

THE
BOOK OF NATURE.

SERIES I.

LECTURE I.

ON MATTER, AND A MATERIAL WORLD.

In the comprehensive range of science proposed to be treated of in the SURREY INSTITUTION, the department to which I shall have the honour of beseeching your attention will be that of NATURAL PHILOSOPHY, or PHYSICS, in the most extensive sense of these terms: that branch of science which makes use of the individual principles and discoveries of every other branch within the range of nature, as the architect makes use of the bricks, the mortar, the wood, and the marble of different artisans, and builds up the whole into a perfect edifice; which takes a bird's eye view, as it were, of a picturesque and spreading landscape from some commanding eminence; and, without having laboured in the details of arranging the ground, of cultivating the soil, of planting the woods, of winding the rivers, of enriching the scenery with flocks, herds, bridges, and buildings, points out the general connexion of part with part, and the harmony which flows from their combined effect. This, indeed, is to employ these terms in a somewhat wider sense than has been assigned to them in modern times; for even the Natural Philosophy of Lord Bacon, though it embraces the two divisions of special physic and metaphysic, as he calls them, does not extend to the doctrine of "the nature and state of man," which is transferred to another division of general science;* yet that the study of physics, or natural philosophy, had this more extended meaning among the Greeks and Romans, is clear, since the poem of Empedocles on "Nature," and that of Lucretius, on "the Nature of Things," the two most complete physiological works of which we have any account in antiquity, were expressly formed upon this comprehensive scale; and hence the philosophy of geology and mineralogy, the philosophy of botany and zoology, the philosophy of human understanding, the philosophy of society and whatever relates to it, or general and synthetical surveys of these different departments of science, are as equally branches of physics, or the nature of things, as equally part of the BOOK OF NATURE, as any separate branch which is more ordinarily so arranged.

Thus explained, the scope of the study before us is almost universal, and only a small portion of it can be engaged in during a single series. I shall endeavour to advance in it as I am able; and the infinite variety it presents to us will at all times, I trust, prevent the pursuit from proving dull or uninteresting. Could it indeed be completed as it ought, it would constitute the PHILOSOPHIA PRIMA, or universal science of the great author I have just adverted to.

My sole object, however, is to communicate information so far as I may

* Advancement of Learning, b. ii. p. 52. 56. vol. i. 4to. General science is here divided into three classes: I. Doctrina de numine, or Divine Philosophy. II. Doctrina de natura, or Natural Philosophy. III. Doctrina de homine, or Human Philosophy. The common stem from which they ramify is denominated philosophia prima, primitive, summary, or universal philosophy.

be able; to exhaust nothing, but to touch upon many things; to give a desire for learning, rather than to consummate the learning that may be desirable; to run over the vast volume of nature, not in its separate pages, but in its table of contents, so that we may hereafter be the better prepared for studying it more minutely, and for feeling in some measure at home upon the various subjects it presents to us.

Yet, after all, lectures alone can do but little, whatever the energy or perspicuity with which they may be delivered. They may, perhaps, awaken a latent propensity, or enkindle a transient inclination; but unless the newborn flame be fed and fostered, unless it be nourished by study, as well as excited by hearing, it will perish as soon as lighted up; or, if it continue, will only blaze forth in a foppery of knowledge far more contemptible than the grossest ignorance.

Let us, then, enter upon our respective duties with equal ardour. The path of science is open to every variety of age, and almost to every variety of education. Thousands at this moment behind are pressing forward, and will surpass those that are before; and the richest and most gratifying reward I can ever receive will be, to find that many to whom this course of study is delivered will hereafter be able to communicate to me the same proportion of information, which it is my duty to suppose I can at present communicate to them.

One of the first inquiries that can ever press upon the mind must relate to the nature of MATTER, and the origin of the world around us: what is this common substance from which every thing visible has proceeded, and to which every thing visible is reducible? has it existed from all eternity? or has it been called into being by the voice of an Omnipotent Creator? and in either case, has it uniformly exhibited its present harmony and arrangement, or has there been a period in which it was destitute of form and order, a waste and shapeless chaos?

These are questions which have tried the wisdom of man in all ages; and, I may add, which in all ages have proved its littleness, and the need we stand in of illumination from a superior source. Such, upon one or two points, we have received; upon the rest we are still ignorant; and, but for what we have received, we should have been still ignorant upon the whole.

