this conclusion, knowing it would be impossible for a body to remain at rest, a body which they term the centre of the universe, among such other bodies in continual motion. But these spots, to my comprehension, appear no other than planets revolving in their orbit; their disappearance and return being accounted for by their rotary motion; as when out of the sun's disc they become invisible,

being so near the centre or sun, that it becomes impossible to see them during the elapsed time, to fill up the amount of the *25d. 14h. 8m.*, which is their orbitular motion.

It is not unknown that Mercury is at times invisible, owing to his orbit being so near to the sun; and as the sun's spots are telescopically described as being of all angles, the demonstration to it is thus,—that as planets having also diurnal motion, they, as a matter of course, shew their phases differently at different times, deviating according to that motion; and being bodies, have by their motion hills and valleys; consequently when these valleys are towards us, it causes them to appear of a broken body, and seems the sole reason of their appearing in such different forms. Observe the moon, and see whether those valleys have not a sunlike appearance; it is therefore impossible to give any true telescopic discoveries of the sun as being a body. Telescopes are useful instruments in discovering the formation of bodies, but not of perfecting them, or of estimating the nature of them; and then only when in the field of view. Nature herself must be studied to gain righteous information, which the four laws justify.

The following diagram will lead the reader to a just conclusion of the principle laid down, and forthwith render him more familiar with celestial bodies, and more particularly our Solar system. It will open to his comprehension a multiplicity of thoughts, susceptible of direct improvement; for when the vast magnitude of the works of the Almighty is considered, and the truth each action of the planetary bodies gives of his ever-ruling powers;—when beholding the starry heavens, and contemplating the quantity of luminaries that are composed from different planets, but which are invisible to us,—does it not become our rational sense to ponder, and think within ourselves, of the sublimity and grand display we have set before us! That the Almighty has given us food for our bodies, food for our intellects, and food for our souls, is evident from the very many rules he has ordained for us to all eternity.



SSSS—The Sun.

PP—Planets revolving in the Sun's orb.

OO—Planets' orbit.

Pa—Planet passing the Sun's disc, and is thereby invisible.

Pb—Planet passing Sun's orb, which together account for the Sun having a revolution of 25d. 14h. 8m.

The foregoing diagram clearly shews, that according to the orbitular motion of these planets, it would take *25d. 14h. 8m.* to perform their revolution so necessary to harmony in the adjacent planets; for it is by their means that we have all the degenerated air, emitted by the different planets, collected into one magnificent focus, whence we derive light, heat, and vegetation.

It is a vague idea to suppose the planets' heat to be governed according to their distance from the centre or Sun; for as friction is the cause of heat, by its diurnal motion each planet gains heat in itself by the same operating cause. Refer to the table of the planets—observe their diurnal motion; and it will give convincing proof that the more remote the planets are from the centre, the more swift diurnal motion is required to equalize the rays of heat diffused throughout the Solar system. Calculation will shew that according to motion, so does it bear nearly the same proportion of focus, and so does it emit the like quantity of degenerated air; or in other words, so does it force its proportion of degenerated air emitted by its orbitular motion: then why is heat measured according to distance of the planets from the sun? If such were the case we should have the planets' particles to

separate rather than to adhere; the coldness would not allow of gravitation; it would not allow, nor does it allow, of motion; for slowness of motion is the seat of cold, which we know to be the case; then as Jupiter or Saturn, or any other remote planet has quicker diurnal motion, that motion must of necessity create more friction; which friction is in proportion to their distance; consequently they have one common focus, that is, nearly the same heat as we have ourselves. The same may be said of the inferior planets; for as they are nearer the centre, their diurnal motion, from which their heat flows, is less, and their orbitular motion is greater, in order to emit the degenerated air; consequently our light, heat, and vegetation are governed by our motion; for as we emit inflammable air, so does our diurnal motion, by its attraction, cause heat to return to us; and if our diurnal motion was at double the rate, our heat would also be proportionably increased; and by those causes, sending forth more degenerated air, we should of necessity have the swifter motion in our orbit to emit that degenerated air. The same law applies to all the planetary bodies, for by that law all bodies would follow in rotation; that is, they would alter their revolution, both orbitular and diurnal, in order to

change their position in exact proportion as this earth would be altered by her motion being made quicker: such is the case, for we all have harmonic attractions.

An argumentative reasoning of the sun as being space I will now elucidate by mathematical ideas and calculation. My first argument, on the laws of motion, refers to an observation previously made with respect to gravitation, viz., that if the Almighty in his wisdom should see fit to stop motion, it would become no longer earth. Now in this case, if the earth's diurnal motion is considered (for it is that which causes gravitation), it will be found to be of no weight,—all its weight being in itself; consequently it would whirl as a feather buoyed up by the air; therefore the slower the motion, the less weight the particles would become on the earth's surface, until by the motion becoming so small, all gravitation in itself would cease; particles would become less and less weighty, until they diminished to nothing. The same cause would operate with all the planets of our system, for harmony would be destroyed, attraction would cease, and we should become space; so wonderful are the works of the Creator! Thus far I have explained the effects produced on the planetary bodies by motion.

The next subject for explanation is, the emission by the planets of degenerated air. What I mean by degenerated air is, air after it has fulfilled all its functions in vegetable life,—for air weighs some hundreds of pounds when intermixed with the fluid particles of the earth; and as the motion of the earth is always creating of air, so does it ascend through its vegetation, and become degenerated, inflammable or attractable, weighing nothing. Now if this degenerated air was not to fly off the face of the earth, the newly created air would become foul; and by its being foul, would permit nothing to live on it; but the Almighty has ordained it to be otherwise, by causing the earth and other planets to drive that degenerated or inflammable air into one circle, there to become an attractive power, perfect in electricity in the planets and repulsive in itself; which power, by perpetual reproduction, generates light, heat, and vegetation,—the planetary motions being the cause of it.

Again, the nearer the Equator the greater tendency this degenerated air has to fly off; the matter travels through more space, and by that space causes more air to be created; so it diminishes as the space becomes less (say 80 to 90 degrees on each side of the North or South pole),

that when diurnal motion becomes so very small, or in other terms, when the surface goes through such small space in the same time, the degenerated air has not that power to encounter with, consequently it flies about the portion of the earth that does not go through the space, and thereby produces Borealis,—more on the North than on the South, owing to the land, which has the property of producing the degenerated air, being more on the North than on the South; therefore it plainly shews that it is the diurnal motion of the planets that produces air, and the more space the motion goes through, the more degenerated air is gained by that motion, and is emitted by the orbitular motion; for if we suppose two wheels of unequal diameter travelling with the same centrifugal motion, the smaller will be found incapable of performing the duty of the larger; the same cause has the same effect with the chords of the earth; for if the earth were to be divided into small diameters, near the poles the same effect would be produced exactly in ratio to their circumference; that is, the motion of these small diameters would not produce the same quantity of air as the larger, therefore would not have the same power to contend with; consequently as the orbitular motion declines but $23\frac{1}{2}$ degrees on

either side of the Equator, it of necessity impels the degenerated air to the centre or sun. The same laws coincide with those of the planetary bodies.

It will now be convenient to explain the nature of space, and what it must be, from previous observations.

As motion causes gravity, so does it keep everything to its centre: if it were not for motion there would be no bodies, consequently there would be no earth, no planets, no celestial bodies of any kind; it would be all space: so, being all space, how is it possible that a stationary body could rest? A body that has the least weight would fall! But is it possible to find any weight in space? No. Then we are, strictly speaking, all space in motion, for we are no weight in the firmament! All our weight lies in ourselves, and everything in itself: all our weight is caused by action towards its centre; then is it possible to seek weight in space? Is it possible to say within ourselves, everything on earth has its own momentum? Then how wonderful are all the designs! how wonderful are the effects produced from those designs! and how much more wonderful were the thoughts of our Creator when giving those designs!

A passage from Mr. YOUNG's "*Thoughts on the Being and Attributes of God*," here naturally occurs to the mind :—

What am I? and from whence?—I nothing know,

But that I am; and since I am, conclude

Something eternal; had there e'er been nought,

Nought still had been: Eternal there must be.—

But what Eternal?.....

Whence earth, and these bright orbs?—Eternal too?—

Grant matter was eternal: still these orbs

Would want some other Father; much design

Is seen in all their motion, all their makes;

Design implies intelligence, and art:

That can't be from themselves—or man; that art

Man scarce can comprehend, could man bestow?

Has matter innate motion? Then each atom

Arresting its indisputable right,

Would form a universe of dust.

Has matter none? Then whence those glorious forms,

And boundless flights, from shapeless, and reposed?

Has matter more than motion? Has it thought,

Judgment, and genius? Is it deeply learned

In mathematics? Has it framed such laws,

Which, but to guess, a NEWTON made immortal?

A GODHEAD reigns—

And if a GOD there is, that GOD how great!

Again, respecting the degenerated air being thrown off by the orbitular motion, it becomes of importance to consider the nature and power of accelerating bodies with each other, which will clearly prove the attractive as well as repulsive motion of the planetary bodies. Thus, motion

(the law on which I have surmounted all difficulties), is the continual and successive change of place; and when that motion progresses equally, or passes over equal spaces in equal times, it is called accelerated motion: but when a body in motion strikes a body at rest, with equal motion it becomes repellent; so that the law of one is equal to the law of the other, but diametrically opposed. Now accelerated motion is commonly understood to be that which affects the velocity only, or it is that by which the velocity is accelerated, and is equal or proportional to the motive force directly, and to the mass or body moved inversely; so that if a body of 2 lbs. weight be acted on by a motive force of 40 lbs., then the accelerated force is 20; for the motion of bodies being made up of the motion of all their parts, if the velocities be equal, the *momenta* will be as the masses, that is, the motive force or gravitation is as to their velocities; for by the nature of uniform motion, the greater the velocity the greater is the space described in any one and the same time; that is, the space is as the velocity when the times are equal; and when the velocities are the same, the space will be as the time; that is, in a double time a double space; therefore, universally, the space is in the compound ratio of

the velocity and the time of description. In uniform motion, the time is as the space directly; for supposing the time divided into very small parts, the momentum in each particle of time is the same; therefore the whole momentum will be as the whole time or sum of the parts; but the momentum for each small time is also as the motive force to that time; consequently the whole momentum generated is in the compound ratio of the force and time of acting; and as the planets acting in harmony and keeping each other in equilibrio, are also proportional to the sides of a triangle made by drawing lines, either perpendicular to the direction of the forces, or forming any given angle with those forces, or forming any given angle with those directions; for such a triangle is always similar to the former, which is made by drawing lines parallel to the directions; and therefore their sides are in the same proportion to each other. *See diagram, page 59.*

The change or alteration of motion by any external force, is always proportional to that force. Action and reaction between any two parts are equal and contrary, that is, by action and reaction equal changes are produced, and these changes are directed towards opposite or contrary parts; so it will be perceived that the orbitular and

diurnal motions, acting in contrary directions, produce repulsive forces equal to their velocities; that is, the air created by the diurnal motion is repulsed by the orbitular motion. Thus far I have given the repulsatory laws relating to the planetary bodies, which point the absolute necessity of those laws in throwing off the degenerated air; for air is in itself an inflammable matter, and when produced is converted into a vegetable body by the revolution of the earth; for the sun being attracted by the earth, causes fluid to rise and become vegetable throughout its entire space; and as that fluid descends by gravity towards the earth, so does the air again become degenerated; then by the laws of motion it is expelled from the earth,—a proof of which is exemplified in thunder with lightning. In that case the electric fluid or degenerated air, is occasioned by the contrary direction of clouds; as when this contrary direction takes place, the air is confined, and becoming imbedded therein, a decomposition takes place; the vegetable matter constantly trying to descend, and the lighter portion at the same time constantly trying to ascend, the said air becomes degenerated, and being from its latitude, expands, inflames, and bursting, the electric fluid descends to the earth with that ex-

plosive noise we call thunder,—telling us the vegetable matter is separated from the air which causes electricity.

Some of my readers might ask, why not,—as I pointed out that degenerated air always ascends,—why not in this case ascend? why not have a tendency to fly up into space and there continue? The answer is simply, that as there is a much greater force of vegetable air above than below, it is borne down by the vegetable body towards the earth; consequently it is no more than degenerated air enclosed between two layers of vegetable matter; the upper layer having predominance over the lower; and this lightning being of no weight, is forced by the upper layer of vegetable matter toward the earth; the lightning being occasioned, as before stated, by the clouds overlapping each other, confining and compressing the air into one space, separated from its natural element; therefore air, as a matter, receives its vegetation from the earth's fluids in vapour, and descends, when it becomes too weighty for attraction to the luminary "*space.*" Those who study chemistry may rest assured that electricity is neither more nor less than degenerated air acting between two courses of vegetable matter: and thus far have I delineated

the portions of the properties relating to the forces which compel air to flow to its own element as a body, and also to its own element as fire.

I will next give the principal laws affecting gravitation and attraction. Any body put in perpendicular motion is found to have that motion stopped, then returns with the same velocity to the earth. The force which retards bodies in their ascent from the earth is termed terrestrial gravitation. The earth attracts all bodies, but the attraction is mutual; and this mutual attraction increases in proportion as the masses are increased. The same law holds good in planetary bodies, as the square of the distance is decreased; and it decreases in proportion as their masses are increased, and as the squares of their distances are increased.

The nearer a body is to the earth the more powerfully it becomes attracted, and that in proportion as the squares of the distance from the centre decreases. Thus a body at the surface of the earth is attracted more powerfully towards the centre than if it were at double that distance. If we represent the distance of the body at the surface from the centre as 1, then the distance of the other body will be 2, the square of which is 4; so that the body at the surface would be four

times heavier than one at double the distance: so, as before observed, gravitation is weight towards the centre, for the nearer the centre the less weight: thus if it were possible to dig through the earth's centre, and throw the most ponderous weight on the earth's surface to the centre, it would there lose all weight, and ponder neither one way nor the other: our attraction to the planetary bodies is in the same proportion. These observations contain merely the sketch of a very extensive and interesting subject; but to dwell longer would surpass our limits: they are merely introduced for the purpose of showing how gravitation must be caused by motion, which overrules all other laws, and is the basis on which this treatise stands; for I consider it to be a law that creates knowledge, wisdom, and understanding.

I will now proceed to show the invariable causes and reasons of the Sun as being Space. As motion causes gravitation, so does it cause a fine matter to proceed out of such gravitation, and to ascend by attraction of heat to the centre or sun, and in so ascending it becomes climated, and intermixes with particles of water, in like manner attracted, and causes what is now termed vegetation,—the particles of water being termed

vapour, and is attracted by heat of the same luminary, caused by the earth's revolution. This vapour being composed of earth, becomes a fluid body by gravitation; and the attraction not being of sufficient force to convey it to the part that the degenerated air is conveyed to, it becomes more weighty by continual attraction, and so falls to the earth, leaving the degenerated air to proceed to its farthest attraction; thus the whole system is in continual motion. Now to prove this, the earth and all bodies we are acquainted with, contain a certain quantity of an exceedingly elastic and subtle fluid, which philosophers have agreed to term electric; they also say, "as long as each body contains neither more nor less than this quantity, it seems to be wholly dormant, and produces no sensible effect." We know for certain, that the earth has the power of attracting the centre, so as to cause the fluids to rise; then why not have the same power to attract what they term electric? As it continually produces electric, certainly that electric must go somewhere. They go on to say, "whenever any body has acquired an additional quantity of electric matter, it must remain overloaded;" which is impossible, according to the laws of motion: they admit that electric fluid in bodies

is caused by friction, and that electricity will leave that substance which has the rougher surface, and pass on to another whose surface is more smooth; or will leave that substance which is the less perfect electric, and pass on to another which is a more perfect electric. This argument proves that, as the sun is space of more perfect electric, it naturally repulses that body which is imperfect; for space consisting of nought, save degenerated air, is of course perfect in electricity; and that body whence flows the electric matter in part, is the imperfect body; for nothing is perfect in itself but space. They also say, "that it is impossible to distinguish to the eye which way the electric matter passes, the velocity is so extremely great." Yes, why is it so? In reply I answer, that the electric matter, in seeking its natural or perfect element, leaves the imperfect with that velocity which is attributed to it. The great laws of degenerated air, and those on which all the phenomena of electricity depend, are:—

1st, That it is to a much higher degree degenerated than common air.

