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REMARKS

ON THE

PHYSICAL AND MORAL HISTORY

OF THE

HUMAN SPECIES.

REVIEWS

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REMARKS

ON THE
PHYSICAL AND MORAL HISTORY

OF THE

Human Species,

AND ITS

CONNECTIONS WITH SURROUNDING AGENCY.

BY L. S. BOYNE.

“ THE PROPER STUDY OF MANKIND IS MAN.”

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Preface.

A BRIEF outline of the History of Man, and his Connections with Surrounding Agency, is at all times a subject primarily important : it is the proper province of Human inquiry, and equally interesting to all : it is a Picture that gives scope to the exercise of splendid genius and talent ; it is a field for the display of invention, and the activity of imagination ; it abounds with mazes and intricacies ; it is in a great measure obscured in a sublime mystery, and to give a finished sketch of Human History is to do little less than to extract order and design from apparent chaos. The limited boundary of our faculties is soon approached, the horizon flies before the observer ; as he climbs each hill in expectation of reaching the desired goal, he sees “ Alps on Alps arise ; ” the philosopher stands confounded in a desert plain, without a landmark---he is at sea

without a compass ; led on by his senses, but more powerfully by his imagination, he is apt to wander from the road to truth, and fall into the specious path that at length bewilders him in superstition and scepticism. Such has been the fate of a large portion of travellers in this department of science. Let it not be thought the writer of these Letters expects any better success ; think not, he has the vanity to suppose he can add any light to this great subject ; he has only acted the part of a student, to gather facts from others, to copy Art as well as Nature. His sketch shows nothing original. His ambition would indeed be gratified, were it his high destiny to say, “ I too am a Painter.” Self-knowledge, the safe guide to truth, teaches him to be contented as a distant observer. The peculiar nature of his Professional studies giving him an acquaintance with the Physical character of Animal Nature, he has been led in his leisure hours to take a cursory survey of the Human state. He has in these Letters thrown together a body of general remarks on the great elements of our Nature, the attributes and qua-

lities of organized beings, as related to, and combined with, the great Masterpiece, *Man*. This rough sketch, this brief outline, not being a finished Portrait, he dedicates to those who have not leisure or means of pursuing more profound research. If any one with whom “his little Bark shall attendant sail,” will have received the slightest tinge of taste for rational inquiry into the matters of which it treats—if any one may consider it an introduction to future more satisfactory investigation—the intention and design of the Writer will then have achieved their entire consummation; he shall then think his leisure usefully employed—his time fortunately bestowed. He claims no merit; he has furnished nothing new; he has merely thrown together in a familiar shape a number of facts in Nature, that cannot be instructive to the Learned, but may operate as introductive of further inquiry among General Readers.

ERRATA.

Page 83, line 3, *for* "inverted," *read* "invested."

88, — 13, *for* "Efflorescence," *read* "Inflorescence."

98, — 21, *for* "Crustana," *read* "Crustacea."

364, — 10, *for* "Sencetus," *read* "Senectus."

CONTENTS.

LETTER I.

INTRODUCTORY Remarks—Solar System—Theory of the Earth—Plurality of Worlds—Figure and General Surface of the Earth—Origin of Society—Geological Theories and Observations—Remarks on both Continents 1 to 24

LETTER II.

Air—General Form of Bodies—Fire—Composition of the Atmosphere—Oxygen—Nitrogen—Carbon—Mechanical Properties of Air—Winds—Temperature of the Globe—Sound—Music 25—54

LETTER III.

Light—Vision—Colour—Matter—Space—Vacuum—Attraction—Time—Magnetism—Materialism 55—77

LETTER IV.

Organized Bodies—*Vegetables*, their Laws and Functions—Transition from Vegetables to Animals gradual and undefined—*Insects*, their various Attributes..... 78—96

LETTER V.

General Division of Insects, and the Singularity of their Functions—*Fish*, their Classification, comparative Anatomy, &c.—*Amphibia*, anomaly of their Structure and Functions—Form of the Heart—Circulation of the Blood 97—119

LETTER VI.

Birds, their Variety and Beauty—Feathers—comparative Anatomy and Physiology—the Egg—*Quadrupeds*, their general Skeleton, and comparative Structure approaches that of the Human Form—General Division—Domestication—Utility to Man 120—143

LETTER VII.

Man, his general Attributes—his Anatomy—his general Physiology—Cranium—the Brain the distinguishing Organ—the Face—the Thorax—Abdomen—Limbs—the Blood, its temperature and general Properties..... 144—169

LETTER VIII.

Digestive Organs—Experiments on Digestion—Activity of the Gastric Juice—Variety of Food—Muscular System—Position of the Foot—Erect Figure of Man—Mortality of the Species at different Periods—Climacteric Years—Number of Mankind 170—197

LETTER IX.

Mankind sprang from one common source—Remarks on the apparent and real Diversities among Animals—Varieties in Men—Observations to prove that all men have proceeded from one Parent Trunk 198—217

LETTER X.

Origin of the different Nations of the Globe—Man first created in Asia—Complexion of Infant Society—Europe peopled from Asia 218—240

LETTER XI.

The Varieties in Men adventitious—Original Colour of Man—Temperaments—Diversity in Men more influenced by Moral than Physical Agency—Climate has very limited effects—

the Identity of Mankind proved by the evidence of Scripture 241—260

LETTER XII.

The *Human Mind*, its Faculties enumerated and defined—Knowledge not instinctive—Perception—Sensation—Association—Imagination—Memory 261—284

LETTER XIII.

Understanding—Acquisition of Knowledge—Language—the Passions, and their Effects 285—304

LETTER XIV.

Review of the leading events, that occurring in the history of Mankind, have gradually developed the Faculties of the Human Mind—Language—Writing—Printing—Christianity—Commerce 305—324

LETTER XV.

The Magnet—Discovery of America—Gunpowder and the Modern Art of War—Religion—Reformation—the Feudal Institutions 325—354

LETTER XVI.

General Remarks on the Human Structure and Condition—Progressive Course of Human Existence—the Immortality of the Soul—Christian Morals—Conclusion 355—378

REMARKS

ON THE PHYSICAL AND MORAL

HISTORY OF THE HUMAN SPECIES.

LETTER I.

DEAR FRIEND,

THE love of science, and the pursuit of knowledge, which so peculiarly characterize your mind, induce me to present you with a few scattered remarks on a subject you have hitherto not much explored. Your researches have generally been directed to the material system, or the laws of inanimate matter ; allow me now to solicit your attention a little nearer home, to the nature of our own structure and condition in the universe. “ Know thyself,” is a maxim that has been handed down to us from the sages of antiquity, and dwelt upon with peculiar emphasis by the philosophers of all schools, both ancient and modern. All knowledge should begin with ourselves ; an enquiry into our own

nature and attributes, both physical and moral, constitutes the most important subject of human research, and establishes upon a certain basis the axiom of the poet, that “the proper study of mankind is man.” Man has been placed by his Creator above all the species of animated nature. We shall find, in the course of this enquiry, that although some kinds may possess many powers and faculties, equal, if not superior to him, He is endowed with one, which gives him the majesty of the Earth, and the dominion over all; the god-like attribute of mind. Any comparative deficiency in the senses, is amply compensated by the powers of thinking; any paucity of instinct, by the light of understanding; and any defect of muscular strength, by the perfection of reason. The Mind of Man is an attribute, standing alone in the sublunary creation. The approaches towards reason, in some animals, though seemingly near, are for ever separate; a wide chasm exists between the faculties of the most perfect animals, and the intellectual capacity of Man. The perfection of this function, constitutes him, perhaps, a sort of link between animal and spiritual existence, and in some degree a faint mirror of the Being who made him. In the contemplation of human nature, we are not to consider Man detached from the universe in which he is placed—we are

not to look upon him as a separate and isolated being, but must view him in a relative light, both as to his nature and situation : as to his nature, as the companion of other animals—as to his situation, as the principal inhabitant of this globe. It will serve much to illustrate the general observations I have to make on the nature of Man, to take a short survey of the Earth on which he dwells, the elements by which he is surrounded, and also the other forms of animated beings, appointed to be his associates.

This Earth, then, the great Theatre upon which the grand drama of Man is destined to be performed, is, as you well know, a sphere, revolving in ample space upon its own axis, and obliquely to its orbit round the sun. It is situate in a sort of middle rank among several other similar globes, that at different periods, and with different velocities, accompany it round the sun as a common centre. The number of these globes, both primary and secondary, which, according to modern discoveries, amount to twenty-eight, constitute the solar system. These are situate at various distances, and move in a certain ratio to their distances and densities. The powers of human art have extended to these immense regions, and Man has, by the light of science, ventured to measure orbs and spaces, which at length involve him in wonder and

astonishment. It has been calculated that Mercury, the nearest of these bodies to the Sun, is distant from the centre of that luminary about thirty-seven millions of miles, and revolves round him in about eighty-four days; while the Georgium Sidus is removed to the astonishing distance of eighteen hundred millions of miles, and takes eighty-four years to accomplish its revolution. The Earth is placed about ninety-five millions of miles distant, and completes his annual course in three hundred and sixty-five days and a fraction. A certain property, called attraction, inherent in the matter which makes up these bodies, keeps them in their orbits, and chains them to the Sun, as the central point of all their movements. The Sun itself is an immense body, computed by mathematicians to be above eight hundred thousand miles in diameter. Various opinions have been entertained concerning its component matter: Sir Isaac Newton and his followers suppose it to be a ball of fire; others have supposed it to consist of light alone, considering light and fire as two distinct elements; while others conceive it formed of such materials, as fit it for the abode of rational and intelligent beings. On the supposition of its being an uninhabited ball of fire, Buffon ingeniously supposed, that the Earth, and perhaps all the planetary bodies, originated from it; he

imagined that the impinging of a comet on the Sun's surface in an oblique direction, struck off a certain portion of that surface, corresponding with the weight and momentum of the falling Comet, which portion flew off at an equal angle, and acquired a projective force, in addition to the attractive powers inherent in it. Such a body would naturally revolve on its axis, and before it acquired any considerable density, would have taken from its motions a spherical form. This hypothesis has been but lightly treated by many subsequent writers; to be well understood, however, it must be read in the elegant language of its accomplished author. Many theories, more repugnant to nature, and doing more violence to reason, have met with a better reception from the learned. I see nothing so much out of proportion in the supposition, that secondary bodies, inferior in magnitude, moving round a larger as a common centre, deriving their movements from its influence, and powerfully and incessantly attracted towards it, may be an emanation from that body, and at some period, and in some way, may have sprang from it as a common source. It seems to accord as well with the harmony and beautiful simplicity with which nature effects all her operations, as many theories that have gained possession of the schools. Whether all these bodies that accom-

pany the Earth, are, like it, worlds destined for the abode of animal existence, is an opinion now very generally taken up, and perhaps as fairly warranted by analogy as any hypothesis can be. But, of what order of beings the tenants of these planets may consist, is a conjecture that leaves us but little satisfaction. These bodies are many of them so small and so distant, as not to be visible to us without the assistance of our best glasses: is it not then reasonable to infer, that He who does nothing in vain, has created them for the abodes of intellectual existence, and the seats of rational enjoyment, as well as the globe we occupy? The idea serves manifestly to exalt our conceptions of the attributes of God, and the amazing scale of his omnipotence. Some persons have indulged their fancies, by supposing that when death terminates the career of the soul on Earth, it becomes transported to one of those orbs, and undergoes a new existence, and is progressively conducted through the different planets of the system before it attains a final state of rest in the most exalted sphere of spiritual beatitude. The active imagination of man leaves nothing untouched; when his curiosity travels upon the wings of fancy, he explores every thing; and when he reaches the narrow line that limits the sphere of his senses, he fills up the void with the liveliest

fiction his inventive genius can furnish. This opinion is not more than one remove from the Eastern doctrine of the Metempsychosis.

The Earth, and all the celestial bodies, have been constructed by nature of an orbicular form, in which we see displayed the hand of superior intelligence : a sphere is the most perfect figure ; it contains the greatest surface with the least bulk, and includes the greatest variety with the most beautiful simplicity : it is that form of all others, best adapted to facilitate the rapid movements of these bodies in their orbits. The small deviation from the perfect sphere, which the Earth has from its velocity taken on, is so trifling, as to form no objection to the above : it probably acquired this oblate form, in the infancy of its movements, before the fluid matter of which it was then composed, had settled down, and attained that density we may suppose it afterwards acquired. The Centrifugal tendency of its equatorial motion being so great, compared with the Centripetal movement about the Poles, that part would necessarily take on a broad form, and in a small degree distort the beautiful figure of a sphere. The genius of man was, perhaps, never more conspicuous, than in the discovery of this phenomenon. Sir Isaac Newton, in his closet, from a chain of mathematical reasoning, pretty accurately deduced the quantum of this

deviation, and estimated the increase of this protuberance, till the equatorial diameter should be to the polar as 230 to 229. It was found on subsequent mensuration of degrees, in different latitudes, that the diameter of the equator exceeds that at the Poles by about thirty-five miles. This oblate form is most conspicuous in the planet Jupiter, where, from the immense velocity of its diurnal rotation, the equatorial diameter is so much extended, as to be obvious to the sight. It is not only in distance and situation that our globe holds a middle course; it also takes an intermediate rank with respect to magnitude; it neither approaches the great volume of Jupiter, nor descends to the diminished figure of either of the last discovered planets. It is about twenty-five thousand miles in circumference, which according to the rules of geometrical measurement, give a square surface of nearly two hundred millions of miles.