If we search into the systems of all the ancient schools of philosophy, amid an infinite variety of jarring opinions in other respects, we find them, perhaps without an exception, concurring in a belief of the eternity of matter, or that general substance which constitutes the visible world around us; which was sometimes conceived to be intelligent in many of its corpuscles, and unintelligent in the rest, as was taught by Democritus; sometimes intelligent as a whole, though unintelligent in its separate parts, as taught both by Aristotle and Plato; and sometimes unintelligent in all its parts and particles, whether united or disjoined, which formed the dogma of Epicurus. Under some modification or other, however, the doctrine of the eternity of matter appears to have been universal among the philosophers of ancient nations. That a loose and floating idea of its creation, by the energy of a pure intelligence, is occasionally to be met with, and which probably existed as a remnant of patriarchal tradition, must be admitted; for the Tuscans were generally allowed to have entertained such an idea, and we find it frequently adverted to and opposed by the leaders of the different schools; but in no instance does it seem to have been embodied or promulgated as a doctrine of philosophy.

The grand motive for this general belief appears to have been a supposed absurdity in conceiving that any thing could be created out of nothing.* The Epicureans, and many other schools of philosophers, who borrowed it from them, perpetually appeal to this position. It was current, however, among many of the philosophers of Greece at a much earlier period; for Democritus expressly asserted, according to Diogenes Laertius, "that nothing could

* This, and two or three subsequent passages in the present lecture, are given summarily from an ampler and more recondite view of the subject in the author's prolegomena to his translation of "THE NATURE OF THINGS."

spring from nothing, or could ever return to nothing." Epicurus, in the few fragments of his that have reached us, echoed the tenet in the following terms: "Know first of all, that nothing can spring from nonentity." It was thus given by Aristotle: "To suppose what has been created has been created from nothing, is to divest it of all power; for it is a dogma of those who pretend thus to think, that every thing must still possess its own nature." From the Greeks it passed to the Romans, and appears as follows in Lucretius:—

ubi viderimus nihil posse creari
De nihilo, tum, quod sequitur, jam rectius inde
Perspicimus.*

Admit this truth, that naught from nothing springs,
And all is clear.

And it was thus long afterward reiterated by Persius, as the common doctrine of his day:—

De nihilo nil, in nihilum nil posse reverti.†

Naught springs from naught, and can to naught return.

The Greeks themselves, however, seem to have received it from the East, and to have become acquainted with it as a branch of gymnosophy; for it constitutes, even in the present day, a distinct doctrine of Brahminical religion, and is thus urged in univocal terms in the Yajur Vaid, in the course of an address to Brahm, or the Supreme Being: "The ignorant assert that the universe, in the beginning, did not exist in its author, and that it was created out of nothing. O ye, whose hearts are pure! how could something arise out of nothing?"‡

This reasoning seems, indeed, to have spread almost universally, and perhaps from the same quarter; for we find many of the Jewish theologians, and not a few of the Christian fathers, too much influenced by Platonic principles, giving countenance to the same doctrine, though probably not to the full extent of the Platonic school. Thus, the author of the Book of Wisdom, a book written in Greek instead of in Hebrew, and hereby proving his own era as well as the school in which he had studied, expressly asserts that "The almighty hand of the Lord created the world out of unfashioned (amorphous) matter," § ἀμόρφου ὕλης; while Athenagoras, Tatian, Theophilus of Antioch, Athanasius, and Gregory Nazianzen, appear to have concurred in the same opinion; and Justin Martyr affirms it to have been the general creed of his own era: "For that the word of God," says he, "formed the world out of unfashioned matter, Moses distinctly asserts, Plato and his adherents maintain and ourselves have been taught to believe."

This is one specimen of the very common attempt in the writings of the fathers to blend the narrative and doctrines of Moses with the principles of Platonism, which, in truth, had been embraced by many of them before their conversion. The text of Moses, when accurately examined, will be found, if I mistake not, to lead us to a very different conclusion. This text consists of the first and second verses of the book of Genesis, and is as follows: "In the beginning God created the heaven and the earth; and the earth was without form and void, and darkness was upon the face of the deep (or abyss); and the Spirit of God moved upon the face of the waters." Now in this passage we seem to have a statement of three distinct facts, each following the other in a regular series: first, an absolute creation of the heaven and the earth, which, we are expressly told, took place foremost, or in the beginning; next, the condition of the earth when it was thus primarily created, being amorphous and waste, or in the words before us, "without form and void;" and, thirdly, the earliest creative effort to reduce it from this shapeless and

* De Rer. Nat. i. 157.

† The passage is quoted from M. Anquetil du Perron's Latin version. The reader may find various similar extracts in Sir William Jones's works, vol. vi. 4to. edit.

‡ Sat. iii. 83.