2nd, That it is elastic and repulsive of itself.

3rd, That two bodies having both of them neither more nor less than their natural share

of it, repel each other; but if one of them have more than the other, they will attract; therefore the stronger prevails: so that all bodies universally brought within the influence of perfect electrified spaces (whether they are so by having more or less than their natural share of the degenerated air), become possessed of a contrary or repulsive electricity. For the same reason, excited electric of every kind, attracts all light bodies which are brought within the attractive sphere; and its influence (which is a greater portion of degenerated space), having a greater power on the planetary bodies, causes them to have that motion in their orbit so essential for the production of perpetuity, they being of no weight with respect to their orbitular motion.

The capital use that has been made of this observation, has been, to draw the electric matter from the clouds, and thereby to prove that lightning and electric air are the same. Now, as this electricity is brought down, the apparatus which is used becomes sensibly charged with it, and will attract light bodies; sparks of electric matter may be drawn from it, and it will exhibit every other appearance of common electricity.

Thus I have shown degenerated air to be similar to electricity; and the great degenerated

space, or in other words, the "*Sun*," has the same influence over bodies less perfect,—of which are the *Planets*.

As an additional proof of degenerated air being the same as electricity, I may here notice an improved electric apparatus of the present day, by which the electric light is produced, by Mr. W. E. Straits. This light is not a flame, but an incandescent light; that is, a light which does not partake of any vegetable substance, and which shews itself as a *sun light*; not the light of either candle or gas, or a light produced from any vegetable substance. Now this clearly proves, that when the degenerated air is extracted from vegetation, so it ignites; for this electricity is formed from materials that destroy vegetation, thereby becoming not only electric, but sun light.

I will now proceed to consider the nature of its production, and whence it flows. Air is that transparent fluid in which we live and breathe. It encompasses the whole earth, and to a considerable height, according to the attraction of the centre or space, in proportion as each radii is to the circumference, and together with clouds is called vapour, or atmosphere; which clouds assemble by means of attraction, and the more dark they appear, the more of this vapour do

they contain; until they acquire that weight which will cause them to fall in continual flakes or drops, to the surface of the earth. The air is justly reckoned among the number of fluids, because it has all the properties by which a fluid is distinguished; for it yields to the least force impressed; its parts are easily moved; it presses according to perpendicular height, that height being regulated by the attraction of the central space or sun. That the air is composed of such particles as have no adhesion betwixt them, but easily glide over one another and yield to the slightest impression, is evident from that ease and freedom with which animals breathe it, and move through it without any difficulty or sensible resistance. As a body, its strength may be proved, when agitated, by excluding all other bodies from the space it possesses; and as it is a body, it must needs have gravity or weight: this is shown, not only by what has been before said with respect to attraction, but is also demonstrated by experiment; for if the air be taken out of a vessel by means of an air pump, and having weighed the vessel, the air be let in again, it will then, on weighing it, be found considerably heavier; hence it shows that air is a body intermixed with electric or degenerated

matter, and by its rising, directly tells us it must be attracted ; it becomes more rare, consequently lighter, bulk for bulk ; which also tells us, that the fluid body becomes too heavy for the attraction of the centre, at the several points of elevation ; for since it is of an elastic nature, it is plain that the air so attracted must be more dense or compact at the earth's surface than at any height above it, and gradually becomes rarefied the higher it rises ; which readily proves by calculation, that a cubic inch of such air as we breathe would be so much rarefied at the altitude of 800 miles, as would fill a sphere in diameter equal to the orbit of Saturn, if it were not for our orbitular motion repulsing it to a centre.

The air is rarefied or made to expand by heat, thereby creating what we term wind ; which again clearly proves, that as heat has the property of rarefying air, or in other words, of drying the vegetable substance contained in it, so has heat the property of attracting that which becomes degenerated ; for when the air is much heated it will ascend towards the upper part of the atmosphere to gain its own element, consequently the adjacent air will rush in to supply its place, and by this means there will be a stream of air from all parts, towards the place where the

heat is ; thus we may take it as general, that the air will press towards that part of the earth where it is most heated ; which clearly shows the correctness of the preceding arguments.

All common air is impregnated with a rarefying spirit, or quality termed electric, which is necessary to continue the endurance of life in every thing on the face of the earth ; and that rarefying spirit being always attracted with the fluids, intermixes with them, and causes vegetation, without which we could not live ; for if the earth were surrounded with either description, the one would suffocate us inflammably, and the other by drowning. This quality of air can be proved by destroying the vegetation in passing it through fire : air is also vitiated by remaining closely pent up in any place for a considerable time ; all which are proof of the principle of the degenerated air becoming the fountain of light, heat, and vegetation. Air that has lost its rarefying spirit is called damp air, not only because it is filled with moist vapours, but because it deadens fire, extinguishes flame, and destroys life.

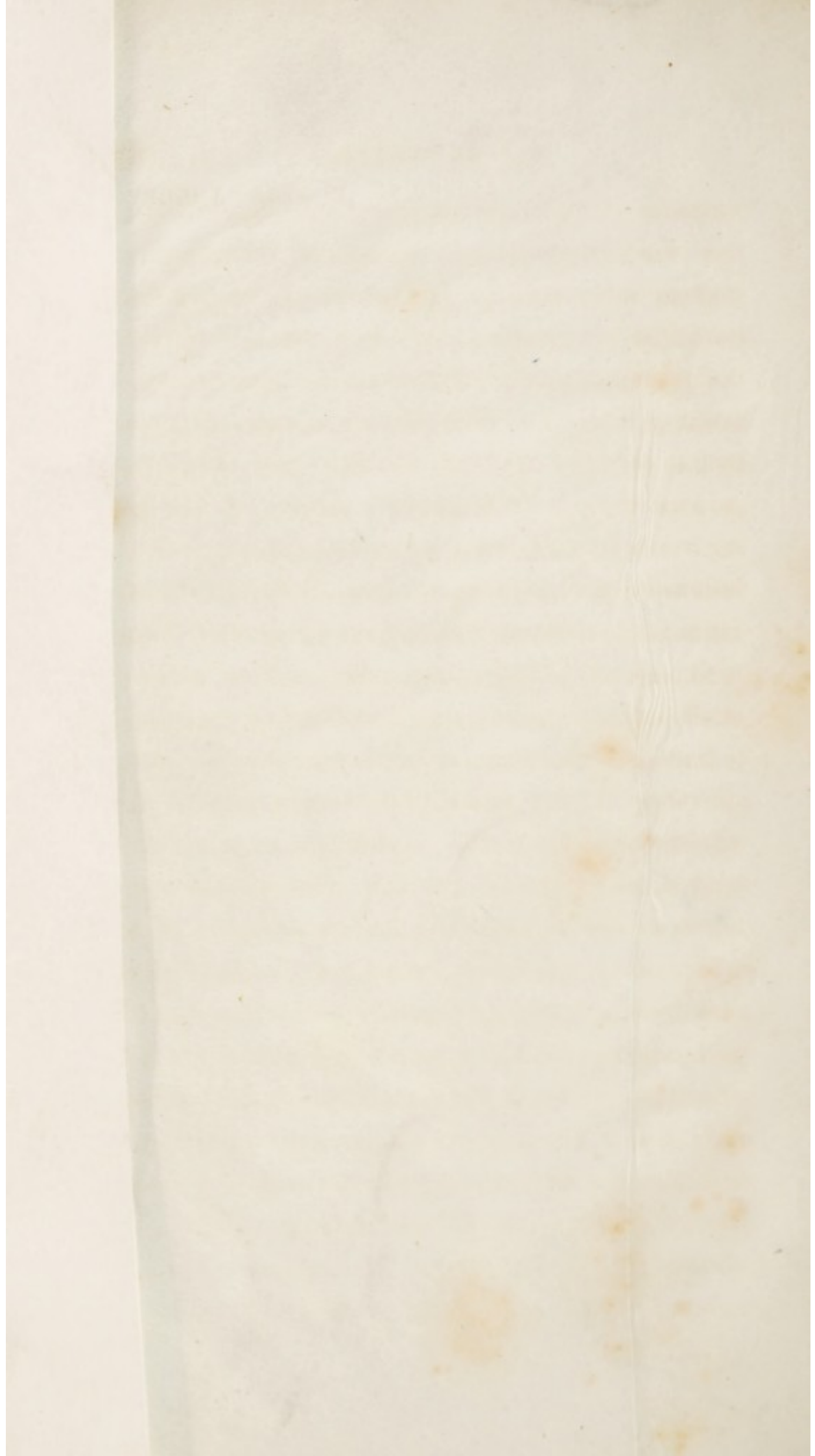
Again, this degenerated or electric air, being of that light body and always ascending, is sufficient proof that there is a greater attraction for it than the earth ; and as I have shown that each planet

has its natural quantity of that matter, and that bodies are attracted in compound ratio, as the planets proceed in their diurnal revolution, the one in a much quicker motion than the other, so do they emit a greater quantity of this degenerated air, which has the property of attracting; and, as observed with respect to attraction, the greater quantity prevails: therefore the planets being so situated, that the farthest from the centre produces the most degenerated air, in order to give the same amount of heat as those which are nearer, (as will be observed by noticing their diurnal motion,) they have the force of attracting such heat in proportion to their revolutions. If the sun as a body, attracted the planets, it would of necessity attract them all to its centre, so that in course of time they would all become centre: by allowing the sun to be the attracting body, it would attract the different planets into one focus, and not attract them proportionably, which is contrary to sound reasoning: but the more rational theory is, that their attraction is to each other, and produced by their own respective motions in their orbits.

Now planets, as observed in the former part of this treatise, have no weight, and therefore by having no weight, require no force to propel

them, consequently it must be by attraction that they are moved : then motion being the cause of planets becoming of no weight, so is motion the true cause of their attraction ; for this reason, because motion causes the air to become vegetable, and it also causes it to become degenerated, thereby causing all matter to ascend to the greater power. It also neutralizes weight in itself. It causes the origination of all bodies into whatever strata they belong. It also causes attraction, as is evident, by the rules laid down with respect to electricity, namely, that it is no more than the attractive quality by which it is possessed. Now as motion is the true cause of everything in our nature, why not motion be the true cause of everything relating to planetary bodies, they having all the like external motion ? And as they have such external motion, why not have the same attractive motion as our earth ? for certainly it emits air degenerated. I will not say our centre attracts fluids from the different planets ; it is plain the moon as a satellite has no fluid, from its having no atmosphere ; therefore the degenerated air not being a fluid substance, becomes incapable of producing an atmosphere.

Observe the solar projection, and see whether the orbitular motion is not much quicker, according to the distance; so that each motion produces a more electric portion, or in other terms, a more degenerative attraction to each other in their respective orbits? The general opinion is, they attract each other through aid of the sun as a body; which is clearly erroneous, as shewn in the former part of this treatise: on the contrary, I desire to impress on every rational mind, that the planets attract themselves, keeping the sun as their centre; each planet deriving heat therefrom by its diurnal revolution. These facts must be plain to every intelligent mind, that if there were no revolution, there would be no attraction, no gravitation; therefore it would be impossible for the particles to adhere; each particle would become open space. And now let me request the reader to examine well the Solar projection, as laid down by the Author, and ask, if it be not more convincing to the understanding and agreeable to known facts, than that popularly taught and received from the same data? Let me add also this further evidence of its truth, that it is fully confirmed in eclipses of the sun, for the bodies never appear to go behind him, which would of necessity be the case under the present



THE SOLAR SYSTEM,

ACCORDING TO THE THEORY OF THE AUTHOR.

U *Orbit of Uranus.*

S .. *Saturn*

J .. *Jupiter*

M .. *Mars*

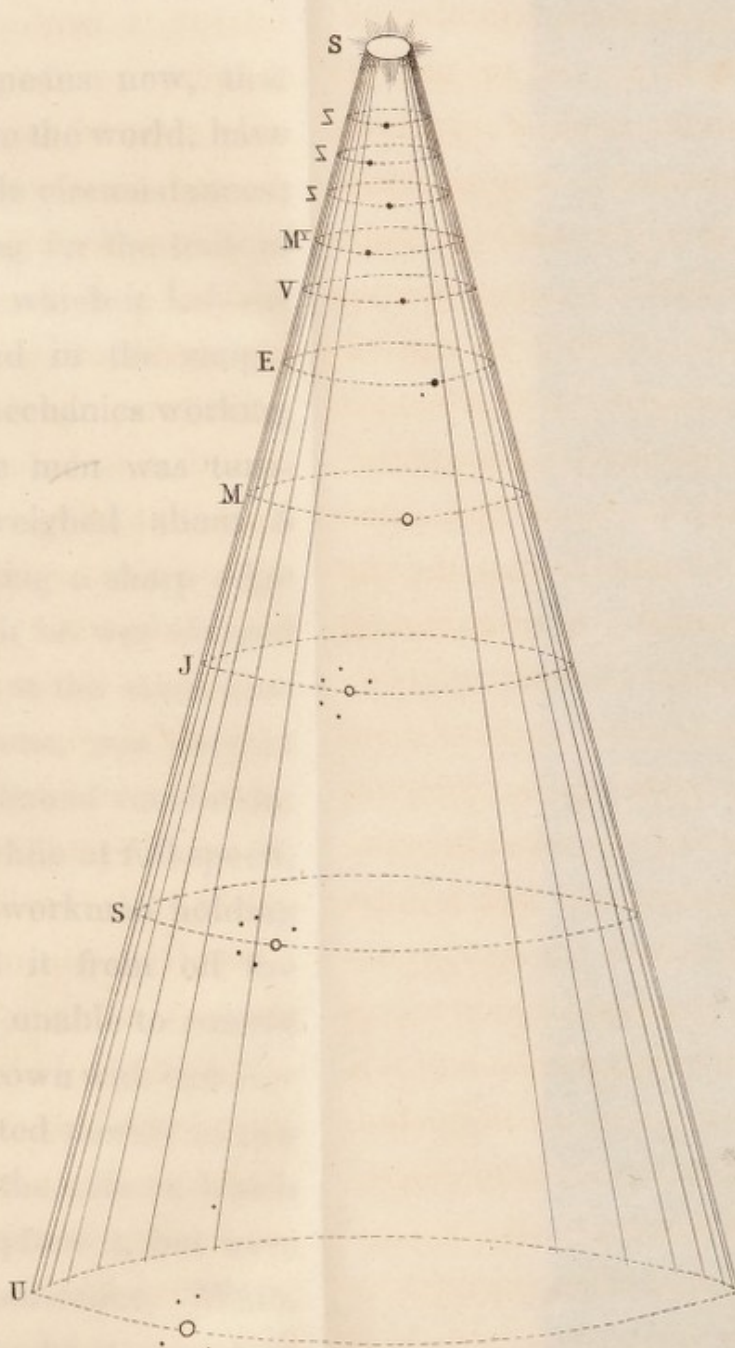
E .. *the Earth*

V .. *Venus*

MY .. *Mercury*

S *the Sun.*

Σ } *Planets or Spots*
Σ } *seen on the Sun.*
Σ }



received system, more particularly as the sun is represented as a globular body.