This astonishing expanse, then, forms the grand theatre of the history of man; it is on this ample surface he is destined to continue his measured portion of time; his powers and faculties are regularly organized to become its inhabitant: nature has wonderfully created in him an aptitude to enjoy his existence here, and adapted the earth to be the seat of that enjoyment. In setting down to contemplate the sur-

face of the globe, we are very apt at first view to be led away with an appearance of every thing being in a state of chaos and irregularity ; we are apt to suppose the broken, uneven forms of the different parts, the irregular boundaries of the water, the uneven tables of the land, to be the results of accident and chance, and destitute of design ; but the closer we inspect this branch of nature, like every other, we perceive new beauties at every step present themselves to our sight ; we see the hand of supreme intelligence, and a regular system of order and symmetry, arise from materials that seemed at first but confusion and disorder. It exhibits to us a scene of the most unbounded variety, blended with the most perfect uniformity and simplicity ; the harmony of all its parts, and their fitness for the final purposes of their creation, become legible, in strong characters, to the enquiring mind.—The first thing which strikes us is the division into land and water. The ocean forms, perhaps, two-thirds of this great surface ; indeed it makes almost the whole southern hemisphere, and by two spacious branches, the Pacific and Atlantic, keeps a watery communication between both Poles. Some have calculated the average depth of the ocean at ten miles, others have made it less ; but this is involved in much obscurity, and cannot be supposed very accurate. We

find this huge mass of waters impelled with a certain movement, dependant, perhaps, on planetary influence. The phenomena of the tides, and the Newtonian theory of their explication, you are well acquainted with. The regular flux and reflux of the sea, is one of the most striking appearances we meet with in nature; although it may be said to be a general occurrence, yet it seems to admit of numerous exceptions, that somewhat impeach its universality. In the Mediterranean there are no tides: this may be explained from the immense evaporation which issues from its surface, occasioned by the great heat of the winds, which proceed from the parched African soil. Dr. Halley has estimated the quantity that may be carried up in vapour from this sea, and supposes it sufficient to supply Europe with most of its rain, and to expend that volume of water that enters by the current of Gibraltar, and the various rivers that run into this immense gulph.

The Baltic is another exception; but here, from its high latitude, evaporation cannot prevail, and a number of rivers running into it, a current consequently sets out of it into the German ocean. In the West Indies very little tide is also observable, for that general flux of the ocean, from the east towards the west, which, like a trade wind, accompanies the course of

the sun over the earth, causes a perpetual influx of water into the gulph of Mexico, which accumulating upon its shores, occasions, as we are told, a greater elevation of the water on the east than there is on the west side of the Isthmus of Darien. This superfluous water reflected from the shores, finds its way out, through the Straights of Bahama with a rapid course, takes the name of the Gulph stream, and is perceptible both in course and temperature in high latitudes. The Sea is the grand source of all the clouds, that descending, fertilize the earth, and render it subservient to animal and vegetable growth; its saline particles being too dense, do not ascend; all the particles, carried up in vapour, are fresh. The source of the salt in the sea-water has given rise to much discussion among the learned; some have supposed it impregnated with this mineral from the beginning, while others have thought it was originally fresh, but had acquired all its salt from salt rocks at the bottom, and from the washings of the rivers into it; so that it must have been continually increasing in saltness, and thus the age of the world might be supposed to bear some reference to the quantity of saline matter in the ocean.

The multifarious windings of the shores of the sea, the numerous indentations and inter-sections of its coasts, have had a most material

influence on the moral and political history of mankind: it would seem that a facility of procuring an useful article of food, would very early in the progress of society have led many tribes to take up their residence on the seashore; and while other companies took to the forest and plains, and procured a hard-earned subsistence from the fatigues and dangers of the chase, these attached themselves chiefly to the boisterous element, and led a more tranquil course. Thus the original stock divided themselves into hunters and fishermen. It is one of the most amusing themes in history, to trace the subsequent progress, towards civilization, in these two different classes of men. The hunters spread themselves into the interior; as their numbers increased, they divided, subdivided, and split into different flocks, each of which, under a patriarchal leader, travelled from hill to hill, and from plain to plain, according as the face of nature afforded them convenience. These different tribes elongated at length from the parent source, and cut off, by the extent of desart, from future correspondence, built by degrees such systems of polity, as naturally grew out of the peculiar modes and manners, imbibed from their ancestors at first starting; whence a great uniformity among the families scattered over the continent; accident, locality, climate,

&c. might in time create some diversity ; but the general features of such states, must be uniformity and permanency ; and this history tells us. The nations of Asia originated in migratory bands of hunters, carrying from their native source, the same manners, customs, and prejudices : left afterwards to themselves, every thing took deep root ; tradition held for ages its sway over multitudes ; Idolatry, Parental authority, tyranny established themselves upon a lasting basis, and scattered nations owned a close fraternity. Observe the similarity between the ancient and modern Tartars, spread over the extensive continent of Asia, and these observations become self-evident. Each nation becoming, in a manner, isolated, they enjoyed not the advantages of mutual improvements. Nothing reciprocated, they met in war only to deluge the plains with blood, and in peace their jealousy united them only at a tangent point. This want of intercourse retarded all progress and improvements ; the same physical characters marked them, they bore the stamp of identical origin, and continued for ages at the same mark in the scale of social advancement. Let us now cast a glance at the other division, those tribes whom we left dragging a subsistence from the watery element : far different has been the progress and the destiny of these hardy fishermen ; they gra-

dually obtained a sort of mastery of the water, and by degrees began to brave the storms and the waves, they

“ Learn’d of the little Nautilus to sail,
Spread the thin oar, and catch the driving gale ;”

they wafted themselves from point to point—they explored all the windings and recesses of the coast—settled where circumstances seemed to invite, and transported the products of one district, to feed and maintain the natives of another: this barter begat friendships, and mutual interchanges of all civil benefits, besides articles of trade: whatever advantages in civilization, whatever discoveries became known in one country, were, ere long, diffused through the rest: profiting by each others labours and experience, they attained arts, and made a rapid progress in all that serves to adorn the human condition on Earth. The Phenician ships, from the shores of the Levant, carried the first specimens of civilization, along the shores of the Mediterranean. The science of the Egyptians was transported to Greece, from whence it coasted to Sicily, Rome, Carthage, Gaul, and Spain: thus the Mediterranean has alone so much influenced the character of all Europe, that it has been called “ the medium and propagator of all

the cultivation of antiquity and the middle age.” the Baltic, though situate in a severe climate, and possessed by ruder hands, has followed distantly in the same track, and Europe has outshone all the other quarters in arts and policy, less from any other circumstance than from the multiform intersections of its shores, the physical outline of its form.

If we now turn our attention to the solid parts of the Earth, we perceive infinite variety branching out of unity of plan. We see chains of elevated mountains, some giving vent at their summits to subterraneous fires, and most of them capped with eternal snows; we see corresponding vallies, where nature pours out her abundance, and Man, and all animated beings, serenely enjoy the blessings of Providence; extensive plains, where harmless flocks enjoy a placid and sportive existence; impenetrable forests and marshes, where various orders of organized beings fulfil the purposes of creation, and “Hymn their equal God;” rich vallies, barren hills, burning sands, thick woods, and deep marshes, with rivers and lakes interspersed, make up the surface of this revolving ball.

The temperature of this globe is almost as diversified as the soil and form of its surface. About the central regions, we find the fervid sun-beams scorching the earth, and rendering

many parts scarcely habitable. A broad belt, extending one thousand six hundred miles on each side of the equator, being the boundaries of a vertical Sun, has been designated the Torrid zone, and is the great hot-house of nature, where every thing is forced into early and full maturity. Extending from this belt to within the above distance from the poles, the space takes the name of the Temperate zone: this is chiefly the province of Man; it is here he has attained that perfection which the superior organization of his fabric is calculated to produce; here he first originated, and here he finds the medium best adapted for the display of his active faculties: genius, liberty, and reason, are the children of this quarter: the human mind, overcome by effeminacy in the warm regions, sinks beneath the rod of power, and degenerates into slavery and superstition: the Temperate zone has ever been the nursery of science and independence; the love of freedom has been fostered here, and Man has shone forth, vested in the true dignity of his nature. The Frigid zone, comprising a circle of more than three thousand miles diameter, at each extremity of the Earth, are wrapped in almost continued winter, and afford a dreary abode to a few children of necessity. A solid cupola of ice, that has been increasing for ages, caps each extreme, huge masses of which some-

times become detached, and float down into the temperate seas, to the danger of the astonished mariner. These masses of ice, although the ocean, of which they form a part, is highly impregnated with salt, are always found fresh, and sometimes afford relief to the thirsty and distressed seaman. The specific gravity of ice is less than water; hence, when detached, it always swims, and is capable of sustaining considerable weights: this circumstance has been considered, by some geologists, sufficient to explain the situation of many insulated granite rocks that appear on different parts of the coast, which may have been floated there by masses of ice, with which they have been entangled.—“ In the year 1796, the body of a large elephant was detached from a mass of ice, in which it must have remained some thousand years. The flesh was undecayed; besides the coarse hair on the skin, there was a fine down, or wool, underneath, proving, incontestibly, that it was a native of northern climates, and belonging to a race now extinct.”

The causes of the diversity of surface, the nature of the physical agency, which produced such variety on Earth, has been a source of inquiry and discussion among the learned in all ages. The powerful operations of nature's most active elements have been resorted to in explanation,

and at present the world seems divided between two opposite sects ; the one arguing that water has been the great medium of all this diversity and change ; the other contending for the empire of fire. At the head of the former sect we find Werner, a German philosopher of great science and industry ; as the leader of the latter, stands our very learned countryman, Dr. Hutton. The former theory assumes, that at some period all the parts of the earth were in a state of aqueous solution ; that by a chemical process, a precipitation of chrystalline matter was formed, and thus a thick coat of granite, which laid a permanent foundation for the other secondary and stratified rocks, that became successively separated from the general solvent ; the other parts on the top were of light materials, earthy, and made up of fragments of the lower rocks. Thus was laid stratum super stratum, all round the globe, those different layers of rocks, which envelope it something like the coats of an onion. The irregularities were supposed to spring from the inequalities of the Earth's nucleus. It has been objected to this theory, that the observations of naturalists prove, that rocks do not lay in this regularity of succession ; consequently these formations are not universal ; and also that many rocks of great magnitude and peculiar character are evidently of partial and local for-

mation, such as basalt, porphyry, &c. The theory of the Plutonists supposes that every thing on the surface was melted by the action of subterraneous heat ; that as this cooled, rocks were deposited from this state of fusion in the chrystalline form we find them ; that mountains were thrown up by subterraneous explosions, and that central fire has been the grand agent of forming all the ground we tread on. These two theories are warmly advocated by their respective partizans ; if I dared offer any opinion of my own on this great controversy, it would be towards effecting a compromise between both opinions. There appear to me phenomena enough, that may obviously be attributed to both elements ; the action of volcanoes, and the peculiar matter emitted from them ; the evidently igneous origin of basalt, and some other rocks ; the appearances of new islands at different periods, of which that called Sabrina, near the Azores, was a recent instance, sufficiently demonstrate the action of fire ; and the changes apparent on the surface of the whole continents, with appearances in many mineral specimens, prove that water has been a very industrious agent on this globe. I think both elements must be allowed their share in the general agency of nature, and that neither is alone sufficient to establish a rational and satisfactory system of

geology. Many have supposed the Earth a hollow sphere: Dr. Halley imagined it contained a large magnetic mass, which, from its various positions, occasioned by the Earth's movements, caused the variation of the magnetic needle. Some experiments, however, which have been made with a view of ascertaining the mean density of the Earth, lead to the inference, that it must be solid; its mean density is calculated at nearly five to one compared with water, which is almost double the density of most of the rocks found on its surface. There are two or three striking circumstances in the history of the Earth, which I believe most geologists seem agreed on; the first is, that at some distant period the whole of the surface of this globe has been under water: the observations that have been made in different parts of the world attest this beyond a possibility of doubt. In various parts of our own island this is conspicuous: on the summits of the hills of Yorkshire and Derbyshire, at an elevation of 600 yards above the level of the sea, the fossile remains of shell-fish and marine animals are discovered in some quantities. Distinct beds of different shells are found, and the extent and position of these distinct tribes, prove they must have been in existence ages before the great revolution, that elevated and estranged them

from their native element. At Mount Perdu, one of the Pyrennees, situate about 300 yards above the sea, a prodigious number of marine productions and fossile bones of aquatic animals are discovered.

