June 1805.
June. 26. 1806.

Natural Hist.y (1st Lect. after the spring vacation.

After a short seperation of more yr. four weeks, we meet you again, with renewed satisfaction, in order to give you a few more ex-tracts from the <u>Great Book of Nature</u>; a book whose ample and splendid pages must charm all who have eyes to see, or hearts to feel!

Having finished a the principal section of our course, let us now look back on the space we have passed through; lest, during the interval of ~~relaxation~~ seperation, you may have for-gotten some of the leading features of our doctrine; and should not be able to connect what has passed, with that which is to come; for the great end & aim of these lectures is to show you the Unity of design throughout the vast ~~Temple~~ frame of the Universe, that nothing stands detached & alone in this Temple of the Deity, but all is systematical, affinity & connection! clearly indicating an over ruling <u>Mind</u>.

We began with the abstruse subject of the original, or primary mr, or that out of which all things were created. What this primary mr is, He, who made it only knows; for no mortal eye ever saw this <u>substratum</u> of all things, as we only see, feel, and taste matter after it is wrought into some substance or body. In discussing this subject this question arose, unavoidable, — x <u>whether in this world which we inhabit, there be not an univer-sal change, or mutation of all things into all?</u> <u>If there be, then must there be some one primary matter, common to all thin</u>

Discussed a fortnight after vacation

or, in clearer words, — substances of every kind either immediately, or medrately pass one into another; so that reciprocal deaths, dissolutions & digestions support, by turns all such substances out of each other. We went one step farther, and spoke of the vegetable & animal molecules, or organic particles, which survive death; for death has no influence upon them; they circulate through the world, passing alternately from vegetable to animal producing in each life & nourishment. It was at this stage of our disquisition that we glanced at the sublime doctrine of mutation, or that never ceasing change or circulation, through which every thing on this evanescent globe is doomed to pass. We told you that mutability was written on every thing in this world; that nothing was absolutely fixed; that all things are destined to a perpetual series of revolutions. Even we ourselves are passing away like a vapour! You may recollect, that it followed from our doctrine, that every recent production whether animal or vegetable, could not be deemed an absolute fresh creation, or calling of something out of nothing; that is impossible. Since the first creation of the primary m^r "ex nihilo nihil fit" altho' all things change nothing is lost in creation. The sum total of matter in the Universe remains exactly the same. As it was the work of Omnipotence to create originally something out of nothing, so the same Omnipotence is required to reduce any thing back to nothing.

Order

Order led us to speak next of the effecient cause, or motive principle in organised bodies. This induced us to speak of fire. We s^d there were two grand forces, or original powers operating in the system of the Universe. The 1st is that which causes weight; and the 2^d that which causes heat; the one tends from the circumference to the centre, and is called gravitation; the other tends from the centre to the circumference & is called fire. Tho' the tendency of these powers is directly opposite, they ballance each other, and from the wonderful operation of these two forces, checking & restraining each other all the phenomena of the Universe result. The approximating principle of attraction tends incessantly to the centre; but then every particle of matter is surrounded by an elastic atmosphere of fire, whose natural tendency is to cause each particle to recede, by enlarging the fiery atmosphere surrounding it. We said that altho' philosophers have been able to dissect light, analyze air, and decompose water, they have not been able to detect the Essence of fire, that wonderful something that constitutes fluidity. ~~Such are surprizing attrib~~ We have seen that fire not only destroys but creates; tho' commonly considered as the consumer of things, it is in fact the very power that produces them.

We cease to wonder that some celebrated nations, not blessed by revelation, have worship'd fire, & its source the Sun, as a Deity, which seems indeed, to be "the eye & soul of "this lower world."

After speaking of the properties of fire, we discanted on the various attractions, as the attraction of crystallization - magnetism - electricity - chemical attraction - and then we spoke of that internal arrangement, adjustment, or disposition of matter w.c constitutes organization. Over and beyond all this was the moving principle or life, or that power which first moves & then conducts that latent process by which the acorn becomes an Oak; by which the egg becomes a living animal. This is the power by which the aliments of plants & animals is digested, and by such digestion transformed into a part of themselves; the power which departing the body ceases to live & the members soon pass into putrefaction & decay.