§ Cap. xi. 17.

void or waste condition into a state of order and productiveness—"the Spirit of God moved upon the face of the waters." And hence, to maintain from the Mosaic narration that the heaven or the earth existed in a waste and amorphous mass antecedently to the first act of creation, is to derange the series of such narration, and to put that process first which Moses has put second.

I enter not here into the correctness of the general rendering, nor into the exact import of the word ברא, "created;" for whatever be the rendering, the same consecutive order of events must be adhered to, and the same conclusion must follow. I am perfectly ready, however, to admit that ברא does by no means at all times import an absolute creation out of nothing, but, like *create* in our own language, that it occasionally denotes the formation of one thing out of another; yet when we are told that, if Moses had really intended to express an absolute creation of the earth out of nothing, he would have used some other word, which should have limited us to this idea, I confidently put it to any critic, what word he could have employed specially appropriated to such a purpose, and limited to such a sense, at the time he wrote? or even what word, thus restrained, he could select in our own day, from any spoken language throughout the world? Words are not invented for an exclusive expression of solitary facts, but for general use. The creation of the world, or of any thing whatever, out of nothing, is a fact of this kind; and no language ever had or ever will have a term precisely struck out for the purpose of representing such an idea, and exclusively appropriated to it: and assuredly there could be no such word at the time Moses first spoke of the fact, and communicated the doctrine; as, antecedently to this, it could not have been called for. And it will not be questioned, I think, that there is more sound sense and judgment in employing, as on the present occasion, a well understood term, that comes nearest to the full extent of the idea intended to be conveyed, than to invent a new word for the purpose, that nobody has ever heard of, and, consequently, that nobody can comprehend the meaning of, till the very term that is thus objected to, or some other word from the vulgar dialect, shall be had recourse to as its interpreter. Yet although, in the Hebrew Scriptures, the word ברא is occasionally used synonymously with our own terms, "to make, produce, or cause to be," to import a formation from a substance already in existence, we have sufficient proof that it was also understood of old to import emphatically, like our own word "create," an absolute formation out of nothing. Maimonides expressly tells us, that it was thus understood in the passage before us, as well as in all others that have a reference to it, by the ancient Hebrews; while Origen affirms, that such was its import among many of the Christian fathers, whatever might be the opinion of the rest, and forcibly objects to the passage just quoted from the Book of Wisdom, as a book not admitted into the established canon of Scripture.

Still, however, the doctrine of a creation of something out of nothing was generally held to be a palpable absurdity; and a variety of hypotheses were invented to avoid it, of which the three following appear to have been the chief; each of them, however, if I mistake not, plunging us into an absurdity ten times deeper and more inextricable. The first is that of an absolute and independent eternity of matter, to which I have already referred; the second, that of its emanation from the essence of the Creator; the third that of idealism, or the non-existence of a material world.

I have already remarked, that the first of these was modified under the plastic hands of different philosophers of antiquity into a great variety of shapes; and hence, in some form or other, is to be traced through most of the Grecian schools, whether of the Ionic or Italic sect—or, in other words, whether derived from Thales or from Pythagoras. In no shape, however, is it for a moment capable of standing the test of sober inquiry. We may regard matter as essentially and eternally intelligent, or as essentially and eternally unintelligent; as essentially intelligent in its several parts, or as essentially intelligent as a whole. The dilemma is equal in all these cases. Matter cannot be intelligent as a whole, without being intelligent in every atom,

for a concourse of unintelligent atoms can never produce intelligence; but if it be intelligent in every atom, then are we perpetually meeting with unintelligent compounds resulting from intelligent elements. If, again, matter be essentially eternal, but at the same time essentially unintelligent, both separately and collectively, then, an intelligent principle being traced in the world, and even in man himself, we are put into possession of two coeternal independent principles, destitute of all relative connexion and common medium of action.