The Alps furnish the same facts, as well as the Andes, in South America, which, at an elevation of near five thousand yards, exhibit the vestiges of the tenants of the deep. So general, indeed, are these fossile remains found in calcareous soils, that many chemists are disposed to consider all the limestone, chalk, and calcareous matter to be met with, as of animal origin, and as pillars of the remains of organized beings: indeed the opinion derives some colouring, from observations made in the southern ocean, where rocks, formed by the coral insects, and other lithophyte animals, have laid, and are continuing to lay, calcareous foundations for large Islands, by immense masses gradually forming from the bottom of the ocean. Perhaps at some remote period, a great revolution of nature, occasioning a recession of the ocean, may unveil the dry land in those regions, a new continent be formed, and these labours of aquatic animals become pillars of chalk and limestone, equal to what we meet with in our present continent. Thus nature is never working in vain; past ages of insects may have been labouring for materials to serve future

ages of Men: the whole universe is a circle, where there is no termination, no distinctness, no independence of parts. The form of mountains, and their wave-like outline, led Buffon to suppose, that the action of the water had occasioned all the hills, and the unevenness we meet ~~on the globe~~. He has gone into a long series of observations on this subject, which, like all his other writings, should be attentively read by every admirer of nature. The next circumstance in which geologists are agreed is, that many species of animals, formerly existing on the earth, are now certainly extinct. The mammoth of America; the mastodon; the great northern elephant; some species of the bradypus, and many varieties of shell-fish are now no more, and only attest their former existence, by their fossile bones or shells. Many bones of a form not referable to any animals existing at present, have also been discovered. These facts carry our imaginations back to a very remote period, and easily lead us to place faith in the next circumstance, agreed on by geologists, that these animals existed on the globe long before man became its tenant. Mr. Parkinson, in his excellent work, has treated this subject with great talent and precision. The different depths at which those animals have been found, compared to the depths below which no human

bones are found, combined with a train of other circumstances, seem to establish the fact, that another system of things, prior to man, existed on this globe ; that he was the last tenant, and that every thing in reference to him is of recent condition, compared to the age of our planet. Cuvier, the celebrated French anatomist, to whom I shall often have occasion to refer you, has from his labours thrown much light on this subject, and amply demonstrated the great influence the sciences of zoology and geology have upon each other, and that they are in fact mutual exponents. In taking a survey of both hemispheres, we find in Asia a huge ridge, or spine of earth, stretching across, from which the territories of the Tartar tribes extend, as a great inclined plane, towards the coast. On the southern side of this spine, man commenced his earthly career ; here in a garden his natural powers first developed themselves ; the foundation of human society was planted in this spot ; on the northern side of this chain of hills, over an immense compass of ground, for ages wandered the Scythians, and for ages since their half civilized descendants, the Tartar hordes. Civilization sprang up rapidly on the coast, India, Egypt, flourished, and across the Levant transmitted their offspring to the kindred soil of Greece, where the sciences took up their abode.

Europe, as I have before observed, from its intersected outline, imbibed every thing that Greece presented. On the bosom of the Mediterranean all the arts that embellish life, were wafted along the various shores of its extended coast. Africa, on the contrary, an impenetrable tract, impervious almost to physical means, degenerated into barbarism; its extensive sands, and thick forests, bid defiance to the arts and embellishments of life, and its rude inhabitants stood still in the growth of humanity. The discoverers of the new world found an immense theatre, abounding in gigantic features of physical outline, “where man seemed the only growth that dwindled.” Mountains lifted their awful summits as if in converse with the skies, while extending lakes, and rapid rivers, rolled their lengthened courses through different climates, till they mixed with the ocean. Of America I shall have occasion to speak hereafter. In the mean time I remain, Dear Friend,

Your's, &c.

L. S. B.

LETTER II.

DEAR FRIEND,

IN my last letter I solicited your attention to a few remarks on the general form and outline of the globe ; it becomes necessary now to make a few observations on that fluid medium in which it is involved—the Atmosphere. From the days of Aristotle till the era of modern philosophy, the idea prevailed universally that air was an element, that it was one of four substances that entered into the composition of all bodies, and constituted their fabric. Its other three colleagues were Fire, Earth, and Water. According as either of these were supposed to predominate, the body was supposed to assume its peculiar character : no doctrine ever maintained its empire longer than this ; it stood firmly entrenched for ages. The discoveries of modern chemistry have now completely superseded a theory which was not built on the solid rock of experiment and observation, but erected on the loose soil of speculation and conjecture. It appears there are a variety of airs or gases ; that air is only one of the three forms under which all matter exists, according to the quan-

tity of heat or fire with which it may happen to be combined. There are three forms then under which all bodies in nature are found, *viz.* solidity, fluidity, and a state of vapour: the cohesion of the particles of bodies is incessantly promoted by that principle inherent in them, called attraction. An endless multiplicity of experiments confirm the fact, that fire or heat is the grand opposing principle to attraction, its invariable tendency being to separate and destroy the cohesion of the particles. When the quantity of heat in any body is so limited that the natural attraction of the particles is not overcome, they remain in contact, and we call the body solid; when the quantity of heat is so far increased as to separate, to a certain degree, the parts, so that they are capable of moving easily one over another, the body becomes fluid; and when the heat is so far augmented, that the parts are propelled to a certain distance, and form an elastic expansion, the body is said to be in a state of air or vapour. These then are the three natural forms of all bodies, which forms are dependant on the quantity of fire contained in them: this may be rendered familiar to every one by the changes that take place in water by increase of temperature. Thus ice is the natural state of water, and, from containing but little heat, remains solid; raise the degree of heat, it melts and be-

comes water,—still go on increasing the heat, and it takes up the form of steam or elastic vapour. Ice, water, and steam, then, become progressively evolved, as you elevate the temperature. Such is the case with all bodies in nature; according to the quantum of fire they specifically contain, they are either solid, fluid, or aeriform. It is presumed the hardest bodies in nature might be converted into gas, if we could apply a sufficient elevation of temperature. Sir James Hall has succeeded in fusing marble and common coal. Different bodies combine with different portions of this active element, and the portion necessary to raise a body to any given temperature is called the specific caloric of that body. This specific caloric in bodies is measured by that instrument in common use, the thermometer. It is a tube containing a fluid (either quicksilver or spirits of wine are most generally employed) hermetically sealed, and attached to a scale of degrees, which mark the expansion of the fluid in the tube according to the temperature of the body to be examined. When the thermometer, therefore, is applied to any body, the mercury contracts or expands till it acquires the temperature of the body itself. Fire, then, we see, is a very powerful and extensive agent in nature; it may be considered as the author of the various forms of bodies, and the antagonist to the uni-

versal principle of attraction. The continued reciprocation of these opposing agencies, creates all the movements and changes we meet with in the universe : the one is for closely uniting all the parts of bodies, and rendering them quiescent, while the other is in perpetual endeavour to separate, and throw them into distance and motion ; thus, as the poet says, “ *all subsists by elemental strife.* ” Different opinions have been entertained concerning the essence of Fire ; some contending it is a fluid substance, so subtle as to penetrate all bodies, while others have contended that it is not a substance but a mode, a peculiar movement in the minute particles of substances. I shall not attempt to go into the merits of this controversy ; the new chemistry ranks it as a substance, and classes it in the list of simple elements. We perceive, then, the combination of a certain portion of caloric is capable of altering the forms of every body in nature, and making them take on the state of air or vapour, different bodies requiring different quantities of this element to effect this change. The atmosphere which surrounds this globe is composed of such materials, as from their peculiar nature take on the æriform state at the common temperature of the earth. We shall find this elastic fluid, without which neither animal nor vegetable existence could continue,

is not a simple elementary substance, but is compounded principally of three particular Gases, which uniting in certain fixed proportions, present to us an apparently uniform substance. Chemical analysis resolves atmospheric air into two different gases, to which a third, in small proportion, may also be added; these are Oxygen, Nitrogen, and Carbonic acid gases. To these three different airs let me now for a few moments solicit your attention. Oxygen, or Vital air, is one of the most useful and important elements in the creation, and one with which the world has been but recently made acquainted; it is called Vital air, because it is the grand pabulum of animal life, without which respiration, in the higher classes of animals, cannot even for a few moments be carried on: it forms the basis of all acids, enters largely into the composition of water, is the cause of the combustion of bodies, and ministers to most of the changes which take place in the different kingdoms of nature: thus we find it makes up a considerable portion of the atmosphere and the ocean. Water is composed of oxygen, united with another element termed hydrogen, in the proportion of 85 parts of the former to 15 of the latter in every hundred. The atmosphere is composed of 22 parts of this gas united to 77 parts of nitrogen with one of carbonic acid gas:

it enters into combination with solids, and forms a large part of many earths and metallic ores. So constantly and essentially is it necessary to human life, that our breathing could not be continued for the shortest space of time without it. If the air we breathe is deprived of it, or has its relative quantity diminished, suffocation must inevitably ensue. It produces most important changes in the blood, in its passage through the lungs, renovating its lost qualities, and stimulating it to fresh action and life. It was the exhaustion of this gas, by the respiration of numbers, in the air of the Black Hole at Calcutta, that occasioned the suffocation of those unfortunate people. Large congregations of persons become unwholesome from the abstraction of this gas, and towns and cities owe much of their insalubrity to the diminished proportion of this necessary ingredient in the atmosphere. It forms one of the requisite parts of the vegetable economy; plants imbibe and exhale it again in large quantities in the day-time; whence the country is the great field of oxygen: the vegetable world is constantly excreting it, and the air becomes charged with its full quantity. It has been supposed that vegetables have not the same dependency upon oxygen with animals, but that nitrogen and carbon form the basis of the airs which they imbibe, and thence that the

principle which forms vegetable, is opposite to that, which seems to constitute the pabulum of animal life. Another distinguishing property of oxygen, and from which it derives its name, is, that it forms the basis of all acids—they all contain this substance as their general radical, varying only in appearance according to the different matters with which it may be combined. Water is, as I said before, composed of oxygen, in the ratio of 85 to 15 of its other ingredient. Thus the ocean, as well as the atmosphere, are chiefly formed of this great agent. It is also the foundation of the combustion of burning bodies. If any portion of air is deprived of its oxygen, it can no longer support flame, and all lights in it become soon extinguished. A candle placed under a glass receiver, is observed soon to burn dim, and gradually ceases burning altogether: this is because it consumes all the oxygen gas in the receiver, and the remaining air does not possess the power of maintaining the combustion. Oxygen combines with earth and metals, and forms various ores, which it is the business of chemistry to separate and reduce to pure metals. Even the Alcalies seem, by the discoveries of Sir Humphrey Davey, to be combinations of this prevailing element, with peculiar metallic bases. These are some of the leading properties of oxygen, by which we perceive how necessary

and important it is to animal life. We shall find the other great constituent of the atmosphere, Nitrogen Gas, possessing qualities to the direct negative of the former ; it is incapable itself of sustaining animal life, or combustion, for the shortest space of time ; it enters largely into the solid composition of many bodies ; in the atmosphere it seems of use in neutralizing and temporizing the oxygen, which alone would prove too highly stimulating to the blood in the lungs ; it is of less specific gravity than oxygen, and when disengaged in breathing, rises at every expiration to the upper regions of the atmosphere. The third air, which enters in the very small proportion of one part in a hundred, is Carbonic Acid Gas, or fixed air, which is heavy, and unfit for combustion or respiration. It is found in many caverns and mines, and is well known to the workmen under the name of Choke Damp ; it is given out abundantly by all bodies in a state of fermentation, and is met with in close cellars and wells, where it often proves destructive to the incautious, who have occasion to go down to such places, by producing instantaneous suffocation. In its solid state, it enters the composition of both animals, vegetables, and minerals ; it may be separated from chalk and marble, is found in most vegetable products, and forms a portion of animal matter. These, then,

are the ingredients which make up the composition of our atmosphere; the one portion is respirable, and calculated to support flame and animal life—the other is totally unable to produce these effects; when, however, they are both mixed in due proportion, they contribute to the health, the comfort, and the existence of man and animated beings.

Having made these allusions to the Chemical qualities of the air, we come now to consider its Mechanical nature. The air is a transparent fluid, possessing like all other bodies gravity, and is moreover highly elastic. If a bladder half full of air is placed under the receiver of the air pump, or carried up to any height in the atmosphere, it gradually expands and fills up; it is consequently susceptible of being much condensed in compass, and when the compressing cause is removed, it recovers its former volume by its expansibility. Heat has the power of expanding it, and cold on the contrary condenses it. It is this rapid expansibility of air which produces the wonderful effects of gunpowder; which is composed of nitre, sulphur, and charcoal, in certain proportions; materials that contain within themselves great quantities of air. When these are ignited by the spark or the match, a sudden developement of this air is produced, which expands with immense force,

till it occupies a thousand times the space of the gunpowder employed; the elastic force of this air suddenly and violently endeavouring to recover the above space, gives the ball its propulsive force, or splits asunder the solid rock, that cannot withstand such irresistible power. This powder has been a powerful engine of destruction in the hands of man, but has perhaps had a beneficial tendency upon the whole, as I shall have occasion to remark in a future letter. This property of expansibility is often employed in our machinery, as in air guns, forcing pumps, &c. The pressure of the air, or its gravity, is a quality it possesses in common with other bodies. The whole mass of the atmosphere is attracted towards the centre gravity of the earth: like every other body attached to it, it evidently therefore belongs to, and forms an appendage to our globe. Its pressure is pretty correctly ascertained to be at about 15 lbs. upon every square inch of the earth's surface. The density of the air is however liable to continued fluctuation, as the barometer clearly demonstrates.