The observation is by no means new, that most discoveries of importance to the world, have had their origin from very humble circumstances; so the reasons I had when young for the train of thought, and the conclusions to which it led—of the sun being space—originated in the simple circumstance of observing two mechanics working at a grindstone. One of these men was turning the grindstone (which weighed about 5 cwt.), while the other was getting a sharp edge to a chisel, to accomplish which he was obliged to use very great force; while at the same time the man who was turning the stone, was obliged to keep the motion in one continued revolution. It so happened however, that while at full speed, and without giving notice, the workman holding the chisel, suddenly removed it from off the grindstone, and the other being unable to control the increased velocity, it was thrown with violence out of its socket, which consisted merely of two nails driven in at each side of the axis on which it revolved: the men tried to replace it, but were unable to do so without assistance. While sharpening their chisel, a thought occurred to me, of the possibility of motion annihilating

weight in space; and after the occurrence I have related, I made friends with the workmen for the purpose of experiment; and one of them not only assisted me, but took part in my studies. I desired him to turn the stone with great velocity by the multiplying wheel, and having procured a flat piece of iron, I placed it on the top, and to my gratification and surprise it adhered to the grindstone, about 20 degrees below the horizontal line, that is below the point at which it would have slipt off had the grindstone not been revolving at so great a speed; which clearly told me it was motion that caused everything of body to remain on the surface; and if it had been possible for the stone to have been turned with a velocity greater than that of our earth, the piece of iron would have remained on it during the whole of its revolution. After pondering awhile, I resolved on another experiment, and having procured a handspike (the circumstance occurred at the West India Dock Pier), I desired my obliging companion to turn the grindstone with greater velocity, at the same time placing the handspike directly underneath, so as to have a good firm hold; and when at its utmost speed, I gave a sudden jerk upwards with my handspike, and the grindstone flew off its socket with

ease, experimentally showing that it gained all gravitation in itself, and became of no weight to the earth; which led me to a series of studies on the laws of motion, until I became clearly of opinion that we were motion in space, consequently of no weight. On such proofs I have composed this work, and while I doubt not of its meeting with many adversaries, argument and experiment have convinced me of the truth of the doctrine I have advanced, and that it will bear the most strict scrutiny: in this spirit I am desirous of removing the doubts of others, and will answer any questions that may be addressed to me, with that view.

I propose next to discuss, the laws of the four sciences so far as they relate to my subject, shewing how they assist each other in one law, which I term, degenerated law; for that law causes every other to obey it, not only as regards substances, but even space itself,—that great space which we observe as our luminary, and which is the cause of light, heat, and vegetation; shewing the planets to be the true cause of it.

I will in the first place combine the electric matter with fluid particles of the atmosphere, so necessary in sustaining life in all things, and so essential in causing respiration. If it were not

for this electric matter being dispersed throughout the whole face of the earth, it would be an utter impossibility to breathe; for it thereby becomes a vivifying power: this power is destroyed in passing through our lungs, and hence it is, that anything will die soon after being put under a vessel which does not admit of fresh air: the same would be effected with regard to the earth, if there were not a continuation of this electric matter always ascending from it; then the electric matter ascends by further attraction, to that great space, and by its assistance, attracts the waters which are scattered about in small particles throughout the whole surface of the globe, so that one performs the office of attraction, and the other the office of vegetation, after it has become so attracted.

Now we will combine gravitation and motion: motion produces gravitation, as I have fully explained; and the greater the motion, the greater gravitation: so does gravitation cause attraction in every particle of earth, whether in a fluid state or otherwise,—thus the one produces the other; and as they are all four combined, so do they all support that space called the “Sun,” which is composed of, and fed by, the degenerated air emitted from each planet. And here the reciprocity

is equal, for in return, does each planet, and ours among the number, receive heat and attraction ; for that space being perfect in itself, is attracted by the planets, which are bodies less perfect ; and as planets emitting this matter proportionably to their diurnal revolution, the more remote emit a greater quantity of this degenerated air (as before observed in treating of the laws of attraction), and attract the planet next in order : thus the sun is a counteracting space ; and why ? because the combined force of the said air being more powerful, would require a counterbalance, and create a non-attraction ; while the power of each when separate being less, continually feeds each other, until the nearest planet has only to throw the collected volume to the centre.

If the sun as a body were to attract the planets, he would by continual attraction, accumulate all the planets to his centre, unless invested with a repulsive force : then let me ask, where does the sun obtain that repulsive force so indispensably necessary to enforce harmony ?

I have now given some good and scientific details computing the sun to be space, and what feeds that space ; together with a lengthened exposition of the repulsive as well as the attractive forces ; and if any one can point out to me, the

possibility of the sun as a body, retaining a repulsive as well as an attractive force, I will immediately give up the theory I have propounded; but it cannot be. No, it is contrary to the laws of electric, and to the laws of attraction, which require that the greater prevail: then as space is proved to be of that prevailing nature, how is it possible for an all-repulsive body to have that attractive power? No, it is plain that the planets attract, and that the central space repulses, being perfect electric; to suppose otherwise, is contrary to all science, to all calculation; unless by the rule of logicians, to answer all purposes by opinion; for I might with equal justice, with equal right, affirm, the sun as a body, to be placed not only for the purpose of giving heat, but as a place for everlasting torment,—as a body that issues the roaring element, fire,—and as a body which has the property of emitting continual fuel to the different planets, without the property of ignition; which is impossible. But this treatise will explain sufficient to enable my readers to affirm my mathematical reasoning, my experimental philosophy, and the force of my argument—that not only prove the “Sun” to be Space, but also prove its counteracting attractive power—given to it by the motion of the planets, combined with their

attractive motion to each other; in this manner working perfect harmony, so necessary to the support of, and so universally observable in all the magnificent designs of the Almighty !

In confirmation of the truth of the theory developed in the preceding pages, a brief outline of the universal laws on which it is founded, will not only bring conviction to the mind of the general reader by the positive force of argument, but will at the same time produce that conviction by the force of those known physical laws admitted by men of science. Thus, in confirming the truth of the propositions advanced, confidence will be created, and an inducement held out to investigate a science so beautifully displayed in the Solar system,—an inducement that will not be unattended with advantage to the progress of science itself.

The general laws relative to this treatise, are Motion, Gravitation, Hydrostatics, Pneumatics, and Electricity.

The laws relating to motion are defined in the following order, viz., that body is the mass or quantity of matter, contained in every material substance, and it is always proportional to its

weight or gravity with the earth's diurnal revolution, whatever may be its figure.

Body is either hard, soft, or elastic. A hard body is that whose parts do not yield to any stroke, but retains its figure unaltered. A soft body is that whose parts yield to any stroke or impression, without recovering their original form; and an elastic body is that whose parts yield to any stroke, but directly restore themselves, such as water, air, &c.

All bodies imperfect in themselves are neither hard, soft, nor elastic, but partake more or less, of the properties of the three.

Bodies are also either solid or fluid. A solid body is that whose parts are not easily moved amongst each other; but a fluid body, is that whose parts yield to the slightest impression, and whose surface when left to itself, is always observed to settle in a smooth plane at the top.

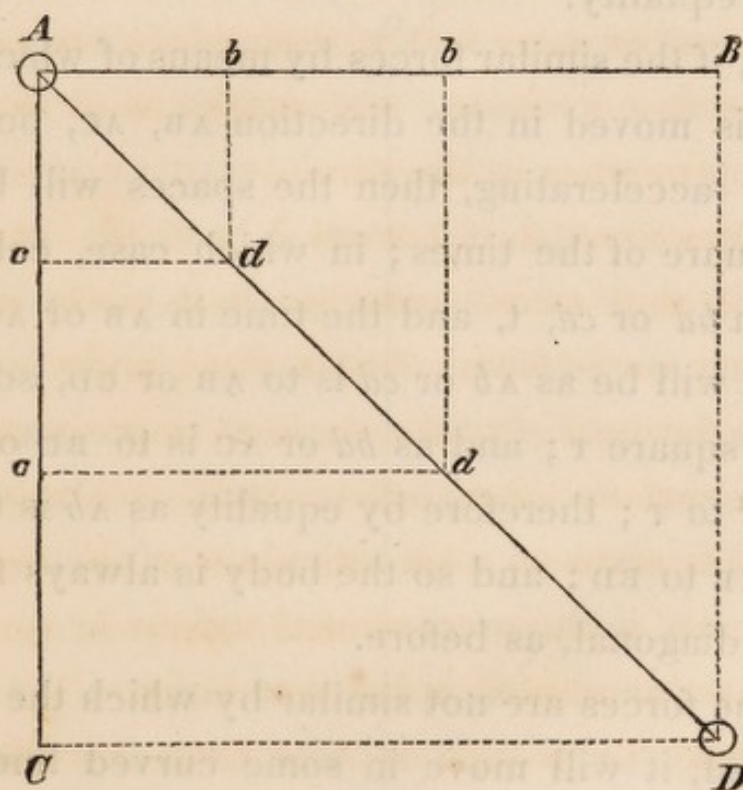
Density is the proportional weight or quantity of matter contained in any one body.

Gravity or weight is that force by which a body falls downward. It is called absolute gravity, when the body is in empty space; and relative gravity, when immersed in a fluid.

The momenta or quantity of force in moving bodies, are in the compound ratio of the masses

and velocities; that is, as the momentum is to the velocity of the body.

Thus, if a body at A , be urged in the directions AB and AC by any two similar forces, so that they would separately cause the body to pass over the spaces AB , AC , in an equal time, then if both forces act together, they cause the body to move in the same time through AD , the diagonal of the parallelogram $ABDC$.



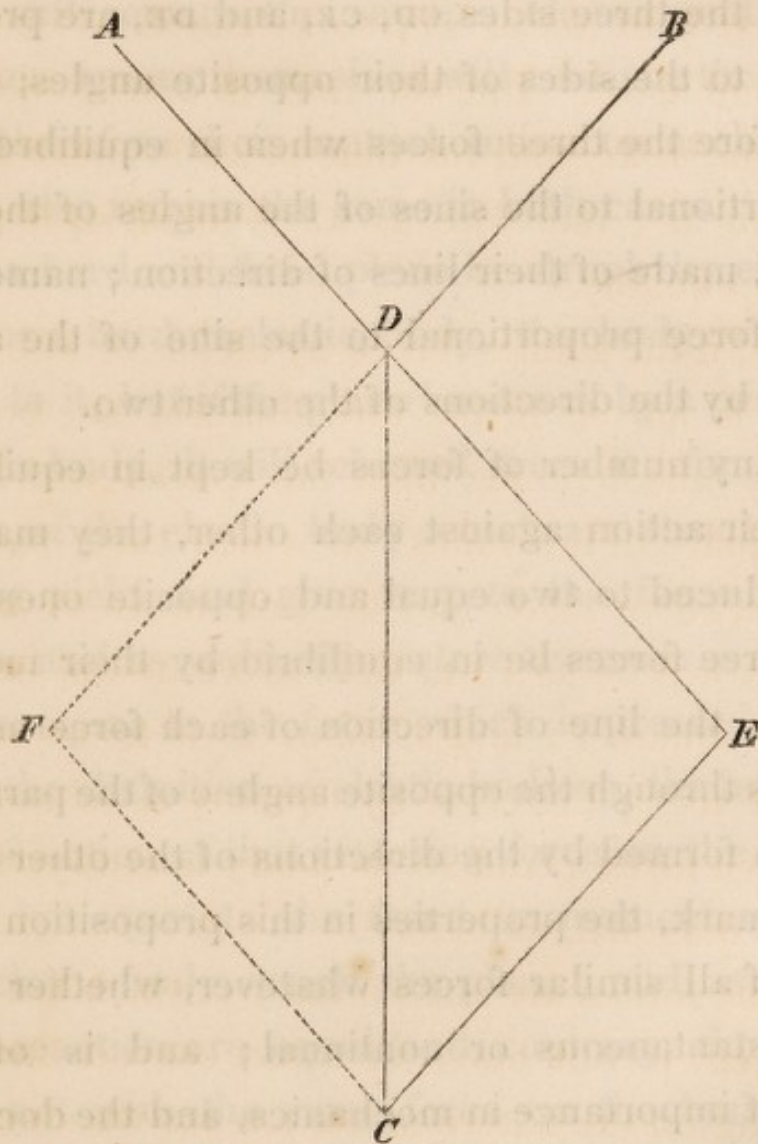
Draw cd parallel to AB , and bd parallel to AC ; while the body is carried over Ab or cd by the force in that direction, let it be carried over bd by the force in that direction; by which means it

will be found at d . Now, if the forces be impulsive or momentary, the motions will be uniform, and the spaces described will be as the times of description; therefore, as Ab or cd is to AB or CD , so is the time in Ab to the time in AB . And as cd or AC is to BD or AC , so is the time in AC to the time in AC . But the time in Ab is equal to the time in AC , and the time in AB is equal to the time in AC ; therefore as Ab is to bd , so is AB to BD by equality.

But, if the similar forces by means of which the body is moved in the direction AB , AC , be uniformly accelerating, then the spaces will be as the square of the times; in which case, call the time in bd or cd , t , and the time in AB or AC , T ; then it will be as Ab or cd is to AB or CD , so is t^2 to the square T ; and as bd or AC is to BD or AC , so is t^2 to T ; therefore by equality as Ab is to bd , so is AB to BD ; and so the body is always found at the diagonal, as before.

If the forces are not similar by which the body is urged, it will move in some curved line, depending on the nature of the forces; which is precisely the same as planetary bodies are urged; and thus any force may be compounded of two or more other forces.

If three forces, A , B , C , acting all together, keep each other in equilibrio, they will be in proportion to three sides, DE , CE , CD , of a triangle, which are drawn parallel to the directions of the forces AD , BD , CD .



Produce AD , BD , and draw CF and CE parallel to them, then the force in CD is equivalent to the two AD and BD , by the supposition; but the force CD , is equivalent to the two ED and CE , or FD ;

therefore if CD represent the force C , ED will represent its opposite force A , and CE or FD its opposite force B ; consequently the three forces are proportional to DE , CE , CD , the three lines parallel to the directions in which they act; because the three sides CD , CE , and DE , are proportional to the sides of their opposite angles, EDC ; therefore the three forces when in equilibrio, are proportional to the sines of the angles of the triangle, made of their lines of direction; namely—each force proportional to the sine of the angle made by the directions of the other two.

If any number of forces be kept in equilibrio by their action against each other, they may be all reduced to two equal and opposite ones. If the three forces be in equilibrio by their mutual action, the line of direction of each force as DC , passes through the opposite angle C of the parallelogram formed by the directions of the other two.

Remark, the properties in this proposition hold true of all similar forces whatever, whether they be instantaneous or continual; and is of the utmost importance in mechanics, and the doctrine of forces: it also holds good with electric or attractive forces.

The motion of bodies included in a given space, is the same with regard to each other; for

if any force be equally impressed both on the body, and the line on which it moves, this will cause no change in the motion of the body along the right line ; for the same reason the motions of all the other bodies in their several directions, will still remain the same. Consequently the motions among themselves will continue the same, and therefore their mutual action on each other must also remain the same in both cases.