The SECOND HYPOTHESIS to which I have adverted is not less crowded with difficulties and absurdities; but it has a more imposing appearance, and has hence, in many periods and among many nations, been more popular, and was perpetually leading away a multitude of the philosophers from the preceding system. According to this hypothesis, the universe is an emanation or extension of the essence of the Creator. Now, under this belief, however modified, the Creator himself is rendered material; or, in other words, matter itself, or the visible substance of the world, is rendered the Creator; and we merely shift the burden, without getting rid of it. There can be no difficulty in tracing this doctrine to its source. It runs, as I have already observed, through the whole texture of that species of materialism which constitutes the two grand religions of the East—Brahmism and Buddhism; and was undoubtedly conveyed by Pythagoras, and, perhaps, antecedently, by Orpheus (if such an individual ever existed, which Cicero* seems to have disbelieved, from a passage of Aristotle, not to be found, however, in any of his writings that have descended to us), into different parts of Greece, in consequence of their communications with the gymnosophists. From Pythagoras it descended to Plato and Xenophanes, and, under different modifications, became a tenet of the academic and eleatic schools. I have already quoted the principle on which it is founded, from M. Anquetil du Perron's translation of the Oupnek'-hat, or Abridgment of the Veids;† the passage at large is as follows, and develops the entire doctrine as well as the principle: "The whole universe is the Creator, proceeds from the Creator, exists in him, and returns to him. The ignorant assert that the universe, in the beginning, did not exist in its Author, and that it was created out of nothing. O ye, whose hearts are pure! how could something arise out of nothing? This First Being alone, and without likeness, was the ALL in the beginning: he could multiply himself under different forms; he created fire from his essence, which is light," &c. So, in another passage of the Yagur Veid, "Thou art Brahma! thou art Vishnu! thou art Kodra! thou art Prajapat! thou art Deionta! thou art air! thou art Andri! thou art the moon! thou art substance! thou art Djam! thou art the earth! thou art the world! O lord of the world! to thee humble adoration! O soul of the world! thou who superintendest the actions of the world! who destroyest the world! who createst the pleasures of the world! O life of the world! the visible and invisible worlds are the sport of thy power! Thou art the sovereign, O universal soul! to thee humble adoration! O thou, of all mysteries the most mysterious! O thou who art exalted beyond all perception or imagination! thou who hast neither beginning nor end! to thee humble adoration!"‡

As this doctrine became embraced by many of the Greek and Roman philosophers, it is not to be wondered at that it captivated still more of their poets; and hence we find it, with perhaps the exception of Empedocles and Lucretius, more or less pervading all of them, from Orpheus to Virgil. It is in reference to this that Aratus opens his *Phenomena* with that beautiful passage which is so forcibly appealed to by St. Paul in the course of his address to the Athenians on Mar's Hill,§ of which I will beg your acceptance of the following version:—

From God we spring, whom man can never trace,
Though seen, heard, tasted, felt in every place;

* De Nat. Deor. l. i.
† See Transl. of Lucr. t. p. 282.

‡ Tom. i. Paris, 1802
§ Acts, xvii. 25.

The loneliest path, by mortal seldom trod,
The crowded city, all its full of God;
Oceanus and lakes, for God is all in all,
And we are all his offspring.*

So Æschylus, in a passage still stronger in point, and imbued with the full spirit of Brahminism:—

Jupiter is the air;
Jupiter is the earth;
Jupiter is the heaven;
All is Jupiter.†

But perhaps the passage most express is one contained in a very ancient Greek poem entitled *De Mundo*, and ascribed to Orpheus, in the original highly beautiful, and of which, for want of a better, I must trouble you with the following translation:—

Jove first exists, whose thunders roll above;
Jove last, Jove midmost, all proceeds from Jove.
Female is Jove, immortal Jove is male;
Jove the broad earth—the heaven's irradiate pale.
Jove is the boundless spirit, Jove the fire
That warms the world with feeling and desire.
The sea is Jove, the sun, the lunar ball;
Jove king supreme, the sovereign source of all.
All power is his; to him all glory give,
For his vast form embraces all that live.‡

This doctrine has not been confined to ancient times, or to the boundaries of India and the republics of Greece and Rome; it has descended through every age, and has its votaries even in the present day. M. Anquetil du Perron, whom I have already spoken of, as the Latin translator of the *Oupnek'hat*, or Upanishad, from the Persian version, has himself distinctly avowed an inclination to it; the writings of M. Neckar are full of it;§ and M. Isnard has professedly advanced and supported it in his work, “*Sur l'Immortalité de l'Âme*,” printed at Paris in 1802. I do not know that it exists at present to any great extent in our own country; but if we look back to something less than a century, we shall find it current among the philosophers of various schools, and especially that of which Lord Bolingbroke has been placed at the head; and hence running through every page of the celebrated *Essay on Man*, in the composition of which it is probable that Mr. Pope was imposed upon by his noble patron, and was not sufficiently alive to the full tendency of its principles. The critics on the Continent, however, perceived the tendency on its first appearance; and hence its author was generally, though incorrectly, denominated the modern Lucretius, and the poem itself was regarded as one of the most dangerous productions that ever issued from the press; as a most insidious attempt, by confining the whole of our views, our reasonings, and our expectations to the present state of things, to undermine

* Ἐκ Διὸς ἀρχώμεθα, τὸν οὐδέποτε ἄνδρες ἴσμεν
Ἀβήτων· μετὰ δὲ Διὸς πάσα μὲν ἀγνία,
Πάσα δ' ἀνθρώπων ἀγορά· μετῆ δὲ θάλασσα,
καὶ λιμένες· πάντα δὲ Διὸς κεχρημένα πάντες·
Τοῦ γὰρ καὶ γένος ἴσμεν. Lib. i. 1.