The weight of the atmosphere is subservient to many useful purposes in life. Man, who has been created in the midst of surrounding elements, employs them all to minister to his wants and necessities, and applies them according to the intention of his Great Maker, who has

assigned him their use, and with whom “to enjoy is to obey.” The raising of water in a common pump is owing to the pressure of the air on the water in the well below, which forces the water up the tube of the pump, in proportion as the ascent and descent of the piston effects the exhaustion of the tube. The Ancients had a very imperfect knowledge of the cause of the elevation of the water in a common pump; they attributed it to a certain abhorrence which nature had to a vacuum, by which, as the piston ascended, the water immediately rushed forward to prevent this much-dreaded vacuum. In the 17th century, a pump was constructed at Florence, by which it was intended to raise water from a well, to a very considerable eminence; it was found, however, that no exertion of this pump could at all raise the water above 33 feet from the level of the water in the well; the cause of this unexpected obstacle puzzled the makers very much, but Galileo soon discovered that the pressure of the air on the water below must cause the ascent of the water in the pump, and that when it rose to the height of 33 feet, it became equivalent to the pressure of the air, and could not be lifted further. A column of water, therefore, of 33 feet in height, is thus found to balance a column of air of the height of the atmosphere: no suck-

ing pump can lift water, then, above 33 feet. I said above, that the pressure of the air was at the Earth's surface about 15 pounds upon every square inch, at a mean. Now, the human body contains about 14 square feet, consequently it is exposed to the astonishing average pressure of more than 14 tons: the amount of this pressure often varies considerably from the fluctuation in the density of the air, as ascertained by the range of the mercury in the barometer. The changes which take place in the weather cannot, therefore, fail of having considerable influence on the state and condition of our health and feelings. We are sometimes, in the course of a few hours, exposed to a change of several hundred weight, in the degree of this pressure. It need not be at all a matter of astonishment, that the body is capable of sustaining this immense weight, it being a law in hydrostatics, that the pressure of a fluid is equal in every direction at the same level, consequently the pressure upwards, downwards, and sideways, is at all times alike: this great pressure of air prevents the evaporation of bodies at low temperatures. Sir George Shuckburgh ascertained, that water boiled at different degrees of temperature, proportioned to the weight of the superincumbent atmosphere. Lavoisier made some interesting experiments on this subject,

by which he clearly deduced, that evaporation was held under controul by atmospheric pressure, and that boiling water, in consequence, did not cool so fast, (owing to the comparative greater density of the air,) in winter, as it did in summer. This celebrated Chemist has made some speculations upon the supposed changes that would take place in our atmosphere, were it exposed to any considerable alteration of climate; as if it were suddenly carried to the orbit of the planet Mercury, where, he conjectures, the common temperature might be beyond that of boiling water, the water and other fluids on the surface would become rarefied, and converted into steam: even quicksilver might become aeriform, many solids would become fluid, and a new series of affinities and combinations would be developed, and afford a complete new order of things. The pressure of the atmosphere, however, he calculates, would at length tend to check this extensive evaporation, and in the end serve to balance it: if, on the other hand, our planet was transported to the orbit of Saturn, the water of the ocean might be converted into a solid block of ice, “at first diaphanous and homogeneous, like rock chrystal; but in time becoming mixed with foreign substances, would become opake stones of various colours. The atmosphere might be partly condensed into a

fluid, and new liquids be produced, of whose properties we cannot form the most distant idea." This pressure, or weight of the atmosphere, is, in general, estimated by that well-known instrument the barometer, which is a tube hermetically sealed at top, exhausted of its air, and filled with mercury by the open end, and inverted in a vessel of the same, which then sinks a little from the bottom of the tube, thus indicating the degree of pressure on the surface of the mercury in the vessel below. The range of the mercury, in the upper portion of the tube, is marked by a graduated scale, and in this climate is found to fluctuate between 28 and 31 inches; but, in the neighbourhood of the Equator, this range is very inconsiderable, so as to admit of very little variety, whatever may be the state of the weather. The height of the atmosphere it is somewhat difficult exactly to calculate, it not being a fluid of uniform density: it has been, however, estimated, from some observations made on its refractive power, to be somewhere about 45 miles; the density of the air will, of course, vary considerably at different points of altitude: the degree of density, at any level, will be as the compressing force—consequently its height may be supposed to be indefinitely extended: its rarity, as you ascend, decreases in a geometrical progression, so that,

at the height of three miles and a half, it is twice rarer than it is at the surface of the Earth ; and, if you ascend twice that space or 7 miles, the decrease being in the geometrical series, will be four times as rare as at the surface. The figure, or outline of the atmosphere must incline, to take on the form of the globe which it envelopes, partly from the same cause, (the centrifugal action,) that excited the Earth to take on the spheroidical form ; but more particularly from the greater rarefaction of the air near the Equator, by the sun's influence—consequently it is higher over the Equator, and gradually decreases in altitude, so as to form an inclined plane towards each Pole. This elastic ocean then, which, composed of a mixture of dissimilar gases, united in certain proportions, and containing an assemblage of all the volatile parts, of the different species of matter to be met with on the Earth's surface, as well mineral as vegetable, and animal, is the great medium in which Man and his associates are placed by the Creator, and from which they are incessantly obliged to drink continued draughts of the living stream ; excluded from its balmy influence but a few moments, the breath of life is irrecoverably gone ; it forms a compressing envelope, that braces and keeps together the parts of the frame : by its transparency and its refractive

power, it is adapted to the transmission of light, and enables Man to enjoy the benefits of another element: by its movements, it wafts him across the trackless expanse of the ocean, and in a variety of ways contributes to his wants, his conveniences, and his luxuries: it however is, from the various alterations in texture and quality to which it is liable, the agent of producing great impressions on the character and condition of animal bodies. When we consider that in our climate, the variation of its pressure amounts to the astonishing difference of a ton and a half, we cannot deny it great effects on our bodies; when we feel it at one time surcharged with heat, and again almost condensed with cold; at one time replete with particles of dense vapour, and at other times destitute of apparent moisture; sometimes manifesting its power in the frantic tornado, at another period lulling us by its soothing stillness; we must allow it a very important share in the active energies of physical agency.

The density of this fluid is, as I have said before, least at the Equator, and greatest at the Poles. As the heat in the Torrid Zone never differs much, very little difference consequently takes place in the density and height of the atmosphere there, which explains the cause of the trifling range of the barometer in that part of

the globe ; but, as we increase in latitude, the temperature becomes more various, the density increases, and in consequence the barometer takes a wider range ; so that, it is found at Calcutta to be but three-fourths of an inch, whereas at Petersburg it is three inches and three-fourths. The mean height of the barometer, at the level of the sea, is thirty inches all over the globe, indicating that the pressure of the air is every where alike, being, in a certain ratio, to its density and height. It is somewhat surprising that the barometer appears to be in some degree under Lunar influence, observations having proved that the level of the mercury is liable to particular variations at particular periods of the Moon ; proving, that the atmosphere has a tendency to acquire weight, while the Moon is passing to either quarter, and *vice versa*, to lose it during the approach of either new or full Moon. The mercury also displays a tendency to rise from the morning to the evening : the range is greater in winter than in summer, owing to the greater variation of the weather. It appears that a current of air is always ascending at the Equator, which cannot accumulate above a certain degree, but must roll down the inclined plane, which the atmosphere forms, from the Equator towards the Pole.

The quantity of the air thus collected, and its various movements, occasion, perhaps, much of that diversity of climate we meet with in our hemisphere, and is the cause of that variety of winds which prevail in high latitudes. Winds are supposed to be occasioned by any cause which has a tendency to excite partial rarefactions and condensations; the heat of the Sun, Electricity, Rain, or whatever may disturb the uniformity of the air's density in any spot, causes the motion of the contiguous air, to or from that spot, and in consequence all the neighbouring atmosphere is put in motion. The progress of a storm is generally preceded by some appearance of clouds, either in the quarter from, or towards which the storm is directed. Winds most generally begin at the point towards which they blow, and have been found frequently to travel at the rate of one hundred miles an hour. Winds are either permanent or variable; of the former, the Trade Winds, which accompany the course of the sun, are most conspicuous; they blow from the east all round the globe, between the latitudes of 23° north and south of the Equator, and are caused by the rarefaction of the air, by the rays of a vertical Sun within the limits of the Tropics. The Monsoons in the Indian ocean are another species of permanent winds, which blow for nearly six months

in a northerly direction, and *vice versa* for the other half year. Various causes have been assigned for these winds, but none have proved satisfactory. The land and sea breezes met with in the Torrid Zone, are perhaps easier of explanation. In our variable climate, the winds blow from all parts of the compass: on the western coast of Europe, however, the south-west is the most prevailing. In the interior of the Continent it would appear that east winds are the most frequent. The winds, according to their direction, influence very much the temperature of the atmosphere. The north-west wind, which in winter is so predominant on the coast of North America, is productive of the greatest cold: these winds arise in high latitudes, where the mountains take a great elevation, in the vicinity of the frozen fields of the Arctic regions, and passing over an extensive tract of forest, and uncultivated land, from which it can derive but little heat, it advances to the coast, keeping its original reduced temperature. The cold is in consequence greater in the western Continent than it is in the same parallel in Europe, where the easterly wind has not the same space of uncultivated land to traverse. It is invariably found, that clearing and cultivating a tract of country, improves very much its climate. Woody countries are cold; their tall

trees shelter the earth, from the warm influence of the sun's rays ; hence the earth does not acquire any degree of warmth in summer, the surplus of which, it might return to the atmosphere in winter. Swamps and marshy lands, which abound in the desert, are capable of receiving but little heat ; the cold wind, therefore, from the Icy Zone, passing over these countries, receives from the ground but little warmth to temper its severity. As the land, however, becomes drained and cleared, the earth in summer imbibes a portion of heat, which it imparts in a degree to the cold winds in winter, and thus moderates their piercing intensity. This has been conspicuous in the progress of cultivation in America ; and in Europe, history informs us, the climate of Germany is much altered : when the Romans became acquainted with Germany, they found it replete with large forests and tracts of uncultivated land, which from their low temperature were inhabited by the Elk and the Rein-deer, animals, which in the improved condition of modern Europe, are not found at all to the south of the Baltic. The Danube often afforded an icy bridge to the contending armies, whereas at present it is never frozen over. Stony and sandy soils have a less capacity for heat than earth, whence they retain less, and occasion the scorching fervour of the African desert, and the

severe cold of Terra del Fuego. The soil and surface of a country, then, are instrumental in creating a locality of climates, independent of the latitude, or distance from the sun : Islands, and situations near the coast, are in general warmer than the interior of Continents. The ocean has the power of moderating the temperature of the wind, as it passes over it to a considerable degree, whence the air is at all times much milder at sea than in inland situations ; the reason of this is a peculiar law in the condensation of water. In general it is found, that all bodies contract in cooling ; the mercury in the thermometer descends, as the temperature decreases. Water, however, in cooling, forms a remarkable exception to this ; when it descends to forty-two degrees and a half of Fahrenheit, it has acquired its greatest density ; as it cools below this, it gradually *reexpands*, and the expansion is the same for any number of degrees above or below forty-two degrees and a half, which is the maximum of its density ; this curious fact was, I believe, originally discovered by Count Rumford ; it has however been further elucidated by Sir C. Blagden and Mr. Dalton. When, therefore, the water on the surface of the ocean is cooled by the passing winds so low as forty-two degrees and a half, the upper stratum sinks by its acquired density, a fresh stratum

of warmer fluid from beneath ascends, gives out a portion of its caloric to the air, is cooled down to the above point, descends, and makes way for fresh strata, that gradually ascend and effect the same changes. The water on the surface is therefore prevented from freezing, till the whole mass has been cooled down to forty-two degrees and a half, then the upper portion sinks to the freezing point, becomes solid, and of less specific gravity than the water underneath, by which it is in consequence buoyed up. Had not nature established this peculiar law, water would have sunk in the form of ice, the bottoms of all our seas and rivers would have been immense masses of ice, which no subsequent solar influence could have reached in sufficient force to have melted.

As we ascend in the atmosphere, the temperature decreases, and at a certain elevation we arrive at the region of perpetual congelation; this point of course is highest at the Equator, and diminishes towards the Poles, and in our latitude is about six thousand feet; so that the summits of most of our mountains are enveloped in frost. The mean temperature of the air in our climate is about fifty-two degrees of Fahrenheit.

Our atmosphere is renovated from the great waste occasioned in it, by its various mixtures with other bodies, chiefly from the water of the

ocean, which is exposed to continued decomposition ; and from the transpiration of vegetables, which copiously emit oxygen from their leaves during the day-time ; this uniting with the nitrogen given out by animals in respiration, keeps up the equilibrium of the atmospheric composition. It has been remarked, that a considerable consumption of water must have taken place on this globe since its formation : many ingenious reasonings have been made, to render it probable that marine animals and vegetables have contributed to its expenditure ; the immense masses of organized remains, that constitute the rocky bases of so many islands in the southern ocean, with the extensive depths of peat and coal, vegetable remains, every where to be found ; sufficiently prove, that a great quantity has probably been formerly reduced into part of their constitution. Thus we see nature is always pursuing a regular circle of operations, the result of consummate wisdom and foresight ; processes are going on to-day, that may hereafter lead to future revolutions in the face of Nature ; and every trifling movement, in every kingdom of the creation, is a specimen of the power and attributes of a great Supreme Cause.