If a hard and fixed plane be struck by either a soft or a hard unelastic body, the body will adhere to it; but if the plane be struck by a perfectly elastic body, it will rebound from it; for as the parts of the elastic body which are struck, suddenly yield, and give way to the force of the blow, and as suddenly restore themselves with a force equal to the force which impressed them, (by the definition of elastic bodies), the intensity of the action of that restoring force on the plane, will be equal to the force or momentum with which the body struck the plane; and as action and reaction are equal and contrary, the plane will act with the same force on the body; but hard or soft bodies being devoid of elasticity by the definition, have no restoring force to throw them off again; they must necessarily adhere to the plane struck.

All the properties of motion are true in the motion of bodies freely descending by their own gravity; namely,—that the velocities are as the times, and the spaces as the square of the times, or as the squares of their velocities. Now, it has been found by numberless experiments, that gravity is a force of such a nature, that all bodies, whether light or heavy, fall perpendicularly through equal spaces in the same time, abstracting from it the resistance of the air. It is also found, that the velocities acquired by descending, are in the exact proportion of the times of descent; and further, that the spaces descended, are proportional to the squares of the times, and therefore to the squares of the velocities; hence it follows, that the weights or gravities of bodies near the surface of the earth, are proportional to the quantities of matter contained in them; and that the spaces, times, and velocities, generated by gravity, have the relations contained in the general proportions before laid down. This argument proves, that the laws for the destruction of motion, are the same as those for the generation of it, by equal forces, but acting in a contrary direction; therefore, a body thrown directly upward with any velocity, will lose equal velocities in equal times.

If a body be projected into free space, either parallel to the horizon, or in an oblique direction, by the force of gunpowder or any other impulse, it will by this motion, in conjunction with the action of gravity, describe the curved line of a parabola. Thus far I have delineated the laws of motion and gravitation, with their dependencies as relate to the works of this treatise.

HYDROSTATICS.

I will now enter into the solution of the problems relating to hydrostatics ; which is a science that treats of the pressure or weight of fluid, whether in body or vapour. A fluid is elastic when it can be reduced into a less bulk by compression, and which again restores itself to its former bulk when the pressure is removed, as air ; and it is non-elastic when not compressible or expansible, as water, &c.

Though fluidity is commonly regarded as an essential property of water, yet many philosophers consider that property as an adventitious circumstance, produced by a certain degree of heat ; and assert its natural state to be that of a chryselline, as when in ice ; but I have proved in the preceding pages, that water is in its natural state

when fluid ; for as the planets naturally produce their own heat, consequently everything on the face of the planets is natural, because it is a self production. Then to the point: water is one of the constituent parts of all bodies ; as is proved by distillation. All fluids, except air, are incompressible. Water in its natural state, contains the three other elements*—fire, earth and air.

It has already been said that water owes its fluidity to heat ; and it is evident from many experiments, that it contains no small quantity of air ; and the sediment that is found in all water, always contains a quantity of earth.

The pressure of a fluid upward is equal to its pressure downward, at any given depth.

If fluids of different gravities be contained in the same vessel, the heaviest will be at the bottom, and the rest in proportion to their specific gravity.

Every solid immersed in a fluid, loses so much of its weight as is equal to the weight of a quantity of that fluid of the same dimensions with the solid.

Sir Isaac Newton's definition of a fluid, is, that it is a body yielding to any force impressed,

* I have described fire, earth, and air, as elements, for brevity sake.

and which has its parts very easily moved one among another.

It must be here remarked, that this definition supposes the motion spoken of, produced by a partial pressure; for in the case of an incompressible fluid, it is demonstrated by Dr. Reid, that under a total or equal pressure, it would be impossible the yielding body should move.

The original and constituent parts of fluids, are by the moderns conceived to be particles, small, smooth, hard, and spherical; according to which opinion every particle is of itself a solid or a fixed body; and when considered singly, is no fluid; but becomes so, only by being joined with other particles of the same kind. It is probable that the particles of fluids are exceedingly small, because their texture has never yet been discovered by the most powerful microscope: we judge them to be smooth, because they are found easily to glide over each other; hard and impenetrable, because no fluid we are acquainted with (the air excepted), is capable of compression: we conceive them to be spherical, that they may only touch in some part of their surface, and so be the more easily moved; admitting air, and forming vacancies between them.

Were fluids not compounded of primary circles, formed as before stated, but made up of one homogeneous substance, without consistence equally dense, there would be no difference in their specific gravity; and all fluids would be of the same weight, bulk for bulk; which is contrary to experience. A fluid becoming more buoyant, is a certain proof that its specific gravity is increased, and of consequence, that many of its vacuities are thereby filled; after which it may still receive a quantity of other dissoluble bodies, the particles whereof are adapted to the vacancies remaining, without adding anything to its bulk, though the absolute weight of the whole fluid be thereby increased.

And as fluids are found by experiment to have vacancies, or are not perfectly dense, it is also probable that they are compounded of small spheres of different diameters, whose interstices are successively filled with created air.

Was all space absolutely full of motion, this matter must either be a fluid body or air degenerated; if it were all fluid, there could possibly be no orbitular motion, because the fluid, as a body, would retard progress; but as gravity cannot be denied, all space cannot be filled with a fluid.

The air is a fluid whose density near the surface of the earth, is experimentally found to be to that of water, at a medium, as 1 to 850; so that 850 gallons of air near the earth, weigh as much as one gallon of water.

If any part of a fluid be raised higher than the rest by any force, and then left to itself, it will descend to the lower places, and the fluid will not rest till its surface be quite even and level; for the same reason, if a fluid gravitate toward a centre, it will dispose itself into a spherical figure, the centre of which is the centre of the force.

When a fluid is pressed by its own weight, or by any other force, at any point, it presses equally: this arises from the nature of fluidity, by which it yields to any force in any direction; and the pressure in all directions will be the same; for if it were less in any part, the fluid would move that way, till the pressure be equal every way. If a body has the same density or weight, it will press the fluid under it the same as if its space was occupied with the fluid itself; but if a body is lighter than the fluid, its pressure downward will be less than the water upward at the same depth; therefore the greater force will overcome the less; and if the body be heavier, the pressure downward will be greater than the

fluid of the same depth; therefore the greater force will prevail.

Hence the magnitude of the whole body is to the magnitude of the part immersed, as the specific gravity of the fluid is to that of the body.

I have now given the laws relating to Hydrotatics, and in which ought to be considered water, as fluid particles floating in the air, which is my next subject.

PNEUMATICS

Is the Science which treats of the properties of air or elastic fluids. But it differs from all other fluids in the four following particulars:—

1st.—It can be compressed into a much less space than it naturally occupies.

2nd.—It cannot be *conjealed* or fixed, as any other fluid.

3rd.—It is of a different density in every part upward from the earth's surface, decreasing in weight, bulk for bulk, the higher it rises; and therefore must also decrease in density.

4th.—It is of an elastic or springy nature, and the force of its spring is equal to its weight.

The weight or pressure of the air is exactly determined by the following experiment:—Take

a glass tube about three feet long, and open at one end : fill it with quicksilver, and putting your finger upon the open end, turn that end downward, and immerse it into a small vessel of quicksilver, without letting in any air : then take away your finger, and the quicksilver will remain suspended in the tube $29\frac{1}{2}$ inches above its surface in the vessel ; sometimes more and at other times less, as the weight of the air is varied by winds and other causes. That the quicksilver is kept up in the tube by the pressure is evident ; for if the bason and tube be put under a glass, all the quicksilver in the tube will fall down into the bason ; and if the air be let in again, the quicksilver will rise to the same height as before.

The pressure of air being equal on all sides of a body exposed to it, the softest bodies sustain this pressure without suffering any change in their figure.

When the air is much heated, it will ascend towards the upper part of the atmosphere, and the adjacent air will rush in to supply its place ; so that there will be a stream of air from all parts towards the place where the heat is ; hence is seen the reason why the air rushes with such force into any place where a great fire is made ; but as the sun, with respect to the earth, moves

from East to West, the common course of the air will likewise be that way, continually pressing after the sun; and therefore at the Equator, where the sun shines strongly, there will be a continual wind from the East; but on the North side it will incline a little to the North; and on the South side a little to the South. Now, my readers may possibly think I am verging from my discourse; but I state this in proof of my argument, that the diurnal motion going through such immense space at the Equator, produces more degenerated air than other parts of the earth, and by its greater production, attracts the rays of the luminary with proportionably increased force; which confirms the truth of what has been said with respect to heat being governed by motion, and not by distance.

The atmosphere is the common receptacle of all the effluvia or vapours arising from different bodies; of the steam and smoke of things burnt or melted; the fogs or vapours proceeding from damp watery places; and of the effluvia proceeding from sulphureous, nitrous, acid, and alkaline bodies. In short, whatever may be called volatile, rises in air to greater or less heights, according to their specific gravities and combustible nature.

Air resists bodies in motion, and equal bodies meet with different degrees of resistance, according as they present greater or less surfaces to the air in the planes of their motions.

Air also, when moved briskly by any means, as by a fan or pair of bellows,—or when any body is moved briskly through it; in these cases we become sensible of it as a body, by the resistance it makes to such motions; and likewise by its impelling or blowing away any light substance. As it is a fluid, also, it spreads itself all over the surface of the earth.

Air also is an elastic fluid, being condensible and expansible. This property of the air is proved by many experiments: thus, if the handle of a syringe be pushed upward, it will compress the enclosed air into less space, thereby shewing its condensibility; but the included air thus compressed will be felt to act strongly against the hand, resisting the force the more it is compressed; and on withdrawing the hand, the handle will be pushed back to where it was at first; which shews that the air is elastic.

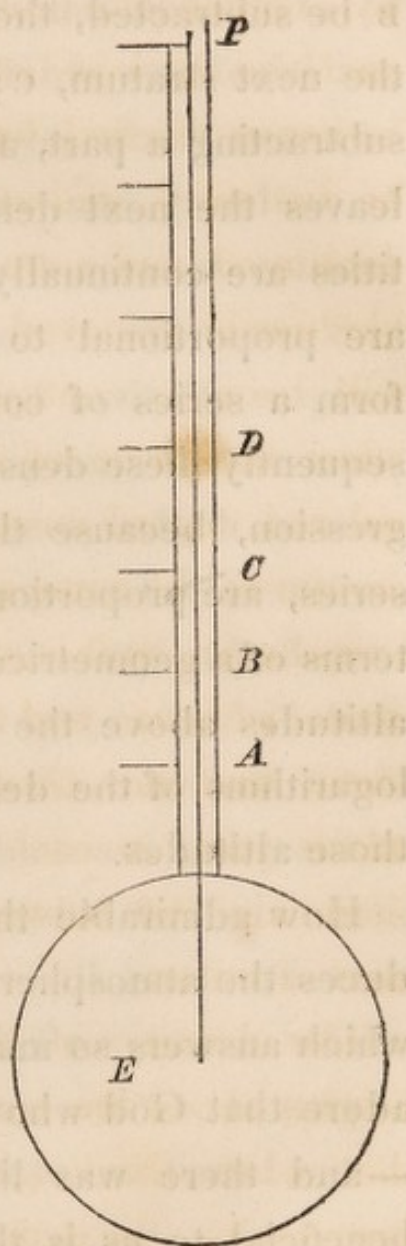
From the foregoing principles may be deduced many useful remarks.

Heat increases the elasticity of the air, and cold diminishes it. This property is also proved

by experiment: thus, if a bladder with some air enclosed, be laid before a fire, as the enclosed air becomes rarefied by the heat, the bladder will be distended, and at length burst, if the heat be continued, and increased high enough; but if the bladder be removed from the fire, as it cools, it will become contracted as before. So that when the force of the elasticity of air is considered, regard must be had to its heat or temperature; the same quantity of air being more or less elastic, as it is more or less endued with the matter of heat; and it has been found by experiment, that the elasticity is increased, by the 435th part, in each degree of heat, of which there are 180 between the freezing and boiling heat of water.

The density of the atmosphere at different heights above the earth, decreases in such sort, that when the heights increase in arithmetical progression, the densities decrease in geometrical progression, as demonstrated in the following diagram:—

Let the perpendicular line AP, erected on the earth, E, be conceived to be divided into a great many very small parts, as A, B, C, D, &c., forming so many thin strata of air in the atmosphere, all of different density, gradually decreasing from the greatest at A; then the density of the several strata A, B, C, D, &c., will be in geometrical progression, decreasing. For as the strata A, B, C, &c., are of equal thickness, the quantity of matter in each of them is as the density there; but the density in any one stratum, being as the compressing force is to the weight of matter from that place upward to the top of the atmosphere; therefore the quantity of matter in each stratum, is also as the whole quantity from that place upward. Now, if from the whole weight at any place, as B, the weight or quantity in the stratum



B be subtracted, the remainder is the weight at the next stratum, c ; that is, from each weight subtracting a part, always proportional to itself, leaves the next density; but when any quantities are continually diminished by parts which are proportional to themselves, the remainder form a series of continued proportionals; consequently these densities are in geometrical progression, because the terms of an arithmetical series, are proportional to the logarithms of the terms of a geometrical series; therefore different altitudes above the earth's surface are as the logarithms of the densities or weights of air at those altitudes.

How admirable that arrangement which produces the atmosphere in which we breathe, and which answers so many useful purposes! Let us adore that God who said “ ‘Let there be light,’ —and there was light.” How valuable, how beneficial to us is this wonderful effect of the power and wisdom of God, which we call light! By its operation all the beautiful and majestic scenery of nature is presented to our view! How many sources of pleasure and instruction are thus widely opened to us! How admirable the All-seeing Wisdom that preserves in existence that atmosphere, which to such an extent sur-

rounds our globe, and with the assistance of attraction produces light ! How wonderful are its reflecting and refracting rays, which unveil to our admiring eyes the beauty and grandeur of the creation ! And how much more wonderful is it that the atmospheric air is not more frequently vitiated, and rendered unfit for respiration and other important purposes, by the multitude of deleterious substances, which continually threaten it with injury and corruption. Surely nothing but the never-ceasing and all-pervading energy of the Almighty Lord of Nature could prevent a result so mischievous and fatal, by constituting those laws which act and react in harmonious succession throughout the Solar system, and are the admiration of all good and wise beings ! Let us bless that Providence which maintains those wonderful productions, so necessary to our comfort, and even to our lives !

ELECTRICITY.

I now proceed to explain the nature of electricity, so far as relates to this treatise. Though it is certain ever since the creation of the world, that the electric fluid had all the operations it has at present, yet the discovery of its action and

even of its existence, is comparatively speaking of a very late date. Perhaps it may not be uninteresting concisely to trace the history of electricity, which may be carried to a very early period.

Thales, the Milesian, who lived 600 years before Christ, was the first who observed the electrical properties of amber: of these indeed, he knew no more than that this substance would attract light bodies when it was rubbed.

For three hundred years after his time, we hear nothing further concerning this subject. Theophrastus then tells us, that the Lyncurium (now called the Journalia) has the property of attracting light bodies as well as amber. From this time there is a chasm in the history of electricity for nineteen hundred years. It was in the beginning of the seventeenth century that the subject became a distinct science; and the foundation was laid of those discoveries (which have since taken place), by Dr. William Gilbert, an English physician, who may justly be called the father of electricians. In the year 1600, he wrote a book, *De Magnete*, which contains a variety of electrical experiments: all these however, considered only the attractive property of certain substances, which from their

agreement in this respect, were called electric. Dr. Gilbert's merits consist in his having been at great pains to find out a number of such substances; and thus considerably enlarged the number of electrics.

Till the year 1760, it does not appear that any further discoveries were made; excepting some trifling additions to the catalogue of electrics. About this time Mr. Boyle applied himself to the study of electricity; he enlarged the catalogue of electrics, and found their electric properties were increased by warming and wiping them before they were rubbed.