† Ζεὺς ἔστιν αἰθήρ,
Ζεὺς τε γῆ·
Ζεὺς δὲ οὐρανός,
Ζεὺς τὰ πάντα.

‡ Ζεὺς πρῶτος γενέτο, Ζεὺς ἕτατος ἀρχικεράνιος·
Ζεὺς κεφαλὴ, Ζεὺς μέσσα· Διὸς δ' ἐκ πάντα τέτυκται·
Ζεὺς ἀσπὴν γενέτο, Ζεὺς ἀβροτος ἔπειτο νόμῳ·
Ζεὺς πύθμην γαίης τὰ καὶ οὐρανοῦ ἀστερόεντος·
Ζεὺς πνοὴ πάντων· Ζεὺς ἀκάματα πυρὸς ὄρη·
Ζεὺς πάντων βίβα· Ζεὺς ἥλιος ἠὲ σελήνη·
Ζεὺς βασιλεὺς· Ζεὺς αὐτὸς ἀπαντῶν ἀρχηγένης·
Ἐν κράτος εἰς Διῶν γένετο, μέγας ἄρχος ἀπαντῶν·
Πάντα γὰρ ἐν μεγάλῳ Ζηνὸς τὰδε σῶματι κίται.
Ex. Apul.

§ See Sir W. Jones's Works, i. p. 448.

the great doctrines of a future state and the immortality of the soul. In our own day we allow to it a very liberal extent of bold imagery and poetic license, and with such allowance it may be perused without mischief; but a few verses alone are sufficient to prove its evil bearing, if strictly and literally interpreted. The following distich, for example, beautiful as it is in itself, discloses the very quintessence of Spinosism:—

All are but parts of one stupendous whole,
Whose body nature is, and God the soul:

and the general result drawn from the entire passage, which is too long to be quoted, is no less so:—

In spite of pride, in erring reason's spite,
One truth is clear, WHATEVER IS, IS RIGHT.

If every thing be right at present, there is no necessity for a day of correction or retribution hereafter; and the chief argument afforded by nature in favour of a future existence is swept away in a moment. Unite the propositions contained in these two couplets, and illustrated through the whole poem, and it follows that the universe is God, and God the universe; that amid all the moral evils of life, the sufferings of virtue, and the triumphs of vice, it is in vain to expect any degree of compensation or adjustment in a future state; every thing being but an individual part of one stupendous whole, which could not possibly exist otherwise; and that the only consolation which remains for us under the pressure of pain or calamity is, that if we are not at ease, there are others that are so—that if our own country is devoured by war, or desolated by pestilence, there are countries remote from us that know nothing of such afflictions—that the *general good* is superior to the *general evil*, and made to flow from it, and, consequently, that *whatever is, is right*:—

If plagues and earthquakes break not Heaven's design,
Why then a Borgia or a Catiline?

The THIRD HYPOTHESIS to which I have referred, is that of the idealists, or those who maintain that there is no such thing as a material or external world; that the existence of man consists of nothing more than impressions and ideas, or of pure incorporeal spirit, which surveys every thing in the same unsubstantial manner as the visions of a dream. Some of the tenets of Malbranche appear to have a tendency to this theory; but it has been chiefly developed in modern times by Bishop Berkeley and Mr. Hume. Their premises are indeed somewhat different, but their conclusion is the same; excepting that the argument is pressed much farther by the latter than was ever intended by the former, and leads to more dangerous consequences. In Germany, Professor Kant has allowed a part of this tenet, as well as parts of various other tenets,† to enter into his system, or that which he chooses to distinguish by the name of the *Transcendental Philosophy*, and which not long since bade fair to obtain a universal sway over the Continent, though for some years it has appeared to be considerably declining in its reputation. It was my intention to have traced the origin of the ideal hypothesis, and to have pointed out its sophisms, but our time will not allow me; and it is the less necessary, as I shall have an opportunity, on a future occasion, of reverting to all these various conjectures and examining them at full length.‡

But why, after all, is it necessary to support the proposition, that “nothing can spring from nothing?” Why may not *something spring from nothing*, when the proposition is applied to Omnipotence?§ I may be answered, perhaps, because it is a self-contradiction, an impossibility, an absurdity. This, however, is only to argue in a circle; for why is it a self-contradiction, or an impossibility? “It is impossible,” said M. Leibnitz, “for a thing to be

* See the author's Prolegomena to his translation of the Nature of Things, p. cxxvi.