The next property in the air of which I have to speak, is Sound. Sound is an undulatory motion of the particles of air arising from its elas-

ticity. When the air is exposed to any percussion, the particles moved, recede from their situation, and press the neighbouring particles into a less space; this compressed portion soon recovers its lost space, and becomes proportionately dilated; it consequently acts upon its contiguous particles, and they in like manner upon others, till a motion is produced something like a wave on the surface of water, except, that as on the surface of water, the waves are produced in concentric rings, in the atmosphere the vibrations move in all directions, in the form of a sphere. Thus we see a condensation, and expansion, of the particles of the atmosphere, alternating with each other, constitutes Sound; analogous to the motions of a pendulum. Persons are very apt to suppose that air is the only medium of sound, and that wherever air is excluded, sound cannot pass; but it is found, that all elastic bodies are capable of originating, and propagating sound, but that the air is to us the best vehicle, because it is an elastic medium, in which our organs of hearing, are, as it were, constantly swimming; therefore Nature has adapted our organs to be easily excited by this medium. It is however rendered very certain, that all elastic bodies, as well as air, are conductors of sound, and even that water, which we know is perfectly inelastic, is a good conductor of sound. The intensity of

Sound is as the density of the air; whence in frosty weather, when the barometer is high, distant sounds are most distinct; and on a clear winter's evening "the far-off curfew's sound" will be more audible than in summer. It is a singular fact, that however sounds may differ in note, they all travel with one velocity; the softest whisper, for the space it goes, flies with the same velocity as the loudest thunder. Dr. Derham ascertained the uniformity and amount of this velocity to be in all cases about one thousand one hundred and forty-two feet in a second, or nearly thirteen miles in a minute! A musical tone depends upon the number of vibrations in a given time, and is said to be more acute as the vibrations are more frequent, and more grave as the number of waves is diminished. A very singular analogy has been mentioned between the senses of Sight and Hearing; it is said, as the limits of our powers of vision preclude us from seeing very small objects, and also on the other hand curtail our views of distance and space, so our ears are not sensible to any sound, where the number of vibrations is less than a given ratio, and again, are not equal to the perception of any sounds, where the amount of the vibrations exceeds a given number. So that sounds may continually exist so minute as not to reach our senses; and again, the Celestial Bodies may

move in their orbits, accompanied by a symphonious melody, beyond the reach of our limited faculties, which are only adapted to the sphere we move in. Creative Wisdom has fitted us for the stage alone on which we are to act—our powers and faculties are not framed to soar beyond our proper region.

“ If nature thunder’d in his opening ears,
“ And stunn’d him with the music of the spheres,
“ How would he wish that heaven had left him still
“ The whispering zephyr, and the purling rill.”

It has been contended that Sound can have no positive existence out of the mind ; that it can only exist in our senses ; that where there are no ears, there can be no sound ; so that if no persons dwelt in the vicinity of the falls of Niagara, that tremendous cataract might be said to roll down its rapid current without the smallest murmur ; however paradoxical this may *prima facie* appear, I think the more you consider it, the more you become convinced of its reality. Sound, like light, becomes reflected from most bodies against which it impinges ; this reflection, under certain circumstances, comes perfect again to the ear, producing what we term Echo. A distance of fifty feet is necessary to produce an echo, otherwise the sound comes back too soon to the ear to be distinct from the original tone.

I have hitherto only been taking a mechanical view of the nature of Sound ; it behoves us now to consider it in a far nobler light—as the great medium of all the civilization and improvement of the human species. Man has learned to combine all his ideas, with the tones of his voice ; to sounds he has annexed signs, and from this arbitrary connection, has developed the hidden powers of his mind—established a superiority over all the orders of animated nature—created a spiritual existence that lifts him above his material self, and teaches him “to look thro’ Nature up to Nature’s God.”—Speech is the instrument of all the cultivation of human intellect—it is man’s distinguishing boon from God. Language is his great prerogative, by which he eminently transcends all the rest of animated nature. In proportion as nations have cultivated language, have they approached the elevated scale of human destiny. The Ear is the great organ of this faculty. Although Vision displays to him the variegated picture, and paints in ten thousand shades the golden scenes of Creative Wisdom, though it conducts him through air, through ocean, and through skies, to view all nature in her sublime majesty ; yet after all, *Man is the pupil of his Ear* : born with a paucity of instinct, he has every thing to learn ; the faculty of speech unites the feelings of all

the senses, and becomes their general exponent. The child who is born deaf, and consequently dumb, enjoys the perfection of his other senses, but in this condition he is worse off than the brute ; destitute of discrimination, of reason, even of sympathy, he adopts an unmeaning imitation of all he sees ; hence he has been known to tear out the bowels of his own brother, in imitation of what he has seen performed upon animals. In considering this tragical fact, where can the advocate for human instinct take refuge ?

Speech then is, as has been said, the rudder of our reason. I shall take an opportunity of saying more on this heavenly faculty in a future letter. I will therefore conclude this by one or two remarks on a subject much allied to Speech, I mean Music.

Music has its foundation in nature ; it is deeply implanted in the human mind ; it is the mother of poetry, and forms part of the essence of all languages. Music has been cultivated in all nations, from their earliest infancy ; it was the instrument of exciting and calling into action the dormant passions of the soul ; no nation was originally without it ; in the early history of both civilized and barbarous states, we find Music was a great medium of instruction. All the maxims and the rules of the community were clad in melody, and delivered in song by the

bards, who learned the nature of the human soul, and could call forth its various emotions with more force and vigour, than the strongest appeals of reason, from the mouths of philosophers of the present day. We are told that Edward the First, in his conquest of Wales, had recourse to the barbarous expedient of murdering all the Bards, from the many obstacles they threw in his way, by the strong hold which they had over the minds of the people; and indeed so great is the influence of national taste in music, that an author has said, if he were allowed to make all the tales and ballads for the community, he should care very little who made their laws. No civilized nation, perhaps, ever cultivated music to such perfection as the Greeks; with them it was criminal in a legislator to be ignorant of music; and when we consider that it forms the basis of eloquence, and how necessary this was in the ancient states to every leader, who could only rise by gaining favour with the multitude, to whose passions he always addressed himself, we shall not be surprised at it. As a power capable of exciting the various affections of the mind, and stimulating it to the noblest achievements of heroism and virtue, Music has always been esteemed among mankind, and a taste for it considered both as an accomplishment and an attribute of a generous disposition.

Shakespeare, whose knowledge of nature, and whose acquaintance with the human heart, was never exceeded, says,

- “ He that hath not Music in himself,
- “ Nor is not moved with the concord of sweet sounds,
- “ Is fit for treasons, stratagems, and spoils :
- “ The motions of his spirits are dull as night,
- “ And his affections dark as Erebus.
- “ Let no such man be trusted.”

Dancing has been found to prevail almost universally, as a favourite amusement, with every nation and community with which we have become acquainted. The simplicity of ancient music was greater than it is with us. It was in fact plain melody, associated with particular passions and emotions, and not that complex union of different notes, which constitutes the intricate science of modern harmony ; where our astonishment at the powers of the artist often overcomes the influences of the musical tones upon our passions. With these remarks I conclude this letter, and remain,

Yours, &c.

L. S. B.

LETTER III.

DEAR FRIEND,

HAVING in my two last made some transient remarks upon the Earth and its Atmosphere, it becomes necessary I should now call your attention to the nature of that something, of which all bodies are formed, I mean Matter. As, however, Light is perhaps the most volatile part of Matter, and possesses many properties *sui generis*, we will previously let it arrest our attention for a short time. The Mosaic History of the Creation tells us, that Light was the first element that was formed. The sacred historian has attracted the admiration of even profane writers, by the sublimity of that passage where the creation of light is announced, “and God said let there be Light, and there was Light.” This line is often quoted among many others in the sacred volume, as an instance of the highest sublime. There has been some difference of opinion concerning the real nature of Light: Sir Isaac Newton conceived it to be a substance, consisting of particles astonishingly minute, emanating from the sun and all luminous bodies,

moving in straight lines, and being reflected from different bodies to the eye, producing in our minds the sensation of Vision. Lavoisier, and most of the new chemists, have taken up this side of the question, while some have contended that is not a substance, but a particular motion in the parts of bodies, put into action by the stimulus of the luminous body. I confess I am disposed to lean towards the substantial hypothesis, and believe Light to be a Body.—The sun is the grand source of light, from whose surface it is perpetually emanating. It travels to our earth, a distance of ninety-five millions of miles, in little more than eight minutes, with a velocity surpassing all comprehension. It is the medium of one of the most important of our senses, that of Vision, by which nature displays to the human mind the grand spectacle of the universe; this sense exhibits to us the immense and beautiful theatre erected by Creative Wisdom, for the abode and the enjoyment of man; to examine, and to admire, the harmony and majesty of which, constitutes one of the highest occupations of his enquiring mind; it teaches him to ascertain his relative situation, to shun impending dangers, and carefully directs his steps to such places, and such objects, as are most conducive to his wants, his conveniences, and his pleasures.

To understand fully the value of this sense, we must consider the structure of the Eye. The Eye, although at first view it appears an organ extremely intricate in structure, and complex in function, we find, on investigation, to be constructed on a plan most sublimely simple: it forms nothing more than a camera-obscura, upon the curtain of which, by the convergence of the rays in their passage through the humours, a faithful picture of the surrounding landscape is most accurately and minutely painted in an inverted position: this picture, which is exactly similar to that formed on the sheet or table of a camera-obscura, is all that is effected by the Eye itself: why such a painting of objects on the retina should produce in the mind a correct idea of the nature and presence of those objects, is one of the hidden mysteries that has hitherto puzzled the heads and pens of all human philosophers. We perceive, then, what benefits this sense imparts to humanity; it enables Man to explore atoms; and from viewing "the green myriads in the peopled grass," to contemplate bodies, perhaps worlds distant, through regions of space, of the existence of which, without the aid of this sense, he perhaps never would have dreamt; in short, it enables him to scan the universe. Light, as you know, in its passage is liable to various refractions and reflec-

tions, by which its course is altered, and it issues again from such bodies in every direction: when it passes out of one medium into another, differing in density, its course is bent, and it is called refraction; the degree of this refraction is proportionate to the difference of the density in the two media: if the rays pass from a dense to a rare medium, as out of water into air, the rays, in bending, recede from the perpendicular; but, when they come from a rare into a dense medium, as out of air into water or glass, they are refracted towards the perpendicular. One principal advantage we derive from this law of refraction, is the morning and evening twilight; for, when the sun is within 18 degrees below our horizon, his rays fall obliquely upon our atmosphere, and would pass over our heads, were it not for this refractive power in the air, which bends them from the perpendicular towards the Earth's surface, thus giving us the advantage of the sun's light, before and after that luminary is itself beneath the horizon: when, with any degree of inclination, it impinges upon a polished surface, we perceive it reflected from that surface at an equal angle beyond the perpendicular, keeping up most accurately the law of all reflected movements, that both the angles of incidence and reflection are always equal. Light, like every other Element, is

capable of various combinations and affinities, and no doubt enters the composition of many solid opake substances in nature, from which it is often disengaged on the decomposition of these bodies. One very interesting experiment illustrative of this, was the exposing a diamond to the brilliant rays of the sun for some time, and suddenly covering it with black wax; at the expiration of several months, the wax was removed, and the diamond shone with great brightness in the dark for some time: bodies that possess this property of absorbing and again emitting light, are called *solar phospori*. Although the sun's rays appear of one uniform colour, and seem to be of homogeneous form and texture, yet we find, on investigation, that a ray of light is not a simple body, but can be analyzed into seven distinct pencils or rays, each giving to the eye the sensation of a particular colour. These colours are separated in passing through a Prism, and are in the following order, red, orange, yellow, green, blue, indigo, and violet; they each differ in the degree of their refrangibility, and that in the order above stated; thus the red is the least refrangible, and the others more so gradually, to the violet, which has this property in the highest degree. Dr. Herschel has made some important discoveries on the different properties of the

various rays that compose the Solar Spectrum, the result of which seems to be, that heat and light are not present in equal degree, in any part of the Spectrum. He found that the illuminating power, is most intense in the middle of the Spectrum, with the yellow and green, while the red and the violet at each extreme, possess it in a much less degree. The heating power of the rays seems to be greatest in the red, and gradually diminishes as you go on towards the violet. But the most extraordinary part of his discovery was, that if the thermometer is removed out of the Spectrum altogether, in an even line from the red extremity, it rises considerably higher than it did in the red ray, and continues so to do for half an inch beyond the limits of the Spectrum: it rose in less than three minutes from 61° to 79 . These heat-making rays, although invisible, may be reflected by mirrors, and are refracted by the lens like the *illuminating rays*. Beyond the limits of the Spectrum, on the violet side, the thermometer is not affected, but there are *invisible rays* which produce the same chemical changes on certain bodies that the illuminating effect, such as changing the colour of muriate of silver, gum, guaiacum, &c. Hence we find, that the solar beams consist of three distinct species of rays, one *visible and of coloured brilliancy*, another of

heat but invisible, and a third evincing *chemical properties, but, like the second, invisible*.— For measuring the intensity of light from different sources, an instrument called a Photometer has been invented by Count Rumford, and improved upon by Mr. Leslie. Thus, then, we find, this beautiful Element serving the most important purposes. I before remarked, how much it ministered to our comforts and convenience, in being the great medium of rendering the page of nature visible to us. Beneficent nature has not only rendered it subservient to our necessities, but has also endowed it with qualities, which become continued sources of the most exalted pleasures to the human mind. All colours are, we see, derived from the solar rays ; the surfaces of different bodies have the power of separating and reflecting different rays, and absorbing the rest. The ray that comes reflected from any object to the Eye, creates in the mind an idea of that colour so reflected : thus colour is no property of the object coloured, but derives that property from being part of the solar light, the rays of which contain in themselves the essence of all the various colours we meet with in nature. The seven colours into which the Prism separates the rays of the light, are the primary colours, out of which all the rest are formed. When any body reflects the

whole of the rays as they come to it, that body appears white, this being the colour of the sun's rays when mixed together. Black, on the contrary, is the mere negation of colour, where all the rays are absorbed ; therefore it has been said that if any body was perfectly black, it would be invisible, from absorbing, and not reflecting the rays of light.