Otto Guericke, however, who was cotemporary with Mr. Boyle, improved the science much further. He made use of a sulphur globe, whirled on an axis, much like our present glass globes; by which means he excited a greater power of electricity than any of his predecessors, and tried all their experiments to much more advantage. He discovered the electric repulsion, and not only saw the electric light more clearly than Mr. Boyle, but heard the hissing sound with which it is emitted. He also made another remarkable discovery, but which has since been generally overlooked: viz.,—that a feather when repelled by an excited electric, always keeps the

same face towards the body which repels it, the same as the moon does to the earth.

The next discovery of any moment was made by Sir Isaac Newton, that the electric attraction and repulsion penetrated through glass.

In 1709, a treatise was written on electricity, by Mr. Hawksbee, who not only far excelled all his predecessors and cotemporaries, but also made some discoveries which well deserve the attention of the most expert electricians of the day. He was the first who applied a glass globe to the machine, and he remarked various appearances of the electric light, and the noise that accompanied it, together with a variety of phænomena, relating to electric attraction and repulsion.

After his death, not only the use of globes, but even the study of electricity itself, seems to have been pretty generally laid aside for some time. The reason of this was, that the recent discoveries of Sir Isaac Newton engrossed the attention of philosophers to such a degree, that they had no leisure for any other pursuit. However, after the death of that great man, the study of electricity began to revive, and in 1729, a capital discovery was made by Mr. Stephen Grey, who (by his curious observations), found out the difference between electrics and conductors ;

and with the assistance of Mr. Wheeler, contributed much to the advancement of electricity. Soon after, Mr. Du Froy accidentally discovered the difference between positive and negative electricity, by observing that a piece of leaf gold repelled by an excited glass tube, was again eagerly attracted to it, after it had touched some body that was not electric; the same was also the case with rosin, sealing wax, sulphur, and a variety of other substances.

It may be observed, that although the science had, through the indefatigable attention of so many ingenious persons, and by the discoveries that were daily produced, excited the curiosity of philosophers, and engaged their attention; yet as the causes of everything, whether small or great, are seldom much attended to, if their effects are not particularly striking and singular; so electricity had till the year 1746 been studied by none but philosophers, until that capital discovery, of the vast accumulation of its power, in what is called the Leyden phial, was accidentally made by Mr. Muschenbrock, in the year 1746, at which time the study of electricity became general, and gave more surprise, even to philosophers, than any other science whatever. From the time of this discovery, electricity became the

general subject of conversation, and great numbers of people got their livelihood by going about and shewing its curious phænomena.

The science of electricity has, since the above period, been greatly improved by the indefatigable industry of the celebrated philosophers, Dr. Franklin and Dr. Priestly; but it would be endless to enumerate all the improvements that have been made by a great number of other gentlemen, who have added something towards its advancement: and having thus far given the history of electricity, it remains only to apply its powers in reference to this treatise with respect to the sun, as being attractive and repulsive.

The great laws of the electric fluid, and those on which electricity and degenerated air depend, are simply these: that the electric fluid is produced from bodies on the earth mechanically; and degenerated air is produced from the earth by inartificial means, which I may term electric purified; being much lighter than common electric, and having the property of repelling forces with greater strength: but to explain the law relating to artificial electricity, will give sufficiently just conclusions as to real electricity or air degenerated. Then, when two bodies contain either more or less than their natural share, they repel each

other; or if one body has a larger surface than the other, it will repel; but if one have more and the other less, they will attract each other: the same law holds good with respect to our planets, when speaking of the quantity of degenerated air that flows according to their diurnal motion: it also holds good with respect to our moon, when compared to the earth.

To exemplify this, take a bundle of feathers and hang them on a prime conductor; the moment they become electrified, they begin to fly from each other, so that some of them will stand quite erect, and they cannot be made to collapse till the conductor be discharged.

Again, if you hold in your hand a bundle of feathers, and present them to the electrified conductor, it repels the electric fluid from that part of the feathers you present, into the more distant part of those feathers, or into your hand, and so to the ground; the consequence of which is, the feathers having less than their natural share, do strongly repel and avoid each other; and at the same time are all strongly attracted by the conductor, which is in its opposite state. If the conductor had been deprived of its natural share of electricity, the bodies presented to it would have had more than their

natural share ; so that still the same appearance of mutual repulsion and of attraction, by the conductor, would have taken place.

Electrical attraction and repulsion are exhibited in a very pleasing manner, by means of a glass tube and a feather. When the tube is excited, by being drawn through the hand, the feather, when brought near it, will be attracted, and jump to the tube ; and after taking some time to get fully saturated with electric matter, it will suddenly jump from it, and fly towards the next conductor, upon which it may discharge the redundant electricity it has acquired. If no other body happen to be in the way, it will tend towards the ground ; but if the electrified tube be held under it, it will be still repelled, and driven into the middle of the room, where it may be kept suspended or be driven about in all directions, almost as long as a person pleases, if the air be dry. Other beautiful effects of electrical attraction and repulsion, can be produced from the prime conductor of an electrical machine ; but as these would serve more for amusement than to strengthen the nature and purport of this treatise, they are here omitted.

Thus, by the law of electricity, the nature and power of attraction and repulsion of the planetary

bodies is fully explained; that they contain more or less of this attractive and repulsive quality is evident from their motions; that is, they repulse by one motion and attract by the other. And further, the reason why the planets' centre, the sun, should repulse, is obvious by the same natural laws; for that luminary being perfect, causes bodies less perfect to revolve in uniform motion, as feathers by the power of an electrical conductor,—the planets being of no more weight in the firmament; that is, they, one and all, attract that body according to their respective diurnal motion, which attraction conveys to them their natural portion of heat.

I shall now proceed to treat of the Solar system as it is laid down by men of science.

The Solar system, so called by Astronomers, is that in which our earth is placed; and in which the sun is *supposed* to be fixed, in or near the centre, with several bodies similar to our earth, revolving round him at different distances. This hypothesis, which is confirmed by all the observations hitherto made, is called the Copernican system, from Nicholas Copernicus, a Polish philosopher, who, about the year 1500, revived

this notion from the oblivion in which it had for many ages been buried.

There are seven primary planets, which, reckoned in order from the Sun are as follow, *Mercury, Venus, the Earth, Mars, Jupiter, Saturn, and Uranus.*

The primary planets are those bodies which in revolving round the sun, respect him only as their centre; the motions of which are regularly performed in tracks or paths, which are found by observations to be nearly circular and concentric to each other.

The orbit of a planet, is that track or path in which it moves.

Mercury and *Venus* are called inferior planets, because their orbits are within that of the earth; the others are called superior planets, as their orbits include that of the earth.

The annual motion of a planet, is that in which the planet is carried in its orbit round the sun, from West to East.

The diurnal motion of a planet, is that by which it turns or spins on its axis; and is also from West to East.

The sun is the first and greatest object of astronomical knowledge: it is placed near the centre of the orbits of all the planets, and turns

round its axis in *25d. 14h. 8m.* : its diameter is *886,473* miles, and its mean distance from the earth is *95,513,794* miles ; and it is a spherical body. [The latter quality is disputed by the writer, who maintains it to be *space*, an *electric space*, and a *perfect electric space*, as proved by this treatise.]

Mercury is the nearest of all the planets to the sun ; his mean distance being *36,973,282* miles,—as per table, page 17.

Venus is the brightest of all the planets : her mean distance is *69,088,240* miles. When this planet is in that part of her orbit which is west of the sun, she rises before him in the morning, and is called *Lucifer* or the morning star : when she is on the eastern side of the sun, she shines in the evening, and is then called *Vesper* or the evening star.

The *Earth* is next to *Venus* : it is distant from the sun *95,513,794* miles. The *Earth* being an opaque body, and of which we have more scientific knowledge, I shall give a more lengthened account of it. As it is a globe, one half only at a time can be enlightened by the sun's rays ; so that while it is day in our hemisphere, it is night in the other, and produces day and night ; this motion is called diurnal, and as the *Earth* con-

tinues to revolve on its axis, the sun appears to move in the opposite direction, till the place enters the darkened side of the earth, when the sun is said to set.

As the motion of the Earth is from West to East, the sun's apparent motion is from East to West.

When it is sun rise at one place, it is sun set at the point directly opposite; and hence arises the difference of time.

As the Earth revolves round the sun in a year, it describes an imaginary line, in the space in which it travels, called its orbit. The axis of the Earth is inclined or placed obliquely with regard to the plane of its orbit, and remains constantly in the same direction during the half of its annual revolution. Hence when the one extremity of the Earth's axis is most inclined towards the sun, the other extremity will be most inclined from it: if they were not inclined either way to the plane of its orbit, both of its extremities would always be at an equal distance from the sun: there would be no difference of seasons. It is evident that when the North pole is turned towards the sun, it receives his rays; and the South being turned from him, will not receive his rays; consequently it will be constant day at

that pole which receives his rays, and constant night at the other, during the time the axis retains this position. These regions extend $23\frac{1}{2}$ degrees from either pole. Thus, by reason of the obliquity of the Earth's axis, when the North pole is turned towards the sun, the sun's rays fall directly or vertically on the north of the equator; and the reverse is the case, when the South pole is inclined towards the sun. At the extreme inclination either way, the sun's rays fall directly on the earth $23\frac{1}{2}$ degrees north or south of the equator.

I will here also enlarge on a matter that must not be overlooked; namely, that there are two great motions of the waters, described in the former part of this treatise, to be caused by heat in the tropics. This heat constantly carries off a quantity of water from the sea, by raising it into the air in the form of vapour, which occasions a deficiency on and near the equator, according to the earth's declination from the same; and in order to preserve the level or balance, (as explained in treating of Hydrostatics), the water from the colder climates on either side, flowing in to supply the vacancy, causes currents. A constant circulation of the waters of the sea thus takes place; the current from the westward

within the tropics, is produced by the motion just described, combined with the motion of the earth round its axis; for it is evident that those parts of the surface of the globe which are under the equator, must move more rapidly than those toward the poles; because any point of the equator must travel a distance equal in time to any other circumference of the globe in 24 hours, which makes the difference in the warmth of the seasons at particular places, according to latitude and declination; shewing that heat does not arise from its greater or less distance from the sun (planetary wise); but is governed by the motion of the earth in the ecliptic. Thus, when the earth shews more of her North side to the sun, he throws his rays more perpendicularly to the neighbouring parts, consequently they receive his heat more powerfully: the same is to be observed, when the earth shews more of her South; for it is a vague notion, to suppose the heat of places, either on the earth or planets, to be according to their distance from the sun. No, it depends on the latitude and declination; for the further the places recede, either North or South, the less space the parts go through in the 24 hours; therefore the diurnal motion of the earth and planets, attract their full power of heat

to the part that goes through the most space; and, thus is again confirmed, the assertion I have before made, that heat is governed by motion; and that the earth and planets attract their own made centre, or sun, by their respective diurnal motion; for as the equator is 90 degrees from either axis, it consequently travels through the most space in the 24 hours; and being in *nadir*, or under the equinoctial, alone proves the sun to be an electric space, and that space to be gained by motion. Were it otherwise, we might as well say, why not the equinoctial or sun's place, be our zenith or over head, where the motion is less, or travels through less space in the same time? I recommend to my readers, to study well this part of the subject, (being that mostly within our own knowledge,) and the conclusion to which they must perforce come, will, I have no doubt, be the same as my own, namely, that the diurnal motion is the true cause of heat.

Mars is the next planet to the earth, being distant from the sun 145,533,667 miles, as will be observed by the table (*page 17.*) He appears of a dusky reddish hue, and is supposed to be encompassed by a very dense atmosphere.

Between the orbits of Mars and Jupiter, several planetary bodies have been lately dis-

covered; but as they are supposed by Dr. Herschel to be Asteroids not belonging to our system, further notice of them here seems superfluous. It may, however, be observed, that the supposed time of Ceres, the first of those discovered Asteroids, performing her orbitular revolution, is about 1681 days.

Jupiter is still higher in the system. He is the largest of all the planets, and is easily distinguished by his peculiar magnitude and light. Though Jupiter is the largest of all the planets, yet his diurnal revolution is completed in the short space of $9h. 53m. 33s.$ According to the most accurate observations, the equatorial diameter of this planet is about $\frac{1}{14}$ more than the polar diameter; and when viewed through a telescope, he is seen surrounded with rings called belts. Jupiter is attended by four satellites, invisible to the naked eye; but through a telescope they make a beautiful appearance. In speaking of them, we distinguish them according to their places, as the first, second, &c. The eclipses of these satellites are of considerable use in determining the longitude of places on the earth.

Saturn is still more remote in the system: he shines with a pale and feeble light: he is also attended by seven satellites, and is encompassed

with a broad luminous double ring, distant from the body of the planet 2839 miles.*

Herschel, called also *Uranus*, or the Georgian planet (in compliment to His late Majesty George III.), is the most remote planet of our system: it was discovered in March, 1781, by Dr. *Herschel*, though there are many reasons to suppose it had been seen before, but had been considered as a fixed star. It appears no larger than a star of the sixth magnitude. Dr. *Herschel* has discovered six satellites attending this planet, whose orbits are nearly perpendicular to the plane of the ecliptic, and they perform their revolutions in their orbits contrary to the signs.

Now, although astronomers generally say that the planets are spherical, yet they do not mean a

* Saturn's double ring consists of two concentric rings detached from each other, and from the body of the planet; the innermost of which is nearly thrice as broad as the outtermost.

The following are the dimensions of his luminous zone, as determined by Dr. *Herschel* :—

	Miles.
Inside diameter of the interior ring	146,345
Outside „ of the „ „	184,398
Inside „ of the exterior „ „	190,240
Outside „ of the „ „	204,833
Breadth of the interior ring	20,000
„ of the exterior „ „	7,200
„ of the dark space between the two rings	2,839
Angle which it sustains when seen at the planet's mean distance	725,332

geometrical sphere, but a figure called an oblate spheroid, which is something like the figure that a flexible sphere would be formed into, by gently pressing it at its poles. Observations have determined this in Jupiter, and it is known that the earth is of this figure, both from observation and actual mensuration.

That the planets must have an oblate spheroid, is evident from this consideration; that as they are of matter and violently turned on their axis, all the parts would endeavour to fly off; and although the parts are retained in the sphere by the superior force of gravity, yet the equatorial diameters will be somewhat increased, and the polar diameters lessened.