† Degerando, Histoire Comparée des Systèmes de Philosophie, tom. ii. 17.

‡ Series in. Lect. v.

§ See the author's Prolegomena, et supra, p. lxxviii.

and not to be at the same time." This impossibility I admit; because, to assert the contrary, would imply a self-contradiction absolute and universal, founded upon the very nature of things, and consequently applicable to Omnipotence itself. But the position that "nothing can spring from nothing" is of a very different character: it is necessarily true when applied to man, but it is not necessarily true when applied to God. Instead of being *absolute* and *universal*, it is *relative* and *limited*; the nature of things does not allow us to reason concerning it when its reference is to the latter: and hence we have no authority to say that it is impossible to the Deity; or to maintain that an absolute creation out of nothing by the Deity is an absurdity or self-contradiction. It is absurd to suppose that matter does not exist; it is absurd to suppose that it does exist eternally and independently of the Creator; it is absurd to suppose that it constitutes the Creator himself: but, as it is not absurd to suppose its absolute formation out of nothing by the exercise of an almighty power, and as one of these four propositions must necessarily be true, reason should induce us to embrace the last with the same promptitude with which we reject the other three.

So far, indeed, from intimating any absurdity in the idea that matter may be created out of nothing by the interposition of an almighty intelligence, reason seems, on the contrary, rather to point out to us the possibility of an equal creation out of nothing of ten thousand other substances, of which each may be the medium of life and happiness to infinite orders of beings; while every one may, at the same time, be as distinct from every other, as the whole may be from matter, or as matter is from what, without knowing any thing farther of, we commonly denominate spirit. Spirit, as generally used among modern metaphysicians, is, to say the most of it, but a negative term employed to express something that is not matter; but there may be ten thousand somethings, and substrates of being, and moral excellence and felicity, which are not matter, none of which, however, we can otherwise characterize. Yet why, between all or any of these and matter itself, there should be such an utter opposition and discrepancy as was contended for by Des Cartes, and has since been maintained by most metaphysicians, I cannot possibly conjecture; nor conceive why it should be universally thought necessary, as it still appears to be thought, that the essence of the eternal Creator himself must indispensably consist of the essence of some one of the orders of beings whom he has created.—Why may it not be as distinct from that of an archangel as from that of a mortal? from the whole of these various substances, which I have just supposed, and which we cannot otherwise contemplate or characterize than by the negative term Spirit, as it is from matter, which is more immediately submitted to our eyes, and constitutes the substrate of our own being and sensations?

Matter, then, we are compelled to regard as a substance created out of nothing by an intelligent first cause; himself immaterial, self-existent, eternal, and alone; and of matter the whole visible universe is composed. It is arranged and regulated by an extensive code of laws, of which, however, we know but a few; and which give birth to a multiplicity of concrete forms, under which alone we are capable of contemplating it: for no effort has hitherto succeeded in ultimately enucleating the compound and tracing it to its elementary particles. We may divide and subdivide as we please; but when we have followed it up into its subtlest rudiments, its most retiring principles, by the aid of the best glasses which the best art of man can provide for us, we learn no more of the real nature of its primitive essence than we do from an acorn or a pebble.

But we are as ignorant of matter in its total scope as we are of it in its elementary particles. We can examine it as it exists in the globe, but the globe on which we tread is but as a drop to the ocean; the earth is surrounded by other planets, by other worlds, by other systems of worlds; all of which, we have reason to believe, are composed of the same substance, and regulated by the same laws. We stretch out our view on every side, but there are still worlds beyond us; we call in the aid of the best glasses, but they still

surpass our reach; till at length we resign ourselves to imagination, and in the confusion of our thoughts and the weakness of our language, we speak of space as being filled, and of matter as being infinite.

This view of the subject has given rise to a variety of magnificent speculations, at which I shall just glance, without meaning to dwell upon them. Is all this immensity of matter, this universe of worlds within worlds, and systems within systems, the result of one single fiat of the great Creator? Did the Power that spake it into existence give it from the first the general order and harmony and perfection that prevail at present? or did he merely produce a vast central and aggregate chaos, as the rude basis of future worlds, the parent-stock or storehouse from which they have since issued by a series of distinct efforts and evolutions? or, thirdly, has every separate system of worlds, or every separate planet, been the result of a separate birth, and a separate act of creation?