The surrounding creation might have been sufficiently visible to answer all the common purposes of life, had the sun's rays been of only one colour ; but the bountiful scheme of Providence, has not only provided means to maintain a bare existence, it has also supplied us with sources of exquisite enjoyment, over and above the mere purposes of common life. The various shades and tints which so splendidly diversify the face of nature, contribute to the continual delight and happiness of those creatures placed here to enjoy, to admire, and to adore the benevolence of that supreme agency that creates and directs the whole ; whose power and providence are conspicuous in every item of the universe, and the majesty of whose Omnipotence, so exceeds the limits of our comprehension, that our minds become lost in the contemplation.

“ Lightnings and storms his mighty word obey,
And Planets roll where he has mark'd their way.”

We come now to the consideration of Matter, or the Basis of which all bodies are formed. There are certain fixed properties which invariably belong to every species of Matter with which we are in any way acquainted ; these are, *Extension, Solidity, Divisibility, Figure*, and perhaps *Motion*. To these may be added what is called the *vis inertia*, or that tendency which all Matter has to remain in the same condition of either rest or motion, with which it happens to be impressed ; thus a body left at rest, would remain in that condition for ever, unless put into motion, or acted on by some external cause ; and if once put into motion, would continue in motion for ever, unless some external agency influenced it from the direction of the moving cause.

Solidity, and extension, belong to all Matter, as is manifest by the power it has of resisting, by which it excludes every other body from occupying that portion of space it fills. Thus Space and Body possess different properties ; space is infinite, and can be contained in no limits ; its parts, consequently, are immoveable and inseparable. Body, on the contrary, is made up of parts moveable, capable of separation, and being finite, we easily comprehend them. Some have contended that Space has an absolute existence as a Being independent of the mind ; that all is

full, and no part devoid of matter. Others imagine that Space is only an idea of extension in the abstract ; that it has no positive existence as body, and that therefore a vacuum or negation of the properties of body prevades the universe. It would seem, I think, that space is only something of negative existence, like darkness, which is only the absence of light, although we are apt in language to give it positive attributes, as figure, depth, degree, &c. Cold, also, of which we speak positively, is only a privation of Heat ; Silence, Death, &c. are only negative conditions, denoting the absence of positive qualities, and as they strike our senses very forcibly, we are hastily induced, from this circumstance, to attach positive properties to circumstances that are mere abstract feelings, of the privation or absence of tangible attributes. So it is with Space, which is the absence of Body, and moreover, if all Space were full, and what is called a Plenum really existed, there could be no motion ; for a body in motion must displace so much matter as is equal to its bulk ; now this displacement evidently supposes a vacant space, to which the dislodged matter must be impressed ; but in a Plenum there would be no room for the particles to remove each other. I should conceive a Plenum would also afford considerable resistance to the movements of the

Planets, which does not appear to be the case, as their velocities have no doubt continued for ages uniform. We know that a Body projected in the air meets with considerable resistance in its passage.—If the Planets were revolving in any other than empty Space, their motions must, from the increasing resistance of the medium, be retarded and ultimately destroyed; whereas if they were projected in a Vacuum, their movements would continue, as long as the projectile and gravitating forces, with which they are impressed, might continue to exert themselves. *Divisibility* is the next property of Matter, and this division of Body into parts, must be supposed to be capable of infinite extension; for you cannot suppose any particle, however small, but what the mind is still capable of supposing, the further division of that particle, it immediately becomes a whole, as susceptible of being divided, as the larger portion of which it so lately formed an integral part. The minute division of bodies is proved from various experiments. Mr. Boyle found that fifty square inches of leaf-gold weighed but one grain; eight grains of gold will gild a wire thirteen thousand feet long; and a pound of gold will gild a wire long enough to circumscribe the globe. All odoriferous bodies, as Musk, Camphor, &c. exhale particles which must be astonishingly minute.—

Lewenhoeck was said to have discovered more animalculæ in the melt of one Cod-fish, than there are living souls in this island. Mathematicians have given the following theorem in proof of their ideas of the extensive divisibility of Matter. “ Any particle of matter, how small
“ soever, and any finite space, how large soever,
“ being given, it is possible that that small sand or
“ particle of matter, shall be so diffused through
“ all that great space, and shall fill it in such a
“ manner, that there shall be no pore in it,
“ whose diameter shall exceed a given line.”—

Figure is another attribute of all finite substance ; divide it into whatever number of parts, each part possesses determinate figure. If any Body has no figure, it cannot be of bounded extension, it must be an infinite.

In a former letter, when speaking of the Nature of Fire, I made some allusions to that property which pervades all bodies, and keeps them together—the power of Attraction. Attraction is a force inherent in all bodies, by which they are impelled towards each other ; this pervades all the matter in the Solar system, by which the different Planets are attracted towards each other, and towards their great centre of motion, the Sun, and is called Gravity. By this, the parts of our Earth tend constantly towards the centre of it, to which they always incline in fal-

ling. This attraction operating between the particles of matter, is called Cohesion or Aggregation; there is, moreover, another species of attraction, called Elective, or Chemical affinity, which is excited between the particles of many different substances, as between acids, alkalies, &c.—The attraction of cohesion in the particles of Bodies, is proved by many experiments, as by placing two polished slabs in contact, these will cohere with such force as to require considerable force to separate; and it has been said, that two highly-polished iron planes have adhered so strongly, that twenty-four men have not been able to separate them. Drops of rain and of quicksilver assume a globular form, from this attraction among the particles.—Small glass tubes open at both ends, and one end immersed in coloured liquor, the liquor will be observed to rise to some height in the narrow calibre of these tubes. Many have supposed trees and shrubs to be aggregations of these tubes, and that the sap and other juices of vegetables arrive at their sometimes lofty summits, by the agency of capillary attraction. I believe, however, the ascent of the sap in plants is dependant on a very different cause; a living power in the vessel of the plant, enabling it, like the animal artery, to act upon its contained juice, seems to explain the phenomenon with more probability.

We are at a loss to suppose Capillary Attraction sufficient, to raise the sap to the great height of some of our tallest trees. I have said above that Motion may be considered one of the contingent properties of Matter. The nature of Motion, and its various laws, would lead us into a digression, too long, for our present purpose, although it is a most pleasing subject, and leads to the foundation of the science of Mechanics. Motion, then, is a translation from place to place, and is supposed to have some reference to time, which is in fact an idea of abstraction, being only the interval between the motions of bodies. Time has been divided into absolute and relative. The latter is the only kind perceptible to us, and measures the degree of motion in certain bodies. True Time, if there be any such thing, flows equally, and is not cognizable to us. Absolute Duration can have no positive existence in nature; it is merely an idea of succession. The most usual measure of Time with us, is the motion of the celestial orbs; but, perhaps, the most natural measure, is the succession of our ideas; this seems to constitute the true duration of intelligent beings; whence the duration of human existence, is not correctly computed by the number of revolutions of the Sun and Moon, but by the number of ideas that pass through the mind in the course of life;

whence one man may have enjoyed considerable longer existence, although he was born and died on the same day with another man, from having had in the same period, a greater volume of ideas passing through his mind. There is no doubt, that if thought is suspended between Death and the Resurrection, the two moments will appear contiguous. It seems perfectly clear that to an All-perfect Mind, whose existence is infinite, and who can combine the past, present, and future all in one view, Time can have no positive existence. It would appear then that Time, which seems to us so momentuous, and to have a positive reality, has no absolute existence, but is a mere reference to the motions of other bodies, being a limited portion of duration marked by the successive occurrence of any phenomena. Besides the attractions above spoken of, there are two species, which possess peculiar properties of their own, different from the common laws of gravitation; these are *Electricity* and *Magnetism*. I shall, however, not detain you long upon these two modifications of Attraction. Electricity is a very extensive and powerful agent in nature, and nearly allied to Fire. Fire, perhaps, is the genus of which Light, Electricity, and Galvanism, may be different species. Electricity is found to pervade all nature; it is met with on the surfaces of bo-

dies below, and becomes often visible in the terrific Lightning above, and appals the timid spectator by its flaming coruscations in the *Aurora Borealis*. We are only in the infancy of our knowledge concerning this most formidable agent. The other species, Magnetism, is a principle of which we know still less. The attraction which the Loadstone has for Iron, seems to have been known to the ancients; but the property a Magnetic Needle has of directing itself towards the Pole, was the discovery of an Italian in the thirteenth century. When the Polarity of the Needle was first discovered, its direction was several degrees to the *Eastward* of the Pole; it appears that this variation gradually diminished, till the magnetic and true meridians became parallel, which I believe was the case at London about the year 1657, when the line of no variation passed over the metropolis; since which the variation has proceeded *westward*, to near 30°, but we are told is receding again by slow degrees. The Magnetic Poles, then, seem to shift, and at present the Northern Pole, or point to which the Needle is directed, is supposed to be in the Western Hemisphere, at about 160° of longitude. The line of no variation is not parallel to any of the meridians, but takes a serpentine form. The nature and cause of Magnetism seems involved in impenetrable

obscurity. Dr. Halley made some attempts to explain it, but his hypothesis is now very generally, and I believe justly, laid aside. The use of the Needle in directing the mariner across a trackless expanse of water, is a matter of great astonishment, and, as I shall have occasion hereafter to remark, has had no small influence on the history and condition of the human species ; it has enabled them to traverse this immense globe, to unite distant regions, to extend the advantages of science and improvement, and to carry civilization to remote desarts. The gifts and products of one hemisphere have flown into another ; religion, arts, sciences, and every thing conducive to the amelioration of mankind, have been wafted along the surface of the pathless ocean, and propagated in every climate, and all this through the instrumentality of a piece of black mineral.

“ Tall Navies hence their doubtful way explore,

“ And every product waft from every shore.”

After speaking of Attraction, it would seem necessary to say something concerning its opponent, *Repulsion*. As, however, I made some allusions to it in a former letter on the subject of Fire, it will be only necessary to observe that Repulsion is that property which gives the

particles of matter a tendency to recede from each other. Fire is the grand agent of Repulsion. All matter appears to be under the influence of these two opposing qualities, Attraction and Repulsion. According to Boscovich, Attraction exerts its effects upon the particles at sensible distances, and the attractive power diminishes inversely as the square of the distance. Repulsion operates only at the smallest distance; it increases as the distance diminishes, and at the shortest distance acts so absolutely, that the contact of any of the particles of matter is impossible. It is very manifest the particles of Bodies are not in contact: if you examine the mercury in the thermometer, when at an elevated temperature, it has all the appearance of a fluid of uniform density, with its particles in contact; if you then depress the temperature, the mercury will be condensed into half its former compass, and appear as before, proving that in the former instance, the particles could not be in contact; and the same may be said of every other body; for the hardest substance we meet with, is capable of being condensed by a reduction of temperature, to a much smaller compass than we ever find it, shewing that the parts of Matter cannot be in absolute contact.— We find, then, that where the sphere of Attraction ends, that of Repulsion begins; hence all

the motions and changes we meet with in nature are the result of these two contending principles. Repulsion is made manifest to us by many familiar appearances. If a steel needle is very carefully placed on the surface of a basin of water, the Repulsion will prevent its sinking: the rolling of drops of dew upon the leaves of plants, so observable in a garden on a summer's morning, is another; the easy motion of a fly upon the surface of water, while it does not touch it; the evident separation between oil and water, &c. &c.