The planets are all opaque or dark bodies, and consequently shine only by the light they receive from the sun; (which they form of themselves). This is known by observing that those bodies are not visible, when they are in such parts of their orbit as are between the sun and the earth, or partly so. Now, as the planets sometimes appear with a strong light, the rays they receive from the sun must convey to them a degree of warmth proportional, in some measure, to their distance from it; and as a planet revolves on its axis, every part of its surface will pro-

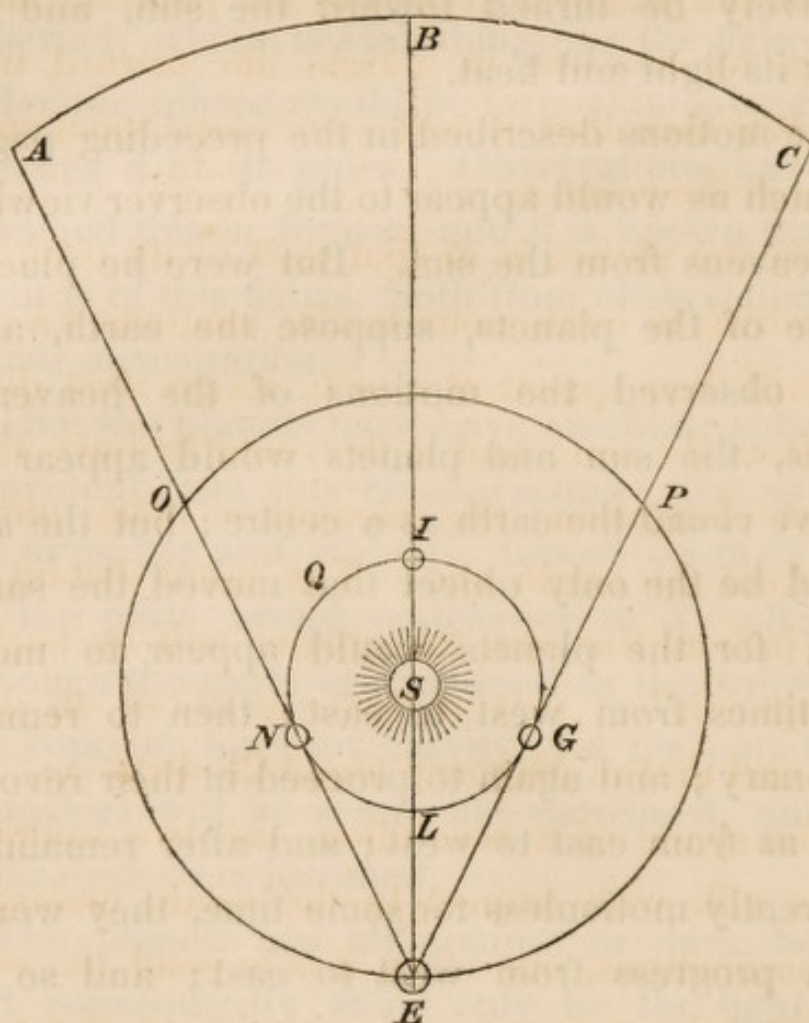
gressively be turned toward the sun, and so enjoy its light and heat.

The motions described in the preceding pages are such as would appear to the observer viewing the heavens from the sun. But were he placed in one of the planets, suppose the earth, and there observed the motions of the heavenly bodies, the sun and planets would appear to revolve round the earth as a centre; but the sun would be the only object that moved the same way; for the planets would appear to move sometimes from west to east; then to remain stationary; and again to proceed in their revolution, as from east to west; and after remaining apparently motionless for some time, they would again progress from west to east; and so on alternately.

The place in the celestial sphere that any planet appears in when seen from the centre of the earth, is called its geocentric place.

The direct motion of a planet, is that by which it appears to move from west to east; and this motion is said to be according to the order of signs; and when its motion is apparently from east to west, it is then called retrograde.

The following diagram represents the phenomena as seen from the earth.



Let ABC represent an arc of the celestial sphere; EOP , the earth's orbit; $LNIG$, the orbit of an inferior planet, as of Venus; and s , the Sun. Let the earth at first be supposed to stand still, in its orbit at E . Now it is evident that the sun will appear at the point B , and the planet always in the arc AC . While the planet moves in its orbit from I to N , it will seem to move from B to A ; but passing from N to L , it will seem to an eye at E , to return from A to B , or to retrograde.

While the planet is at or near the point *N*, and moving, as it were, in a right line toward the earth, it is then that it will sometimes seem stationary at the point *A*.

When the planet is in that part of its orbit *N* or *G*, which is contiguous to the tangents *EA* or *EC*, it will then appear at *A* or *C*, its greatest distance from the sun; and is then said to have the greatest elongation; this elongation being measured from the angle *SEG*. The more distant a planet is from the sun, the greater will its angle of elongation be; that of Venus is about 48 degrees, and that of Mercury about 28 degrees.

In the space of a revolution, the two inferior planets will, with respect to the earth, undergo two conjunctions, one when it is beyond the sun at *I*; the other when it is at *L*, between the sun and the earth: the former is called the superior, and the latter the inferior conjunction.

While Venus goes from her superior conjunction, she appears in the arc *BA*, always to the eastward of the sun, and therefore sets sometimes after the sun; but during the time she is passing from her inferior, to her superior conjunction, she will be seen somewhere in the arc *BC*, to the westward of the sun; and so will set before him in the evening, and rise before him in the morning.

So far, the planet only has been supposed to move, while the earth stood still; when both are in motion, the foregoing phenomena will be much the same; but the planet will be more direct in the farthest part of the orbit, and less retrograde in the nearest; the former arising from the sum of their motions, and the latter from the difference.

The direct, stationary, and retrograde appearances of the superior planets, are explained much after the same manner; but with these differences:—

1st. The retrograde motion of the superior planets happens more frequently, the slower the motion; while the retrogradation of the inferior planets occurs oftener the more swift their angular motion; for this reason,—because the retrograde motion of the superior planets depends on the motion of the earth, while that of the inferior planets depends on their own angular motion. A superior planet is retrograde once in each revolution of the earth; an inferior planet once in each of its own revolutions.

2nd. The superior planets do not always accompany the sun, as do the inferior planets, but are frequently in opposition to him; which necessarily follows from the orbit of the earth

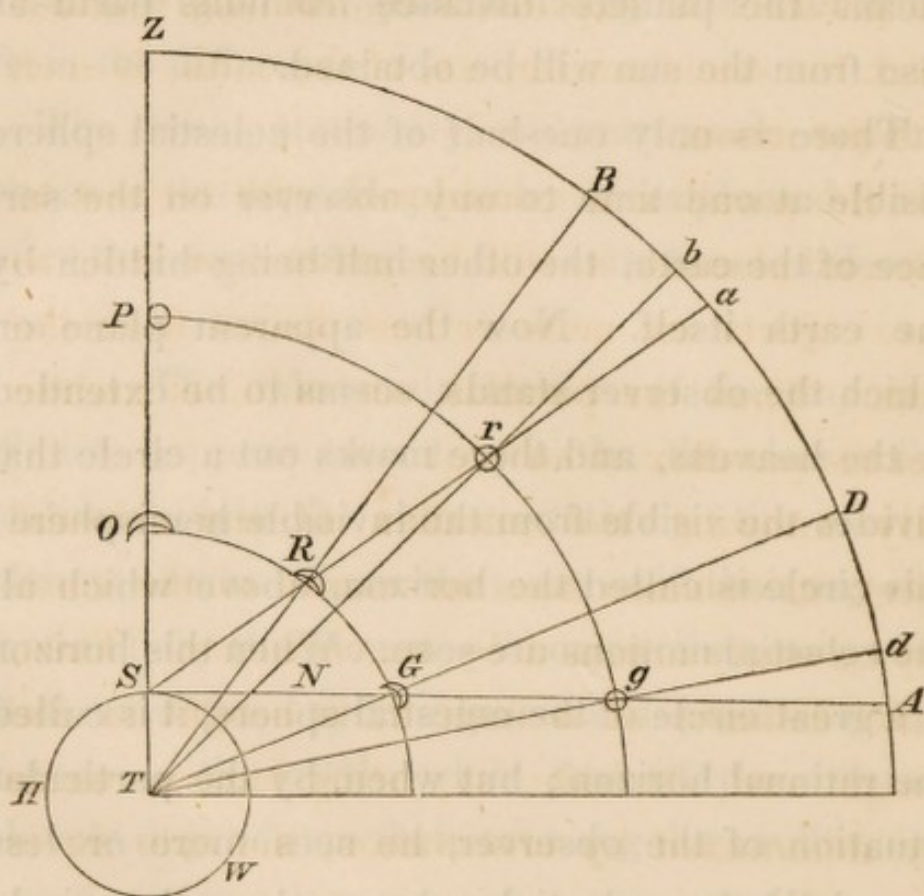
being included in the orbits of the superior planets.

Having now fully explained the planetary motions, I propose to familiarise the method of ascertaining their distance from the earth, as also the distance of the sun from the earth, by which means the planets' distance from the earth as also from the sun will be obtained.

There is only one-half of the celestial sphere visible at one time to any observer on the surface of the earth, the other half being hidden by the earth itself. Now the apparent plane on which the observer stands, seems to be extended to the heavens, and there marks out a circle that divides the visible from the invisible hemisphere: this circle is called the horizon, above which all the celestial motions are seen. When this horizon is a great circle of the celestial sphere, it is called the rational horizon; but when, by the particular situation of the observer, he sees more or less than half the celestial sphere, then the circle bounding his view, is called the sensible horizon.

This horizon is one of the most useful circles in astronomy; for to this circle, which is the only apparent one, almost all the celestial motions are referred: but I shall only lead to parallaxes, or the angles under which any two places in

the inferior orbits are seen from a superior planet, or from the fixed stars; but the parallaxes most used by Astronomers, are those which arise from seeing the object from the centres of the earth and sun, from the surface and centre of the earth, and from all three compounded.



To explain the parallax with respect to the earth only, let HSW represent the earth, in which T is the centre; let OR represent part of the moon's orbit; prg, part of a planet's orbit; and zaa, part of a great circle in the celestial sphere. Now to a spectator at s, upon the surface of the

earth, let the moon appear at G , that is in the sensible horizon of s , and it will be referred to A in the great circle; but if viewed from the centre T , it will be referred to the point D , which is its true place; the arc AD , then will be the moon's parallax; the angle SGT , the parallatic angle: or the parallax is expressed by the angle under which the semidiameter, TS , of the earth, is seen from the moon.

If the parallax is considered with respect to different planets, it will be greater or less, as those objects are more or less distant from the earth. Thus the parallax AD of G , is greater than the parallax of Ad of g .

By knowing the parallax of any celestial object, its distance from the centre of the earth may be easily obtained by trigonometry. Thus, if the distance of G from T , is sought in the triangle STG , the side, ST , being known, angle SGT determined by observation, the side TG is thence also known.

But the parallax most wanted, is that of the sun, by which his absolute distance from the earth is ascertained; and thence the absolute distances of all the planets, are also obtained, from their relative distances, found by the second Keplerian law; namely, that the squares

of the periodical times of the planets are as the cubes of their mean distance from the sun; that is, as the square of the time that a planet, *A*, takes to revolve in its orbit is to the square of the time taken by any other planet, *B*, to run through its orbit, so is the cube of the mean distance of *A*, from the sun, to the cube of the mean distance of *B*, from the sun.

The mean distance of a planet from the sun, is its mean distance from him when the planet is at either extremity of the conjugate diameter; and it is equal to half the transverse diameter.

Thus far I have explained the principal laws I had in view while contemplating the subject of this treatise; and in which I have found sufficient knowledge whereon to base my theory of the Solar system, that THE SUN IS SPACE, and not a body. In thus considering the motions of all the planets revolving in such perfect harmony, the grand secret is presented to my mind, as pertaining to the laws of gravitation and attraction, and the cause of such attraction; and I am induced to believe that attraction to be the continual emission of degenerated air by the planets; for as the sun is perfect electric, it does in consequence attract the degenerated air accumulated from the planets, to the nearest body which is

less perfect electric; and by so attracting, causes their orbitular motion to have more or less velocity, according as they are situated toward the centre; and according to their velocity in their diurnal motion, so do they cause more or less of this degenerated air to flow; and the centre, by means of the diurnal revolution of the planets, has the property of repulsion in itself,—being perfect in electricity, as before explained. Now, it is clear that fluids, being bodies the most perceivably light, are attracted to a considerable height; then as they are attracted in the form of vapour, to such a height as a body, why not the electric matter be attracted much higher, which is not a body? I have noticed that vegetable air is in the proportion of 1 to 875 in fluids; therefore as vegetable air is in that proportion, electricity must be in the same proportion to the next attractive body, by the same attractive power; for we, as a body, attract space diurnally, and the degenerated air flowing from that body, is attracted by our next inferior planet, being more perfect electric.

Again, we know from experience, that in all things the strongest prevails; then why not that centre, which is perfect in electricity, have command over the planets, which taken singly, are

the less perfect? We likewise experimentally know, that a creator of anything, has a method of creating. For the same reason, as the planets create air, so does it fly to that part which is the cause of creating, and returns to the planets in the shape of created heat; heat, as before stated, being governed by their diurnal revolution.

Look into the laws of gravitation, hydrostatics, pneumatics and electricity; and see by their combination, if just conclusions may not be drawn of the electric matter being attracted as the first cause; and then the fluids,—which as a body, descend again by gravity to the earth? See whether we are not all in motion; thereby fulfilling the laws of Him who designed perpetuity! There is not a particle which belongs to the earth that is stationary! No! it is contrary to all laws: then, why the sun, when taken as a body, to remain stationary? It would naturally be supposed, that, as a body, he would have an orbitular motion as a planet, to perform the necessary functions that our present astronomers assign to him as a body: besides, how would the planets act in perpetuity, if aided by a stationary body? How would he, the sun, have the same attraction? He must in this case use his north and south pole; that is, he must have a neces-

sary repulsion with his attraction: otherwise, supposing the Earth to eclipse Uranus, the attraction to Uranus from the Sun would be so enormous, that, being in a line with the Earth, he would by his great attraction for that distant planet, attract the Earth to his centre, with such force as would break it to pieces! Then, if he attracted the Earth with such force, with what force would the inferior planets be attracted when in the same position! for it must be allowed, that the attraction from the sun is according to distance. This may be proved experimentally; thus, place a loaded cannon at such a distance from a target, that when fired, the ball may just strike it, while at the same time, a board placed near the cannon's mouth will be shot through by reason of the force being greater at that place; or place the target farther from the gun, and it will be found that a greater charge of powder is necessary in order to reach it. Give these questions their due consideration, and the present received theory of attraction will be found not only unsupported, but untenable by any known law. Now, whatever flows upward, flows by attraction; then it is obvious that the attraction is caused by a body more perfect; otherwise, the electric space would not have electric or attractive matter flowing from

it. These considerations confirmed my ideas of the properties of the sun as being space: when I considered the influence that one body has over another, caused by motion; when I considered the harmonious action, each planet has to the others in the system; when I considered well the laws of gravitation and attraction, they gave me power; for I considered they were all gained by motion. Then, as we are all in continual motion, there must be a continual attraction upward; and by there being a continual attraction, the earth and other planets must be continually emitting fuel to feed such attraction: for if there were nothing to attract, then attraction would cease. Here lies the question: where does the matter so attracted, fly to? This is a question of a solid basis;—a question that will cause the most acute man of science to ponder; for as the earth is continually under the influence of attraction, the first matter so attracted, if not continually attracted, would become foul after fulfilling all its functions: therefore, if this electric air be considered as a body, and not continually attracted, it would naturally descend in a foul state, and intermixing with those particles which are not foul, would cause them to become foul also; until a stratum of exterminating foulness sur-

rounded the earth ! The reason is obvious, that as the earth contains portions of vivifying air, that air becoming overheated in certain parts, dries, or attracts the vegetable fluid much higher than the general attraction, which will not admit of the proportionate quantity of fluid to spread over the land, and in consequence becomes putrefied : thus, when the air in any country begins to putrefy, the inhabitants of that country will be subject to an epidemical disease, which will continue until the putrefaction is over ; and as the putrefying influence occasions this disease, so if diseased body contribute towards the putrefaction of the air, then the disease will not only be epidemical, but pestilential and contagious. Then, allowing the matter to be in continual attraction, where can it go, but to the centre of our system ? and if that centre were a body, as a matter of course, it would diminish, rather than preserve its original dimensions : besides, were it a body, we should not attract that heat as we do ; for, by being a body, and the planets continually attracting that body, it would certainly become less, if not aided by a supernatural agency, which is inconsistent with the known working of the Almighty's will, as exhibited to us in His universal laws.