It is of little importance which of these splendid fancies we adopt; for all of them are but fancies, and built upon conjecture alone. In a course of philosophical inquiry, however, it becomes us to be acquainted with their existence; and to be informed, beyond this, that the second is the speculation which has been more generally espoused by philosophers; that, I mean, which conceives the existence of a central and primary chaos, from which all the heavenly bodies have successively proceeded, of whatever kind or description, whether suns, stars, comets, or planets; though the mode by which such efforts have been produced has been variously accounted for. Des Cartes seems to have supposed stars to have preceded planets in the order of creation; and that the earth was at first a star, and continued so till rendered opaque by having its bright surface incrustated with grosser and untransparent matter, and drawn into the vortex of the solar system; and Leibnitz adopted his conjecture. Whiston conceived it to have been originally a comet, the rude materials of which constituted the chaos of the earth; and Buffon, to have consisted of a comet and a portion of the sun's exterior limb or edge carried off by such comet, in consequence of its having given the sun an oblique stroke in the course of its orbit; the chaos of the earth being thus formed by the vapoury substance of the impinging comet uniting with a portion of the sun's igneous mass; and in this manner he endeavoured to account for the production of every other planet of the solar system.

But of all this class of speculations (for assuredly they deserve no higher character), the most splendid and comprehensive is that which was first embraced by Dr. Herschel, and was perhaps an improvement on a prior hypothesis of M. Buffon; but which, so precarious is the life of a philosophical hypothesis, he himself discarded, not many years afterward, for something newer. It supposes the existence of an immense mass of opaque but igneous matter, seated in the centre of universal nature; that the sun and every other star were originally portions of this common substance; that it is volcanic in its structure, and subject to eruptions of inconceivable force and violence; that the sun and every other luminary of every other system were thrown forth from it at different times, by the operation of such projectile powers; and that these, possessing in a great degree the qualities of the parent body, threw forth afterward at different times, by means of similar volcanoes, portions of their own substance, each of which, by the common laws of projectiles, assumed an orbicular motion, constituted a distinct planet, and became the chaos of a rising world.* Hence, according to this comprehensive and daring hypothesis, the existing universe has acquired its birth; hence new systems of worlds are perpetually rising into being, and new planets are added to systems already created.

But worlds and systems of worlds are not only perpetually creating, they are also perpetually diminishing and disappearing. It is an extraordinary fact, that within the period of the last century, not less than thirteen stars in different constellations, none of them below the sixth magnitude, seem totally

* Phil. Trans. vol. lxxxiv.

to have perished: forty to have changed their magnitude by becoming either much larger or much smaller; and ten new stars to have supplied the place of those that are lost.* Some of these changes may perhaps be accounted for by supposing a proper motion in the solar or sidereal systems by which the relative positions of several of the heavenly bodies have varied. But this explanation, though it may apply to several of the cases, will by no means apply to all of them; in many instances it is unquestionable, that the stars themselves, the supposed habitations of other kinds or orders of intelligent beings, together with the different planets by which it is probable they were surrounded, and to which they may have given light and fructifying seasons, as the sun gives light and fruitfulness to the earth, have utterly vanished, and the spots which they occupied in the heavens have become blanks. What has thus befallen other systems will assuredly befall our own; of the time and the manner we know nothing, but the fact is incontrovertible; it is foretold by revelation, it is inscribed in the heavens, it is felt throughout the earth. Such is the awful and daily text; what then ought to be the comment?

LECTURE II.

ON THE ELEMENTARY AND CONSTITUENT PRINCIPLES OF THINGS.

OUR study for the present lecture is the first or simplest principles of bodies, so far as we have hitherto been able to obtain any degree of knowledge upon this recondite inquiry, and the means by which they are combined or separated from each other, so as to produce different kinds and orders of sensible objects.