In treating of the devellopement, or unfolding of the ~~egg~~ seed of a plant, & the egg of an animal, we were led to speak of that recently discovered principle in Nature denominated oxygen, w.c when combined with calorie, or the fluid matter of heat, vivifies & animates all organized nature.

We S^d that the terraqueous globe contained the three Kingdoms of Nature, viz the Fossil, w^h constitutes the crust of the earth; and the vegetable w^h adorns the surface of it; and the animal w^h is sustained upon it. ~~These~~ We endeavoured to shew you that these were all made out of one simple matter, w^h is constantly changing out of and into all the various substances perceivable by our senses. Here we resumed the subject of the transmutation of animal to vegetative nature; and of the vegetable again to animal. In animal=nutrition, the organic matter of dead animals or vegetables taken into the stomach, is there decom-posed; and the most nutritive parts are ab-sorbed by the lacteals, & become part of the creature. In the vegetable=nutrition the organic matter of dead animals & vegetables suffers decomposition, and undergoes new combinations, on, or beneath the surface of the earth; and the more nutritious parts are absorbed by the roots of the plant. We S^d that this was the true theory of manures, for that, when an animal dies & putrefies, i.e, dissolves into a fetid vapor

vapor, or gaz, the subtle particles become volatile, are absorbed with avidity by the plant; and this absorption of animal matter causes them to grow, such particles being their appropriate nourishment. This doctrine is the grand fulcrum, on which rests & turns the noble science & art of agriculture.

We next spoke professedly of Vegetables, or that family of organized bodies w^c cover, adorn & diversify the earth on which we live. We saw that the stem of a plant was not like a lump of clay, or even like a stone, but that it had an internal adjustment of its matter into tubes & vessels, forming a kind of hydraulic body replete with various juices, by means of which it derives the matter of its nutriment & growth. We showed you this organization, as it appeared magnified, through the microscope.

We then traced the growth of a plant, or what we express by a single word vegetation, from a seed, placed in a proper degree of heat & moisture, to the formation of the root — the trunk — the branch — the leaf — the flower — the fruit, and last of all to the seed again — i.e. fructification

Here

Here we gave you a glance of the Linnean System of Botany, w.c we said was founded on a discovery, that there was in plants, as in animals, a distinction of sexes; and that their propagation was as obvious in the one as in the other. We saw that this newly discovered law of Nature attracted your attention; and we hope it will produce beneficial effects in a country where Agriculture gives the only riches we can call our own. We earnestly exhorted you to learn the laws of the vegetable oeconomy, for without it Agriculture, that useful, important, & honorable profession must remain a vague & uncertain Study.

We s.d, that every plant has some valuable property either medicinal or nutritive; that beside these private virtues, the great family of Vegetables, had, what may be called their public virtues; for that every plant from the stately pine & sturdy oak of the forest to the humble grass of the field join to constitute one grand apparatus to cleanse & purify the Atmosphere, without which operation all animated nature would soon perish.

We

We told you that while the upper or varnished side of a leaf poured forth the pure vital air, the under or rough side imbibed all putrid matters, and that by this two fold operation the air was kept fit for our respiration, and, at the same time, the plant is nourished by it.

The vulgar think, that there is no other way of destroying all mankind, but by fire or water, by conflagration or deluge; yet were the Creator & Governor of the Universe to cause every vegetable on earth, to be at once annihilated, the air which we now breathe would soon become a putrid mass of every thing noxious, and man & every other terrestial animal would directly turn to a mortified lump of corruption & die. The Ocean also gives out this vital or salubrious air, & also absorbs putridity." Gentle gales of wind waft these healthy emanations from the leaves of vegetables, & mix them with the whole atmosphere; and if these salutiferous gales rise to storms & hurricanes, even there we trace the kind agency of a beneficent Being, who with design, not in wrath, but in mercy shakes the waters & the effluvia of terrestial bodies together, to bury in the deep those putrid & pestilential vapors, which the vegetables had been unable to absorb & consume.*

This view of the Vegetable world, has opened, perhaps, to some of

"Storms & Tempests break out by his design."

* Sir John Pringle

you a new law of Nature and affordy you the law was discovered by that transcendently great Philosopher Prestley.