Again, with respect to astronomical phænomena; observe whether the planets are not in perfect harmony; and if so, whether that perpetual harmony is not occasioned by a something issuing from the planets, in their revolution round their axis: see whether it is not the attractive matter spoken of, which, having less gravity for the earth than for that luminary space, naturally flies to it by means of the next inferior planet: and thus my observation, that all the planets have greater attraction when together, but less when taken singly, is fully corroborated: then how inconceivably light must be this matter; and how much lighter must be the planets in the firmament! Follow the course of argument already explained, that this attracting matter, being of a nature so light, is attracted by the next inferior planet, as a body more perfect electric; and it will then appear evident, that the *heat of space*, attracting this matter from the nearest planet, to its centre, returns it to the planets in the form of heat, conveyed to them by means of their diurnal revolution; that part which travels through the most space receiving the largest portion; that is, to say, those parts which are situated farthest from either axis, as in latitude 64 degrees, do not partake of the central or sun's heat so power-

fully as places situated in latitude 34 degrees, owing to the parts first named travelling through less space in the same time. In this respect the earth's rotundity is the cause of the difference between sensible heat and cold; for the nearer the motive power, the greater the production of heat.

Again, referring to the revolution of the planets, it is unreasonable to suppose they are not governed by their motions. Look at their respective sparkling: look, for instance, at *Mars*; observe his orbitular motion, and he will be seen to have a dingy red appearance, owing to his diurnal motion being less, according to diameter; which proves my former statements, confirmed also by experiment and by daily labour; namely, that degrees of heat are known by their colour. Observe the blacksmith welding his iron, and see whether he does not ascertain heat by colour! The appearance as to colour is observable in all planets; but to dwell further on a subject that pertains to astronomical calculations, would savour more of pastime than necessary to my proposition.

Having quoted laws in support of my argument, I would now ask if any just conception can be formed of the sun as a body, beyond the circum-

stance of supplying heat? It is said that heat can flow only from a body, in the astronomical sense; but I say heat can be, and is produced by attraction and revolution: that by attraction of one body to the other, the true cause of heat is conveyed to the centre; and by diurnal revolution it is brought back again as heat.

As to heat flowing from the planets, I will now further explain. Thus, supposing the planets to become space, leaving the sun as a body; (and by becoming space, we all should be of course undegenerated;) then there would be nothing to cause attraction: the sun as a body would have no attractive power, there being nothing to attract; still it would be a sun,—under the influence of what? Performing the same functions,—for what? Going through all his evolutions,—for what? Why, merely for his name! Then, if it possessed all the necessary attractions, it would be the same in space, as he is in centre of an Universe that has a continual motion; which taken in a scientific point of view, does not seem feasible to the rational mind.

We will now suppose the earth and planets to exist,—their existent formation being occasioned by motion; and as that motion is the true cause of gravitation, so gravitation produces attraction.

Were it otherwise, how would it be possible for the particles of earth to adhere? Then, as attraction has the property of causing adhesion, so has gravitation the property of keeping that attraction to the centre of gravity. Suppose there to be seven different bodies of unequal dimensions, in motion, all possessed of proportional gravity and attraction: now these seven bodies, emitting their portion of electric, must have a centre for such electricity; which centre I will call the centre of gravity to these seven bodies; then as the centre of gravity is found, so does attraction proceed from that centre precisely as attraction tends to the centre of gravitation of the bodies separately; and as such attraction is continually fed by the different planets, so does it return heat by their diurnal revolution; so that the planets are the true cause of that centre called the sun; and as they revolve on their axis, so is heat attracted in proportion: thus the most remote planet has an equal proportion of heat; being proportionably attracted, its revolutions proportionably accelerated, and its motion on its axis also in proportion to its distance from the attractive centre.

With respect to the moon's attraction: in issuing her degenerated air, she produces her at-

traction with less power, owing to her slow diurnal motion; consequently her attraction in herself is proportionate to her gravitation: yet her attraction to the earth, being so near to it, is nevertheless of considerable amount—a proof of which is seen in the attraction of our waters, being the most light perceivable body; which will tend to strengthen my theory of the sun being space. And as attraction is governed by motion, if the moon had double the motion she now has round her axis, her attraction to the earth would be double the present power; and if she had the same diurnal motion as the earth, whilst going round it, as bodies, having the same attractive force, they would collapse; the revolution of the moon round the earth being the means of her attraction, and also of her gravitation; and as she works contrary to the order of signs, so are our waters attracted most in opposition and conjunction to the sun.

The moon of course, has three motions. 1st.—The motion round her axis. 2nd.—The motion round the earth. 3rd.—The motion in her orbit. Now if the motion round her axis, and the principal motion round the earth, were combined in one; that is, if the space in her motion round the earth, and the motion round her axis be added,

they become equal in attractive force, according to the distance ; then as she travels round the earth in that time, she serves as a propeller to the degenerated air emitted by the earth ; and the more remote the planets are from the centre, the more moons they have to perform the same duty. It is not for granting us light alone, that moons are formed ; if that were the case, the remote planets would by swiftness in their diurnal motion, cause their moonlight to supersede that of the sun ; and in that case, where would be the centre of our system ? where would our calculations and our laws go to ? Besides of what service are they with regard to light, when hidden from us ? Then the moons belonging to different planets, appear to me, to be for the purpose more powerfully of delivering the degenerated air from their respective planets, to that centre called the sun ; they serve as a creative power. We can never suppose that these moons were so placed to serve us in light, as generally supposed ; we must look at the different causes that rule our system ; how it is governed by an ever-ruling power to enforce that harmony which is so beautifully displayed in our centre. Observe the remote planets, that according to their diameter, motions, and distance, so have they a pro-

portionate number of moons to perform their necessary functions.

Again, with regard to the earth attracting the moon; I say, that according to the law of attraction, rather than attract, it would repulse her, as explained in treating of electricity. Again, is it possible that our earth can bend the sun's rays, as they must necessarily be bent, (sometimes perpendicular and then in certain angles), in order to pass between the earth and moon, to attract his heat at all? No, it is impossible to alter the rays a jot; for in that case it would throw the planets completely from harmony: the same laws hold good with respect of other moons to their respective planets.

Thus far I have explained that property in matter, which it has been said, admitting of no explanation, could therefore only be described.

I am very sorry to think our forefathers, and indeed Astronomers of the present day, have been and still are so incredulous of the truth,—so irrational in their suppositions,—and so inconclusive in their arguments; tending to mystify and deceive, rather than to instruct the mind. To remove false impressions of so long standing, I am aware, is not an easy task; and to raise a new theory on the falsification of a system that

has been promulgated by the learned as a dogma, might well be assumed an Herculean task; but based on the known and acknowledged laws of science, I submit my theory to the world in the firm hope of elucidating an important truth. In doing so, I must be more than man if I escaped an error; let what I have said suffice as apology for any imperfections that may be found. My hope is, that those imperfections, or any doubts that may arise in the mind of others respecting the propositions I have herein made public, may not lie concealed from me, but that I may have the opportunity of supporting my case with the argument and proof of which I feel it to be capable.

I am satisfied that I have given the true *laws* constituting the *Sun* to be *Space*; and I call upon those disposed to maintain the contrary, to give true *laws* showing him to be a body: until such can be satisfactorily established, I have an undoubted claim to the credit of my theory,—That the Sun is an *Electric Space*, fed and governed by the planets, which have the property of attracting heat from it; and the means of supplying the necessary *pabulum* by their degenerated air driven off towards the central space—the wonderful alembic in which it becomes transmuted

to the revivifying necessities of continuous action; and the central space or Sun being perfect electric, has the counter property of repulsing the bodies that attract it. How wonderful a conception! How beautiful, how magnificent an arrangement!

O Centre! O Space! O Electric Space!

“The lively diamond drinks thy purest rays,
Collected light compact—

At thee, the ruby lights its deep’ning glow,

And with a waving radiance inward flames:

From thee, the sapphire, solid ether, takes

Its hue cerulean; and, of evening tint,

The purple streaming amethyst is thine.

With thy own smile the yellow topaz burns;

Nor deeper verdure dyes the robe of spring

Than the green emerald shows. But all combined,

Thick through the whit’ning opal play thy beams,

Or, flying several from its surface, form

A trembling radiance of revolving hues,

As the sight varies in the gazer’s hand!”

RÉSUMÉ.

Taking a short review, it will appear, according to the laws of motion and electricity, that the outward planet *repulses* the inward or inferior planet; and that the inward planet *attracts* the outward planet; and that this order is preserved throughout the planetary system; the degenerated air of each being drawn in like manner from the outward or less perfect electric, through the entire series; and acting thus, in such perfect harmony, do not require the aid of a stationary body: on the contrary, the degenerated air flowing from body to body, accumulating in volume, and accelerated in velocity as it progresses towards the centre, in like proportion, increases the velocity of the planets in their respective orbits; until the nearest and swiftest planet attracting the centre, pours the whole collected volume of degenerated air towards it; and that centre, being perfect electric, repulses the planet with a power of equal force.

It has been stated already, that the planets are the less perfect electric, when taken singly;

which clearly shews they repulse each other in their orbits as bodies less perfect, and that the centre being perfect electric, repulses the whole universe. To this centre does the collected volume of degenerated air in consequence fly ; and by the diurnal motion of the planets, attracts their portion of light, which is the cause of heat and vegetation. And thus proceeds the system in a regular course of perfect harmony ; attraction counteracted by repulsion, and exhaustion supplied by reproduction, maintaining a perpetuity of action, which none but an All-wise Being could have conceived, much less fashioned, from an uncreated void.

By making the sun a body, what is the consequence ? As a body capable of attraction and repulsion at the same time, he must be invested with supernatural powers unknown to the working laws by which the system of the universe is governed. And here (as it is published under the authority of Government), I may be excused for pointing out the fallacies which in this, the nineteenth century, are not only extant, but are taught and promulgated from the fountain head. In a work issued under the direction of the *Commissioners of National Education in Ireland*, written by way of interrogatory, the authors say,

that “a ball tied to the end of a string and
 “whirled round, is a criterion of the motion of
 “the earth. In this motion they distinguish two
 “powers; the one they called centrifugal,* and
 “the other centripetal motion; the centrifugal
 “power is the one by which a body thus whirled
 “continually, endeavours to fly off from the
 “centre round which it moves; this is owing to
 “the force or impulse given to it in setting out;
 “as if you were to throw the ball away from
 “you, the string by which you hold it, is the
 “power that keeps it towards the centre, and is
 “called the centripetal power.† Thus you see

* “Centrifugal force is that force which is generated or produced by the rapid whirling of our globe round its centre, and which tends to throw off from it the various substances of which it is composed. The faster the rotatory motion is, the stronger the action of this power; and therefore those parts of the earth at and under the equator, whirling faster than those nearer the poles, are driven further from the centre. This it is which gives to our globe its shape of an oblate spheroid, or which flattens it at the poles, and extends it to the equator; so that a line drawn from pole to pole, would be shorter than one drawn through the centre of the earth, from one side of the equator to the other. There is an experiment which plainly shews this action of centrifugal force; if a globe or sphere be made of broad bands of elastic steel, and fixed on a spindle running through its centre; when placed in a frame, and swiftly turned by a handle, it will forsake the figure of a perfect sphere, and assume that of the earth, namely, an oblate spheroid.”

† “The centripetal force is the tendency that all the various

“there are two powers acting upon the ball at
“the same time; one to make it fly off, the other
“to hold it in; and the consequence is, that it
“moves directly according to neither, but be-
“tween both; that is round and round. You are
“then to imagine the sun to be a mighty mass of
“matter; you are to conceive the earth as soon
“as created, launched with great force in a
“straight line. It would have flown off in this
“line for ever, through the boundless regions of
“space, had it not at the same instance received
“a pull from the sun by its attraction. By the
“wonderful skill of the Creator, these two forces
“were made exactly to counterbalance each

bodies of which this globe is composed have to press towards its centre. This they press in exact proportion to their density or bulk; and the nearer they approach towards the centre, the more strongly are they actuated upon by this force; so that a body at any distance from the centre of the earth is not attracted toward it so powerfully as one which is nearer; but being farther from the centre, it has an attraction which is much greater from the centre to keep it on the earth at all, consequently according to the mass or body, so gravity commences; it is this power which causes bodies to return when we throw them into the air, and this is the reason why those which are most bulky return fastest. Were it not for this tendency towards the centre, the stone we might cast from our hand would never return or be seen by us again; and we ourselves should be thrown off its surface by the rotation of the earth, and should fly into the immense regions of space, we know not whither.”

“other, so that just as much as the earth, from
“the original motion given to it, tends to fly for-
“ward, just so much the sun draws it to the
“centre, and the consequence is, that it takes a
“course between the two, which is a circle
“round the sun.”

Thus far, we have delusions and false instruction for the people; for while the writers have given their theoretical views of the orbitular motion, not a word is mentioned of the diurnal. Now, if the planetary bodies had acquired motion after the formation of the sun, that luminary would, of necessity, repulse as well as attract, to keep them in their orbits; were it otherwise, the sun would draw them with the action of a cork screw, nearer and nearer to him, by the laws of motion and electricity: thus, it is evident, the earth would not then be flying in open space; it would be dependent on the sun as a body; which having the power to stop forces, would gradually gain on the earth's revolution, and in course of time would draw, not only the earth, but all the planets, to his centre; as I presume the writers above quoted, propose the planets to have the same law of motion as they have given to the earth. Then, I say this cannot be the case; for if the sun had the two

forces combined in one, he would then continually throw his north and south poles toward the earth, which is contrary to all known laws; besides it would destroy all harmony with the planets, and would entirely disconnect the beautiful organical mechanism of the Solar system. Let me ask whether it be possible by any known law to repulse and attract all the planets at the same time, when one planet is wide of the other in orbitular revolution?

I have given the four laws in support of my theory; while the educational writers I have quoted are contented to rest their doctrine of the action of the two forces on the wonderful skill of the Creator, without defining the physical laws by which all the wonders of creation are performed. Then I would ask, what keeps the earth in that motion these writers describe? I have given the laws and possibility of preserving both orbitular and diurnal motion, by the necessary repulsion and attraction; and I have not found any author who has otherwise defined the subject by proof. If writers could establish laws whereby their system might be solved,—if they could frame laws contrary to philosophical and scientific principles, I should then have little to oppose to their doctrine: but while the Almighty

has one rule and one law, by which all things both celestial and terrestrial are accomplished, it becomes every rational mind to ponder over the universal system; to ruminate and seek to discover the wonderful skill of the Creator, in those physical laws which He has been pleased to give man the intellect to study and develope; and as far as human intellect can conceive, it is contrary to those laws by which the universe is governed, that a central body should be so placed, with but one motion, and that motion so slow, either to perform the important functions required of it as a centre, or even to maintain its own position in space. It is not consistent with those laws, that by such limited action, it should provide the planets with light and heat; neither would the motion attributed to it, cause that repulsion so highly necessary to support harmony with the planets, or produce gravitation in itself, sufficient to keep it suspended in the firmament. It must be an agency supernatural indeed,—entirely out of the province of scientific law, study or speculation to comprehend,—that should place an immense and weighty globe in a firmament, there to find a pathless seat.