A very slight contemplation of nature is sufficient to show us that matter under every visible form and modification, when regarded in its general mass, is perpetually changing; alternately living, dying, and reviving; decomposing into elements that elude our pursuit; and recombining into new shapes and energies and modes of existence. The purest and most compact metals become tarnished or converted into a calx or oxide on its surface, and the most durable and crystallized rocks crumble into granules; and the matter constituting these oxides and granules, by an additional series of operations, is still farther decomposed, till every vestige of their late character is lost, and the elementary principles of which they consisted are appropriated to other purposes, and spring to view under other forms and faculties. The same process takes place in the organized world. The germ becomes a seed, the seed a sapling, the sapling a tree; the embryo becomes an infant, the infant a youth, the youth a man: and having thus ascended the scale of maturity, both, in like manner, begin the downward path to decay; and, so far as relates to the visible materials of which they consist, both at length moulder into one common elementary mass, and furnish fresh fuel for fresh generations of animal or vegetable existence; so that all is in motion, all is striving to burst the bonds of its present state; not an atom is idle; and the frugal economy of nature makes one set of materials answer the purpose of many, and moulds it into every diversified figure of being and beauty and happiness.

It has hence been said, that matter is necessarily corruptible, and is perpetually changing from its intrinsic nature, and that the physical and moral evils of life are mainly attributable to this perverse and incorrigible propensity. Such was the doctrine of many of the most eminent schools of ancient philosophy, both of Greece and Asia, and such continues to be the doctrine of various schools of the present day; a doctrine which has not unfrequently been considered as of the utmost importance, and as forming the best defence of the benevolence of the Supreme Architect; who, we are told, notwith-

* See Dr. Herschel's Observations compared with Flamsteed's, Phil. Trans. vol. lxxiii. art. 17.

standing all the pains and calamities, the tumults and disorders of nature, has made the most of matter that it would admit of, and has tempered it not only with a positive predominancy of good over evil, but with as much and as real good as could possibly be infused into it.

To argue thus is to revive the theory of pure Platonism, far too extensively introduced into the Christian world, as I hinted in our last lecture, upon the first conversion of the Grecian philosophers, who had been chiefly students in the Platonic school; and to suppose the existence of matter as an independent and eternal principle. "God," says the sublime but mistaken founder of this school, "wills, as far as it is possible, every thing good and nothing evil;"* "but it cannot be that evil should be destroyed, for there must always be a something contrary to good,"† a *ἕχουρος ἐπιθυμία*, "an innate propensity to disorder,"‡ in that eternal and independent principle of matter out of which all visible things are created.

How much more consolatory, as well as agreeable to right reason, is the view taken of this abstruse subject in the pages of genuine, unsophisticated, and unphilosophized revelation, in which the present is represented as a state, not of actual necessity, but of preordained probation; willed, in infinite wisdom, by the great First Cause, to promote the best ultimate happiness of man: and matter as a substance produced out of nothing by his almighty fiat! It was one of the express objects of the preceding lecture to prove, not only that matter does exist, in opposition to those who have thought it expedient to deny the being of a sensible and material world, but that it could not exist by any other means; and that, while there is no self-contradiction or absurdity in contending that matter, and that ten thousand other substances than matter, may be produced out of nothing by the energy of an infinite and omnipotent intelligence, there is so pure and perfect an absurdity in endeavouring to account for its existence upon every other theory which has hitherto been invented, that right reason should induce us to embrace the former opinion with the same promptitude with which we fly from every opinion that opposes it.

Matter, then, is the production of an almighty intelligence, and as such is entitled to our reverence; although, from a just abhorrence of many ancient, and not a few modern errors, it has too often been regarded in a low and contemptible light. Though not essentially eternal, as was contended for by all the schools of Greece and Asia, nor essentially intelligent, as was contended for by several of them, it evinces in every part and in every operation the impress of a divine origin, and is the only pathway vouchsafed to our external senses by which we can walk—

Through nature up to nature's God;

that God whom we behold equally in the painted pebble and the painted flower—in the volcano and in the cornfield—in the wild winter storm and in the soft summer moonlight. Although, when contemplated in its aggregate mass, and especially in its organized form, it is perpetually changing, it is every where perfect in its kind, and even at present bears indubitable proofs of being capacitated for incorruptibility. In its elementary principles it is maintained by the best schools of both ancient and modern times to be solid and unchangeable; and, even in many of its compound forms, it discovers an obvious approach to the same character. The firm and mighty mass that constitutes the pyramids of Egypt has resisted the assaults of time and of tempests for, perhaps, upwards of four thousand years, and by many critical antiquaries is supposed to have triumphed over the deluge itself. While there is little doubt that the hard and closely crystallized granitic mountains of every country in which they occur, "the everlasting hills," to copy a correct and beautiful figure from the pages of Hebrew poetry, are coeval with the creation, and form at this moment, as they formed at first, the lowest depths, as well as the topmost peaks of the globe. That they are in

* Theocrit. t. i. p. 176.

† Ibid.

‡ Phileb. See also Brucher, Hist. Phil. lib. ii. cap. viii. § 1.