Having made these few observations on the common properties of Matter, we come to some comparative remarks, between the physical qualities of common or inanimate Matter, and the living attributes of organic substance. All the properties enumerated as attached to Matter in general, we find perfectly passive, it is incapable of itself of taking on any degree of action; it possesses only the aptitude of being acted on by other agency, without any power of resisting the force of that agency; it is entirely inert, and remains for ever in the same state of quiescence, when not exposed to the active energies of other powers. The dormant and inactive state in which we observe Matter to have remained for ages, would seem sufficient to refute the notion of its possessing properties of an active

nature, capable of taking on the form and texture of organic existence. Many philosophers, however, with the talents of Priestley at their head, have supposed in Matter a capacity of assuming active energy, and changing itself into modes of organized substance. We find so striking and important a difference between the properties of living and dead Matter, that we are at a loss to conceive how the functions of life can be carried on, without a spiritual *Immaterial* something, which stimulates the living machine, and directs all its energies. It must be allowed, the connection between Mind and Matter, is certainly of a very arbitrary nature; a perfect display of mental capacity can only arise from a perfect developement of organic form. We behold every where that Perception, and all the faculties of mind, are inseparable from perfection of organization in the brain, and organs of sense; wherever the latter are defective and impaired, Perception, and its modes, become impaired also. This arbitrary connection has furnished the materialist with the main pillar of his argument; in this, however, he seems to have committed an error, very common in enquiries after nature, that of confounding effects, with their causes. The actions of life are the effects of organic structure; yet that organic structure itself is only the effect of the operative power of

a living principle, which is the *primum mobile*. This Principle of Life is the great architect, which models all the organs of the body; it is the great source from which all action springs; it is the essence of the perfect structure of parts; it is, in fact, a first cause, of which organization is only an effect. This Principle of Life is active and stimulant; the matter of which the organs are constructed, is passive and inert. Moreover, Matter is capable of division of parts without any destruction of its integrity. Mind, on the contrary, is perfectly indivisible; we perceive the smallest division destroys the perfection of its faculty, which is inseparable from a totality of structure. If Organization was, as some have contended, a physical property of Matter, then, as the whole is made of its parts, and as all the parts are equal to the whole, we must allow Perceptive attributes to the smallest particles, and thus it must inevitably follow, that the ultimate atoms of body were possessed of percipiency and thought; this is a difficulty which the materialists cannot easily get over. Upon the whole, I think the theory of Materialism is in error by setting out from the wrong point, and supposing that to be a cause, which is in fact only an effect of the great primary spring of action, the Living Principle, which fashions and moulds the inert sub-

stance of passive matter, and gives it its particular form. The complex actions of a Living Machine, seem to arise from a combination of an immaterial agency, with a certain arrangement of parts, and nature has so constituted us, that where this arrangement does not take place, or wherever it is defective, the Phenomena of Life are incomplete. The Brunonian Theory supposes that the Nervous System is endowed with a certain aptitude to be acted on by stimuli, which he calls Excitability; and that, when the different stimuli are applied, (which consist of Alcohol, Heat, &c.) the excitability is called into action; that Living Action is therefore a *tertium quid*, resulting from the action of external exciting causes, upon the inherent excitability of the Nervous fibre. He imagines each individual system to be endowed with a specific quantity of this Excitability, which gives a relative duration of life in different persons, according to the succession in the application of these exciting stimuli. This theory is closely allied to Materialism, and seems to carry along with it all the objections that may be made against the Material Hypothesis. It has, however, the merit of much originality, and deserves to be respectfully mentioned, were it only for the beneficial influence it has had on the practice of Physic. For although few practitioners

care to avow themselves Brunonians, yet their language and practice soon convince us it has had a happy effect, in restraining the use of those extensive depletory means formerly too copiously employed in a multitude of cases.

In my next, I shall offer you a few remarks on Organized Structures in general, till when, I remain,

Dear Friend,

Yours truly,

L. S. B.

LETTER IV.

DEAR FRIEND,

HAVING finished my last with some general remarks on the Theory of Materialism, we will now direct our attention to the nature and attributes of Organized Beings. These are endowed with active properties and powers, of which inanimate matter is perfectly destitute.—Organized Bodies possess within themselves faculties, by which they are enabled to maintain, not only their structures, but to repair the waste of action and the impairments of injury; they can assimilate objects foreign to them, incorporate them with their own texture, and considerably augment the bulk of their parts; they can propagate their respective species by increase of individuals, and in the higher orders, higher powers are manifested, which approach at last the nature of superior intelligences. All the Earth we inhabit (and perhaps its accompanying Planets) is replete with various forms and modes of organic existence; each element teems with living powers; an immense diversity of different genera and species, embracing all possible variety, display themselves to view, and have led

many to suppose, that matter possessed within itself the property of assuming organic structure. The whole surface of the globe seems in motion, a busy circle of animated movements and changes is incessantly going on; no climate, no spot, no element, seems exempt from the presence of living systems; they pervade all.

“ See through this air, this ocean, and this earth,
“ All matter quick, and bursting into birth;
“ Above, how high progressive life may go;
“ Around, how wide, how deep, extend below.
“ Vast chain of being, that from God began,
“ Nature’s ethereal, human, angel man.”

In commencing a survey of Organized Nature, we hardly know where to set out; so minutely regular is the connecting chain, so close is the analogy that links all, and so beautiful is the harmony that prevails throughout, that the whole seems to form one circle, where all the parts have mutual affinity and dependance, and no part can admit of separation, so as to afford the *punctum saliens* of philosophical description. Commencing with the lowest order of matter, the Mineral Kingdom, we see regular forms that excite our admiration and astonishment; the variety of chrystalline productions so uniformly exact, that display almost every variety of geometrical outline, bear, in appearance, an analogy of structure to the more perfect orders of being. The flexi-

ble asbestos, which from the interwoven texture of its fibres, has sometimes been applied to similar uses with cloth, has a resemblance in the arrangement of its parts to the structure of vegetable matter, and has been considered by some as the first step towards organization; but this analogy does not hold out,—we soon find that asbestos and chrystals can only be said to grow by having an accretion of matter, by an apposition of new substance, which merely augments their bulk mechanically, as two and two make four. Their increase of parts is not the effect of a developement of actions going on from within; it is not a penetrable expansion of parts, the result of organic tubes acting by virtue of their own power; it is mere mechanical arrangement, by which one heap is added to another, and magnitude produced by simple addition of quantity. These bodies never assimilate juices, and convert them to their own texture; they never can have the expansion of growth; they only magnify by fresh accumulations; in short, they are not subservient to the laws of organic existence, but rest with the physical endowments of common matter, and continue for ever passive. Organized Bodies are of themselves elaborate machines, that by means of particular organs, assimilate and incorporate the substances of other bodies into the constitution of their own;

by this means all their internal parts, as well as external, are increased; they preserve the regular symmetry and proportion of all their parts, and each part continues its proper functions. They possess the power of re-producing their species, and often of renovating parts that injuries may have torn from them: all this is denied to minerals; a regular formed chrystal, whether a cube, a pyramid, or a polyedron, is no more an organized substance than a fluted pillar, or any peice of ornamental carved work attached to one of our buildings. The Vegetable Kingdom claims our first attention, from the comparative simplicity of its structure, and perhaps the priority of its creation. It is clear it must have existed before the Animal Kingdom, which derives most of its sustenance from it, so much so, that it has been said "All flesh is grass." Vegetables are less complex in their fabric than animals; they are more limited in their powers; they remain fixed to their particular spots, and are destitute of percipency or consciousness; as Linnæus says they grow and live, but animals grow, live, and *feel*. They possess many analogies with animals, but as far as observations have hitherto gone, they are quite destitute of every thing like Brain, or organs of sense. The simplicity of their organization requires only a corresponding simplicity of food; they grow to

immense masses, and endure to extensive periods, by means of air and water only. They surpass animals in simplicity of structure; the latter can only subsist on other organized beings. Vegetables speedily renovate lost parts; each part is often capable of becoming a whole; they flourish again after extensive mutilations, they propagate by various modes astonishingly simple, they acquire immense magnitudes, and they endure in full perfection for periods of time, that far exceed the utmost range of any species of animal longevity. Oaks commonly attain the age of three centuries: there is said to be a chestnut tree at Tortworth, in Gloucestershire, supposed to be a thousand years old. Thus we are induced to consider Vegetables as an order of beings more perfect in corporeal independance of function, than the higher orders of organized bodies, but less important in the final purpose of their creation. Nature ascends by regular steps from the simplest forms of organic arrangement. We see Vegetables abundantly diffused for the use of animals, we see man exercising his prerogative over them, and some placid communities feeding on them alone, and living in peaceful serenity. But exclusive of their absolute utility as food for man, let him cast his eye over the surface of the globe, and see what an inexhaustible store of pleasure and enjoyment

Nature has furnished him, in the immense display of Vegetable creation; the whole Earth is richly carpeted with living verdure, and inverted with a rich coat of vegetable growth.

The great landscape of the Earth has its chief colouring from the Vegetable world; the extensive variety that every where presents itself, astonishes and delights us. We see groves and forests before us adorned with every possible shade of colouring; hills and valleys coated with most luxuriant vegetation; spacious plains exhibiting the waving harvest in golden splendour, and the varied tints and forms which every where embellish the surface, manifesting the bounty of Omnipotence in thus decorating the Globe, and placing man in a garden that abounds with the most magnificent profusion and the most splendid variety. The outline of Plants exhibits an endless variety of figure; and language has been strained to express this variety. They possess functions subservient to the purposes of their nutrition, their growth, the evolution of different products, and their propagation. The roots of Plants are the mouths that absorb elementary matter from the Earth; it is carried on to the vessels of the inner bark, where a process, similar to digestion, is going on, and medulla formed, which is a matter analogous to the blood in animals, out of which all the parts

are formed, and all the juices given out by secretions. The whole inner bark, from the roots upwards to the smaller branches, may be said then to be the vegetable stomach; it forms the medulla from the moisture absorbed, and manufactures the wood itself, which is first deposited in a soft substance called Alburnum, that afterwards hardens and forms an additional ring of wood that increases the bulk of the Tree; one of these rings is added every year, and thus forms an index of the Tree's age. The motion of the Medulla is not like that of the blood, a circulation; it seems to be only that of ascent and descent, according to the stimulus of external heat. In spring and summer, the Sun's warmth excites the sap vessels into action, and the Medulla ascends and pervades every branch and pore, opens the buds, and actuates the evolution of the flowers and leaves. On the contrary; when the influence of the Sun's rays recedes from us at the approach of winter, the sap vessels lose the stimulus necessary to their living action, the medulla retires from the minute extremities, which thus losing their pabulum, become torpid, and the leaves and efflorescence, which had progressively gone on to fructification, now wither and drop, and the whole plant lies dormant, like many species of animals, for the winter, till the return of the Sun in spring

awakens it into action again, to perform the same round of vegetating phenomena. This is the History of the Revolution of Plants, in general, in our climate.

It is wonderful to observe the peculiar manner in which Plants adjust themselves to the different seasons, even the different hours of the day, and how gradually they accommodate themselves to any change of climate. We are told that near the Pole they are later in growth, and ripen so much quicker as the summer arrives later, and opens more forcibly. Plants brought from the Torrid Zone to Europe ripen later the first year, as they wait for their accustomed sun; the following summers they gradually arrive earlier at maturity, as they become habituated to their new situation. In the artificial warmth of a Hothouse, each follows its native seasons, whatever number of years it may have been in this climate. The plants of the Cape blossom in winter, because it is then summer in their native country. The Marvel of Peru is said to blossom at night, because it is then day in America; hence each adheres to the season and even time of day it has been accustomed to in its native soil, strongly indicating that something more than heat and moisture are necessary to their growth. The perfection of the flowers and fruit, and the various juices

which different species give out;—in short, the perfect evolution of Vegetable Life in all its parts, is dependant, like that of Animal, on the atmosphere. Different kinds of air are inhaled and others expired, and this process goes on in the leaves: these are the lungs of trees. It is ascertained the under side of the leaf is the organ of inspiration, while the upper side is the surface which returns to the air such matter as is no longer wanted in the system.

As I have had occasion to remark before, Oxygen Gas is given out in abundance during the day time, when the solar rays are acting. Carbonic Acid and Nitrogen are the gases most speedily absorbed. The leaves of vegetables contain a multitude of absorbent vessels that inhale a quantity of air and moisture, which they occasionally give out again to the atmosphere. Dr. Hales found that the Great Annual Sun Flower perspired, during twelve hours of a summer's day, thirty ounces; the matter thus excreted was no doubt such as had become deleterious and effete, and necessary to the health of the plant to be discharged. This kind of respiration goes on in summer, and seems necessary to the perfection of the fruit of the following year; in fact, the bud is formed the preceding autumn.

Light seems also essential to Vegetables; if

they are situate in a dark room, they will endeavour by degrees to approach any aperture that admits light, and will bend in any direction towards such opening; thus trees that grow in the midst of clusters are generally straight; the vertical light can only reach them; to this they are attracted, and hence acquire a straight form, while those on the edge of the plantation take on the most irregular shapes. Mr. Hunter made many experiments to ascertain the temperature of the sap, which he generally found to be very low. Different plants give out as excretory matter different juices, which are technically designated by the generic term of *succi proprii*, as the various species of gums and balsams, sugar, indigo, opium, aloes, &c. Sugar is a substance that prevails so extensively through the Vegetable Kingdom, that it may be obtained more or less from all; it is found abundantly in many roots—as the carrot, parsnip, and beet; it exists in grain, but is most abundant in the *arundo saccharifera*, or sugar cane, cultivated now so extensively in the West Indies. The juice is expressed by passing the canes between two iron rollers placed perpendicularly; it is conducted into a cauldron, where it is boiled with wood-ashes and lime; the scum is taken off; this process is repeated till it becomes syrup; it is then boiled with lime and alum, and

when sufficiently concentrated, is poured into hogsheads pierced at bottom; it chrystallizes in the form of sugar. Sugar is found by chemical analysis to consist of Carbon, Hydrogen, and Oxygen, in the proportions of 28, 8, and 64.

Linnæus, whose name will be a lasting honour to that country which gave him birth, formed his classification of the Vegetable kingdom from the Efflorescence. He took the Stamina and Pistils as the basis of his artificial arrangement; the great importance of these parts in the fructification led him to this adoption. Although the other parts of the ~~Efflorescence~~ are wanting in many flowers, yet the Anthera and Stigma seem constantly present. As the minute application of the twenty-four orders in this system would embrace so much matter, and as this is a science I have very little explored, I shall attempt no observations on Botanical arrangement, further than to say, that every mode of Vegetable classification hitherto adopted, appears too arbitrary and artificial, to be of much use in leading us to form a correct opinion of the qualities of individual species. Most of the orders contain many plants of various and opposite characters, so that little more benefit is afforded than the mere mechanical advantage, which methodical arrangement gives in the study of all sciences in general, but of this in

particular, which comprehends the astonishing variety of forty thousand different species.