The philosophy, the science, the morals of the age, all require that vague suppositions should

give way to the developed results of natural and physical laws, and that a science so noble as the study of the universe should be remodelled, and again become the corner stone. Let our present Astronomers awake to reason; and learn to seek for effects in their natural causes, rather than accept as a dogma, the unsupported theory of ages unenlightened by the progressive developments of advancing time. In the present treatise, I believe I have opened a new page for study and improvement, and I doubt not, but I shall see works compiled, that will ornament, illustrate, and embellish the theory I have advanced; in complete abandonment of the errors which have so long existed, and to the present time, prevail.

There is no doubt, according to scriptural history, that Astronomy was to a certain extent understood at a very early period; but that knowledge must undoubtedly have been limited to the means of observation then at hand: the advantage of telescopes and other scientific appliances were unknown: yet, from several passages that occur in the book of Job, and elsewhere in Holy Writ, it is plain the stars and other celestial bodies, were then objects of speculation and knowledge. The inhabitants of the country around Babylon, early observed the stars with

great accuracy; the wonders they beheld, caused them to worship the whole host of Heaven,—the earliest species of idolatry. Job furnishes an idea of the state of astronomical knowledge in his day, when speaking of the power of God, (*ch. 26, v. 7,*) he says, “He hangeth the earth upon nothing;” which shews that the wonderful manner in which the earth revolves in the Heavens was then in some measure understood. Much, indeed, has been written to prove that most of the wonderful things now known respecting the sun, were also known to the wise men of that early age. It is clear that the ancient Greek philosophers principally derived whatever is good in their system, from the Jews; Thales was in Egypt while many of that nation were there captive; and there is reason to believe that Pythagoras was in Judea, and also had much intercourse with the captives at Babylon. Thus are we taught to believe that knowledge became diffused; but respect for antiquity or reverence for the acquirements of an early age, can never justify the maintenance of an error, or the placid recognition of philosophical doctrine unsupported by demonstrated facts. In the present case, however, in clearing away the mist of ages and the errors of modern science, I

am inclined to think that the theory I have now demonstrated by known and recognised physical laws, is rather the revival and proof of the belief of the most remote antiquity, than a proposition now for the first time introduced to the world. We have it from authority that "there is nothing new under the Sun;" and certainly, in the revolution of knowledge, the advantages of the moderns consist much in the improved means of analysis and discovery of those natural laws by which the Almighty projector of this wonderful machine works it in perpetual action and reaction.

Then, as God created the earth before the sun, so he ordained the planets to be the natural origin of his birth; and by means of their continual and graduated orbitular motion, to feed him with the degenerated air proceeding from each,—to receive in return its reorganised product, in the revivifying principle of heat—the generator of light and vegetation)—which by a beautiful arrangement, is again modified and governed to the necessities of each planet, by their own diurnal revolution. Hence it appears that motion is the true cause of everything in nature. Then how grand the display, in viewing the planetary bodies revolving in harmony, around their own made "Centre," perpetually

changing their positions to enjoy by agreeable alternations, the full enjoyment of his exhilarating influence. The various stars too, and the blazing comets, do they not all tell of the wisdom and power of the Almighty ! Then, to view them scientifically (which is also to view them in increased beauty and magnificence), it becomes indispensably necessary that they should be studied according to their known laws. Astronomy conveys an everlasting truth, not dependent on power, but is the guide of all power. It undoubtedly has the same authority in all worlds that it has with our earth. It is the law of the whole universe; it is original in its nature, and instructs us to a visible estimation of the Deity in the boundless magnitude and magnificence of his works ! It is a study not confined to any one stage of our existence, or to any particular situation we may be in: and the farther any being is advanced in the science, the greater is his attachment to it, and the more is he under its influence. It is a study which not only unites us in mind to the whole rational creation, but fits us also for comprehending any order of superior natures, and contemplating any part of God's created works. Indeed, as the Almighty fashioned man after his own image, may we not

hope that the more we are advanced in the understanding of His Power and Magnificence, the nearer do we assimilate our minds also to that standard of knowledge which He has ultimately ordained for us, and the nearer do we approach to that perfection of human reason which imagines the purest type of original creation !

Such being the importance of astronomical observation; then, I say, study astronomy as the key of universal truth, inevitably leading to a more just admiration and appreciation of that God, by whose will, all things originated, and by whose wisdom, all things in nature work ! When I consider the subject in this light, it seems impiety not to give attention to the cause of nature and the revolutions of the heavenly bodies, or to be regardless of those phænomena that are placed within our view, as continual and everlasting evidence of His Majesty and Power !

The power of observation and enjoyment, as a rational being, is the fruit of knowledge : to be sensible of the greatness and beauty of God's works ; to be delighted with the harmony of their motions, and by these reflections to obtain just sentiments of the Almighty mind that framed them, must be the result of the study I recommend. It is the variety and order of the celestial

bodies; the regularity of the motions and revolutions of the earth, the moon and other planets, besides the numberless stars, that claim our attention and stamp our belief: even the slightest observation seems sufficient to convince every beholder, that these wonders of creation cannot be the effect of chance, though the mystery of their formation is beyond the circumscribed limits of human imagination. With respect to our globe, we know men have penetrated beneath its surface,—in the vain hope of discovering its internal structure; vain hope indeed! What have they done? Three thousand feet is about the greatest depth to which they have gone; and what is that compared to the distance from the surface to the centre,—about four thousand miles! Thus, scarcely anything is known respecting the internal formation of the globe; all that has been said respecting its deeper parts, and those nearer the centre, is mere conjecture. Buffon imagined the centre to be a space of glass; Whiston thought it to be a mass of heated iron; Burnet considered it a great collection of waters; and Kircher supposed it to be a dreadful volcano!

The principal knowledge afforded by experience of the internal appearance of the earth, is, that the various substances of which it is compo-

sed lie in compact strata, layers, or beds, flat, one over another, like the leaves of a book; this is the usual appearance downward from its surface to the greatest depths men have dug or mined.

In all probability it has undergone a great number and variety of changes, by the numerous shells and other fossils that are found on high mountains as well as in deep quarries. We are led to infer, that which is now cultivated and populous land, was once covered by the waves of the mighty ocean; animal and vegetable substances are seen converted into stone, and whole forests have been discovered buried deep in the earth and hardened into mineral substances: so, to give laws upon the formation of the earth, is at present impossible; and I merely state these circumstances as evidence that it was not by chance, that the earth, the planets, and all things belonging to our system, were formed, to act with such lawful harmony: these alone afford proof of an All-wise Being, that seems irrefragable. When a rational man finds himself surrounded by so many, and such stupendous bodies, performing their various motions and revolutions, without the least deviation from perfect regularity, through the innumerable ages of past duration,

how much more reason has he to conclude that such amazing revolutions are governed by superior wisdom and power! Then let us reverently adore that Almighty, Eternal, Unchangeable God, who created the general mass of matter, out of which he has formed all those grand, beautiful, and sublime objects, which on all sides present themselves to our observation. He it is, the—

Great First Cause—least understood, —

who communicated, and constantly preserves to matter, those various properties which produce such wonderful effects: all its combinations, all its laws are the effect of his unceasingly operating energy; and were that energy to be for a moment withdrawn, creation must return to its original—nothing. Then should we not from these circumstances, conclude, that the great operator is intimately present throughout all systems: surely nothing can be more evident. Suffice it then to observe, that, accustomed as we are to the continual view of these glorious objects,—to the daily “rising and going down of the sun,”—are we not too apt to treat as ordinary matters, objects of the most interesting and sublime consideration?—objects which, if duly considered, cannot fail to lead the contemplative

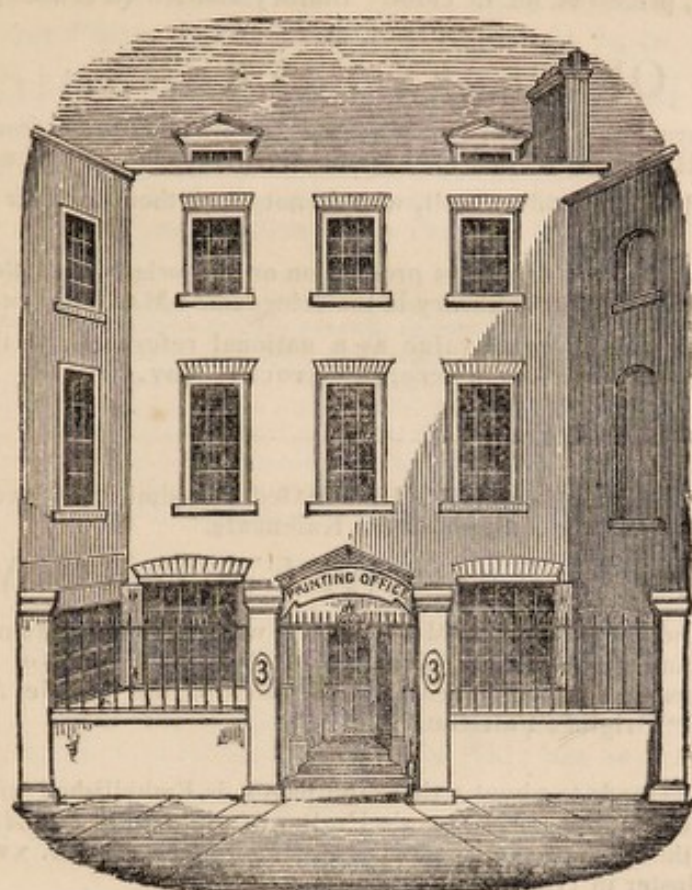
mind to entertain enlarged and proper ideas of the Creator of them ; and instruct us, with reverence, faith, and hope, to “look through Nature up to Nature’s God !”

“ These are thy glorious works, Parent of good !
Almighty ! thine this universal frame
Thus wond’rous fair ! thyself how wond’rous then !
Unspeakable ! who sittest above these Heavens
To us invisible, or dimly seen
To these thy lowliest works ; yet these declare
Thy goodness beyond thought and power divine,
Speak ye, who best can tell, ye sons of light ;
Angels ; for ye behold him, and with songs
And choral symphonies, day without night
Circle his throne rejoicing : ye in Heaven
On earth join all ye creatures to extol
Him first, him last, him midst, and without end.
Fairest of stars, last in the train of night,
If better thou belong not to the dawn,
Sure pledge of day, that crown’st the smiling morn
With thy bright circlet, praise him in thy sphere
While day arises, that sweet hour of prime.
Thou Sun, of this great world, both eye and soul,
Acknowledge him thy greater ; sound his praise
In thy eternal course, both when thou climbest
And when high noon hast gained, and when thou fallest.
Moon, that now meetest the orient sun, now fliest
With the fixed stars, fixed in their orb that flies.
And ye six other wandering stars, that move
In mystic dance, not without song, resound
His praise, who out of darkness, called up light.
Air, and ye elements, the eldest birth
Of nature’s womb, that in quaternion run
Perpetual circle, multiform, and mix

And nourish all things ; let your ceaseless change
Vary to our great Maker still new praise.
Ye mists, and exalations, that now rise
From hill or streaming lake, dusky or gray,
Till the sun paint your fleecy skirts with gold
In honour to the world's great Author rise,
Whether to deck with clouds, the uncoloured sky,
Or wet the thirsty earth with falling showers,
Rising or falling, still advance his praise.
His praise, ye winds, that from four quarters blow
Breathe soft or loud : and wave your tops, ye pines
With every plant, in sign of worship wave.
Fountains, and ye that warble, as ye flow
Melodious murmurs, warbling tune his praise.
Join voices all we living souls ; ye birds
That singing up to heaven's gate ascend
Bear on your wings, and in notes his praise.
Ye that in waters glide, and ye that walk
The earth and stately tread, or lowly creep,
Witness if I be silent, morn or even,
To hill or valley, fountain or fresh shade
Made vocal by my song, and taught his praise.
Hail, universal Lord ! be bounteous still
To give us only good : and if the night
Have gathered aught of evil, or concealed,
Disperse it, as now light dispels the dark."

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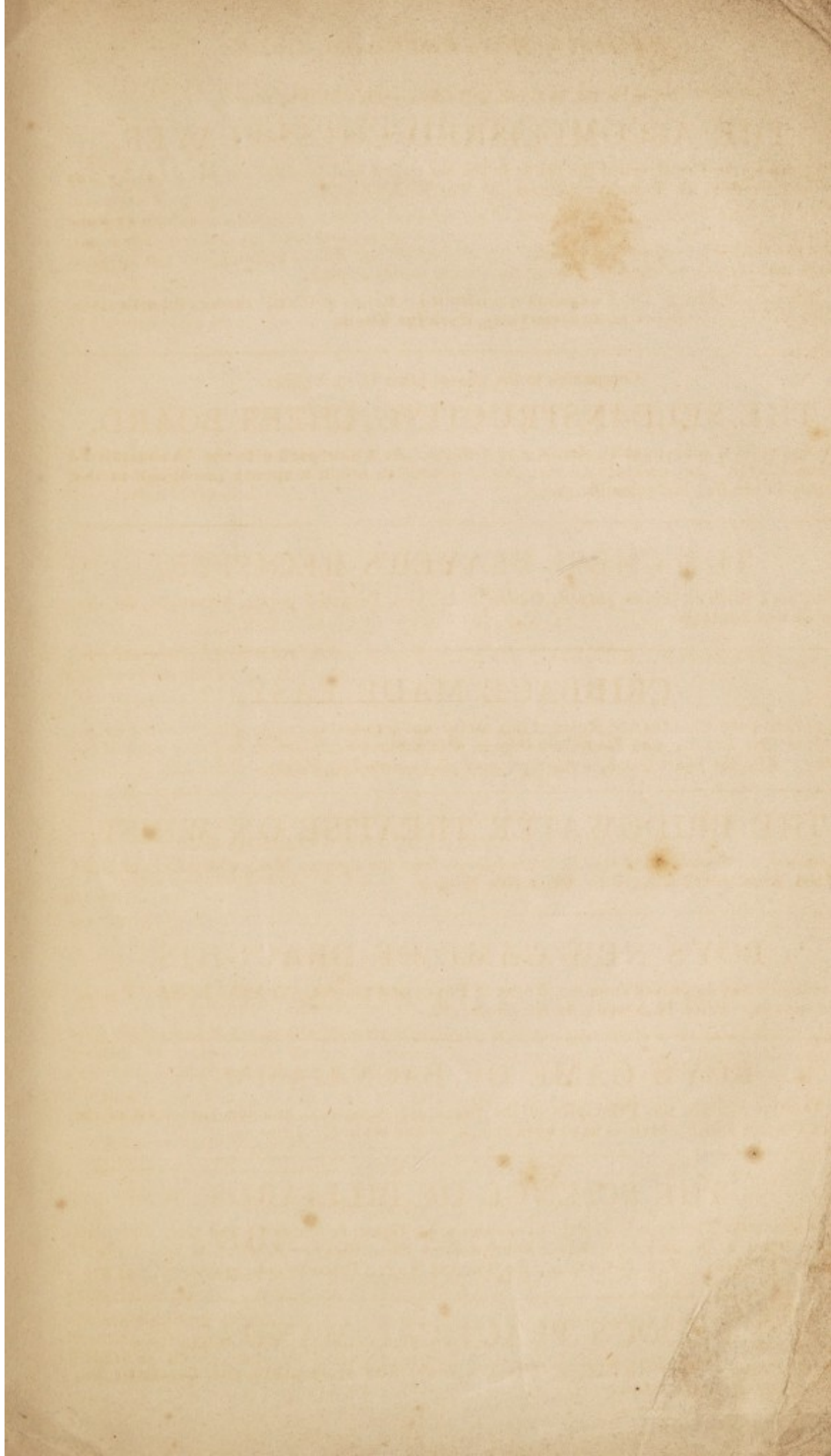
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