The last Lecture previous to the vacation was on the analogy of Vegetables & Animals. Moralists & Poets have, in all ages compared the evanescent beauty of the flower with the transitory life of man, but it was left to the scrutinizing eye of modern Physiologists to run the ~~comparison~~ analogy so close that the most discerning ~~eye~~ observer cannot lay a distinct line between these two orders of beings. We found that life belonged alike to both kingdoms, and that it depended on the same principle. We found that health & sickness belonged to both - that both were liable to be frost bitten & to consequent mortifications - that both languish in excessive heats - both contract diseases from infection - and that both are liable to die of hunger & thirst. We saw that plants possessed sensation, or perceptivity - and that want of air, or sulphurious vapors were alike destructive to the plant & the animal. We saw that some animals could be cut in pieces, yet each piece retained its vivacious property & became shortly a living & perfect animal, capable of producing its kind by cuttings, or by a kind of vegetation. In that ~~we found~~ the animal & vegetable nature connected together by links so nicely fitted &

that where one ended & the other began was invisible to the most inquisitive eye; w.ch led us to conclude that instead of two distinct kingdoms they formed one immense family.

The moral conclusion from this our last lecture was, "that physical observations concerning the generation, nutrition, organization, life, health, sickness & death of plants, keep us as little towards establishing a discriminative characteristic between them & animals, as metaphysical speculations do, relative to the quantum of happyness, or degree of perceptivity. We are apt to conclude that the Species of animals far below us are less happy, because they are less perfectly formed; in other words, that a less acute perception, infers less capacity for the reception of happyness. But our method of estimating things is ever partial & relative to ourselves. On an extensive and keen view of Nature, we shall find that happyness, like water, is ever tending to an equilibrium. —

All your studies tend to little advantage, if they keep you not to discern that unity of design, w.ch pervades the great Temple of Nature. He who encreaseth knowledge, encreaseth his sorrow, ~~if after all~~ if he is, after all, left in doubt, whether what he sees around him, be the effect of

blind and wayward chance, or the work of an in-finitely wise & powerful Being! The great, original, and final cause of all things!

~~The brutes are deprived of the high advantages we enjoy.~~

~~We have told you more than~~

The brutes are deprived of the high advantages we enjoy. Man alone of all animals enjoys the gift of reason & the power of clothing his ideas with speech. No sooner does he arrive at the exercise of thought, than, stimulated by that "thirst of the soul" curiosity, he examines the objects around him & extends his researches wider & wider, over the whole circuit of Nature, and, as his reason attains ~~to~~ its destined perfection, he, to use the emphatic words of Shakespear,

"Sees books in the running brooks,
"Sermons in ~~trees~~ stones, and good in every thing"

Such a being as man is liable every moment to forget himself, & to be hurried away by a thousand impetuous passions. Philosophy has provided against these effects of ignorance and error by the laws of morality. Stoicism, the noble system of Zeno & Epectetus affords a remedy for these. Such a being as man is liable every moment to forget his Creator. The Deist

has therefore reminded him by the laws of Religion. The excellency of human reason shines with renewed lustre in the establishment of civil laws & bodies politic. In these virtue, honor, fear & interest variously employed, or combined prove the source of peace, order & tranquility. But the distinguishing mark of the greatness of man, and of his high exaltation above all other animals, ~~the~~ his communication with his Creator by Religion. — Wrap't in thick darkness, the rest of the animal creation are ignorant of the hand that formed & supports them. They enjoy an existence, but cannot, like us, trace the author of it. Through the medium of that faculty w.ch is the peculiar attribute and ornament of human kind, the Diety condescends to reveal himself to man & to lead him, as it were by the hand, in the path of happyness. The sacred scriptures, solemn periods for contemplation, the institution of the Sabbath, the labors of the ministry of religion, are so many great lights, placed at proper distances to guide us through this dark region, to another & a better world."

Students of Nature, are apt to be enraptur'd with that word. But what do you mean by Nature? It is a term that may misguide us. It is the refuge of a slothful mind, in

in which manifold absurdities are consistent. It is the Deity of Atheists; and while it supersedes farther enquiry requires of us neither fear nor reverence.

It is nearly 2 years since Death extinguished one of those Lights that we mentioned, w^c the wisdom of our fathers had enkindled in this University. But in the course of a kind Providence, that extinguished Lamp is re illumed; by it you will see, that our highest admiration of Nature, like our greatest efforts of morality, must be sublimed into religion. This re illumination will consummate our wishes, by leading you "through Nature, up to Natures GOD!"—