Chemistry proves that all the immense variety of vegetable matter is formed from only four or five simple substances, *viz.* Caloric, Light, Oxygen, Hydrogen, Carbon, and a little Nitrogen. Can any thing in the whole page of Nature be more astonishing than this? that such boundless variety should be involved in a few elements; that such infinity should be contained in such unity: that such an endless profusion of form, colour, odour, and every sensible property, should be produced from half a dozen simple elements, variously combined and arranged, is one of those many sublime wonders that overwhelm the philosopher, and prove incontestibly that “the will of God is the ultimum of all human knowledge.”

This inexhaustible variety of vegetable orders is a wise and beneficent provision of the Creator, for the numerous tribes of animated beings he has placed on this Globe, to fulfil the final purposes of his plan. But I will conclude my remarks on this head with a beautiful and often-quoted passage from St. Pierre:—“The sluggish cow pastures in the cavity of the valley; the bounding sheep on the declivity of the hill; the scrambling goat browses among the shrubs of the rock; the duck feeds on the water plants of

the river ; the hen, with attentive eye, picks up every grain that is lost in the field ; the pigeon, of rapid wing, collects a similar tribute from the refuse of the grove ; and the frugal bee turns to account even the small dust on the flower : there is no part of the earth where the whole vegetable crop may not be reaped. Those plants which are rejected by one, are a delicacy to another, and even among the finny tribes contribute to their fatness. The hog devours the horsetail and the henbane, the goat the thistle and the hemlock. All return in the evening to the habitation of man, with murmurs, with bleatings, with cries of joy, bringing back to him the delicious tribute of innumerable plants, transformed by a process, the most inconceivable, into honey, milk, butter, eggs, and cream." Thus we find vegetables formed of a combination of a few elements from the mineral kingdom ; these they elaborate and convert to their own structure, and become afterwards the pabula and sources of animal existence : thus vegetables are the link between minerals and animals, as perhaps man may be between animals and angels, and thus we see—

“ Dying vegetables life sustain,
“ And life dissolving vegetate again.”

Having made these few general observations

on the Vegetable world, we now arrive in course on the confines of another kingdom of nature: we must make a transition from these to beings of a higher order, but the change we shall find to be very gradual. Though common observers may suppose the distinction between Vegetables and Animals to be strongly marked, and that each is characterized by separate and striking differences, yet the systematic enquirer into Nature, finds that it is one of the most difficult tasks to define the distinction between these two orders; they are found to possess many more common properties, than real differences. Vegetables make a very near approach towards animals; the shades of distinction are found too delicate to discriminate with precision, and the point where Vegetable life terminates, and Animal commences, has puzzled the greatest naturalists; some have inferred a distinction from the locomotive faculty of animals, but this is only a doubtful difference; many of the lowest orders of animals have this faculty in so limited a degree, that they can hardly be said to enjoy it. Oysters have but a very contracted range, and many species of the Testacea and others seem for ever fixed to the spots on which they grow, and have no further movement, than that of expanding or contracting the volume of their bodies. Besides, Vegetables must be allowed to

possess a certain degree of motion; the roots of all plants have an evident tendency to shoot towards that soil which seems to possess most nourishment; they turn towards it, and recede from that portion of soil of an opposite quality. The whole plant, in a dark room, bends towards the opening that admits the light. If, in a dry season, a wet sponge is placed near a plant, it will show a manifest inclination to approach the sponge. Some flowers daily follow the motion of the Sun, from his morning's appearance in the East, till his evening's departure in the West. The Sleep of Plants is accompanied with certain movements, that far exceed any thing we meet with in the lowest orders of animals. But above all, three individuals seem to evince the greatest share of vegetable movement; these are, the Sensitive Plant, the *Hedysarum Gyraus*, and the *Dionea Muscipula* or Venus's Fly Trap; to the particular history of these I must refer you. The existence of a Heart has been supposed by others as the distinction; but we know many insects entirely want this organ. We find animals that possess neither brain, nor stomach, nor any particular viscera; the presence or absence of these parts, therefore, can be no criterion of positive distinction. Irritability cannot be denied to plants, nor perhaps a certain degree of sensation. Both orders possess many com-

mon functions, as nutrition, growth, re-production, and final decay. Their boundaries are not defined by any exact appearances in Nature, and we pass imperceptibly in our pursuit from one order into the other. In tracing the analogy between these two kingdoms of nature, we shall find our labours attended with more success and satisfaction. The similarity of the functions I have just named constitute a close affinity, and prove they possess much stronger similitudes than essential differences, and that the one makes constant approximations towards the nature of the other.

Leaving, therefore, the Vegetable System, let us now take a glance at the extensive range of Animal Existence. Here we find a world of itself, containing a display of the most astonishing and essential varieties of structure and of function; difference of form, diversity of nature and of character; ascending from the lowest species by insensible gradations to the organization of man, the most perfect specimen of Creative Wisdom. All this variety we see blended in one great system of unity. This apparent Labyrinth is a perfect scheme of Harmony of Design. The various powers and faculties of animated beings rise gradually, till Man, endowed with superior attributes of intellectual capacity, stands Lord of the whole. The ut-

most harmony and unity of design pervades throughout. The lowest species form the basis of a column, to which the ascending orders contribute as it rises, till Man at last crowns the superstructure, and becomes the summit of an immense Pyramid of Supreme Architecture.

Linnæus divided the Animal Kingdom into six classes, Mammalia, Birds, Amphibia, Fishes, Insects, and Worms, and this is the system in general use: the labours and discoveries of those great anatomists, Blumenbach and Cuvier, have however modified and improved upon this system, by subdividing some of the orders and genera, and have added much to its amendment. The transition from the Vegetable World is made easy by beginning with the lowest order of animal forms, the Insect Tribe. In the Linnæan arrangement, Insects are divided into Insects and Worms. Cuvier forms the worms into three classes, Mollusca, Vermes, and Zoophyta. The Zoophyta, then, form the lowest order in the scale of animation: they have neither Brain nor Nerves; no heart, nor perhaps Blood-vessels, and no articulated members. Some are soft and gelatinous substances, as the Medusa or Sea Nettle, so commonly found floating on the surface, and the fresh water Polypus, so tenacious of life, that when cut into several pieces, each piece becomes a whole animal, like the parent

one, but somewhat less in bulk. Others are covered with a coriaceous crust, as the Echinus, the Star-fish, &c. The inhabitants of Corals and Sponges rank in this order. There are various species of coral, and their animal nature is now ascertained beyond a doubt. I had occasion before to observe, that the aggregation of these insects in the Southern Hemisphere, has laid a calcareous base for numerous islands that are now occupied by man. The microscopic animalculæ found in different infusions belong to this order. The Zoophyta we find, then, at the bottom of the scale; their powers are so limited that many of them were long considered vegetable productions. Ascending, we come to the Vermes. These are divided into Intestinal and External: the former are of more simple organization than the latter; they exist in the cavities of man and other animals; they are principally the Gordius or Guinea Worm, the Hydatid, the Tænia or Tape Worm, the Ascaris, and the Lumbricus. These animals are naked, and without limbs; they seem to possess no Heart and Blood-vessels. The External worms, as the Earth-worm, &c. possess neither circulating or nervous systems, and like the Polypus, may be multiplied by cuttings; they possess the organs of both sexes, and mutually impregnate. The other class of the Vermes, according to Cuvier, is the Mollusca; these are so called

from their soft fleshy nature ; some of them are naked and destitute of any covering, whence they are called *Nuda*, as the Slug; others are defended by an envelope of shell, and constitute a numerous tribe under the name of *Testacea*. Both these species of *Mollusca* have no articulated members ; they possess blood-vessels and a circulation ; they respire by gills, and have some appearance of brain and nervous system ; whence we may perceive them one degree above the *Zoophyta* and *Worms*. Cuvier has made some further distinction among the numbers of this tribe, as the *cephalopoda*, where the organs of motion are near the head, as the Cuttle-fish, the *Nautilus*, &c. ; the *Gasteropoda* that crawl on the belly, as the Limpet, the Snail, the Whelk, the Screw, &c. ; the *Acephala*, which have no head, as the Oyster, Cockle, Muscle, &c. These animals secrete from the surfaces of their bodies a covering of lime, united with a certain proportion of carbonic acid, which produce all the varieties to be met with in the cabinets of the curious. These shells are ranged according to the number of parts, as Univalve, Bivalve, Multivalve, &c. I shall defer the consideration of the proper Insects and their Economy till my next, and remain for the present, my Dear Friend,

Yours sincerely,

L. S. B.

LETTER V.

DEAR FRIEND,

IN my last I gave you a few remarks on the lower order of Insects, the Vermes ; the other division that take the name of Insects, now merit our attention. These form a tribe that differ very materially from those that have gone before. They possess articulated members, and antennæ ; every insect has a head, antennæ, and feet, of which the Vermes, with a very few exceptions, are quite destitute ; these parts are the distinguishing criteria of Insects. They possess six or more feet, and respire by pores or tubes, in the sides of their bodies, called Stigmata or Spiraculi ; they have no bones, but their tough skins serve the purpose of shells : it is the antennæ that are the peculiar organs ; these are jointed and tubular, and seem to contain some organs of sense, perhaps those of hearing, as well as touch. This class exhibits such a variety, that naturalists have divided them into tribes, chiefly according to the number and position of the wings ; these are, first, the *Coleoptera*, which have a hollow horny case, under which the wings are folded, as the

Beetle, the Glow-worm*, the Spanish Fly, &c.; secondly, *Hemiptera* having four wings stretched straight out, or placed across each other, as the Grasshopper, the Bug, the Cockroach, &c.; thirdly, *Lepidoptera*, having four wings studded with scales, and a soft hairy body, which division takes in all the beautiful tribe of Butterflies, Moths, &c.; fourthly, the *Neuroptera* having four articulated wings, as the Dragon and Ephemeron Flies; fifthly, *Hymenoptera*, which differ from the last only in having a sting, as the Wasp, the Bee, the Ant, &c.; sixthly, *Diptera*, two wings only, with little balls or poisers behind the roots of each; the common Fly, the Gnat, the Musquito, &c. belong to this order; *Aptera* which possess no wings, as the Spider, the Scorpion, the Flea, and to which Linnæus added the Lobster and Crab; Cuvier, however, has placed these, with the Shrimp and the Monoculus by themselves, under the name of *Crustana*. These are the general divisions of the Insect tribe. In looking on this class of ani-

* It is impossible to mention the Glow-worm without calling to mind the singular anomaly it forms in its sexual difference. The little insect that we see on a summer's evening in the hedge emitting phosphoric light, is, as its name imports, *a worm*; it is the female, and its male companion is *a fly*, that takes wing and traverses another element, and is attracted to its mate by this peculiar signal of a luminous secretion on the surface of the female worm.

mated nature, we behold many circumstances in their structure and economy of the most extraordinary character. The peculiar phenomena of their transformation is a most astonishing ordinance of nature ; although most of the other tribes of animals, between birth and old age, undergo many alterations and changes, yet nothing in the whole range of animal existence, equals this singular transmutation of a worm or caterpillar, into a nymph or chrysalis, and the developement from this passive envelope, of a fly possessing no analogy of structure with the preceding worm, but taking on a different set of functions, and becoming a tenant of the air : this is an instance of the greatest change which nature affords amidst all her sportive variety. There are several circumstances in the history of this tribe, which cannot fail of arresting our attention ; we find, the lower an animal is in the scale, the greater is its independence of that complicated texture of nervous system, on which the more perfect animals continue in such constant dependance. Such is the complex structure of Man, and those animals that approach him in their organization, that the slightest injury offered to particular organs instantly terminates life ; while we perceive that the lower orders of animal life, will, like vegetables, suffer violence and lesion to a considera-

ble extent without destruction. When divided, the Polypus and the Earth-worm will again unite, or each divided portion will become an entire new animal ; they are capable of restoring parts that have been separated : the Lobster and Crab will shoot out fresh claws, if their present ones are torn off. Blumenbach removed the head of a Snail, which with its four horns were reproduced, though the process took up near six months. In proportion, then, as animals are depressed in the scale, are they endowed with tenacious living powers, that render their existence more independent. Still, however, they are relatively imperfect ; they are not susceptible of any improvement or education, like the more perfect kinds ; guided by the irresistible and undeviating impulse of strong instinct, they cannot travel out of the prescribed path ; when removed to situations where instinct cannot operate, they have no sagacity, no intelligence to substitute means : a Bee, removed from his associates, is helpless and inert ; without the least power of varying his instinct, he cannot turn to another mode of action : a dog will vary his pursuits, but a Bee is a creature of necessity, a member of society, acting by innate compulsion. Many animals are capable of being instructed ; the Dog, the Horse, even the churlish Hog, evince no inconsiderable docility ;

but the Insect, is destitute of all power of bending from the yoke of instinctive impulse.

Of all the productions in nature, Insects are thought by some to be most numerous, even to exceed plants, which often bear myriads of the former, as living tenants of their surfaces; the extent of their fecundity is immense; a single Mite will, in a few days, be multiplied a thousand times. It is a rule in nature, that the meaner births are lavished in profusion, while the larger and nobler animals are produced with a more dignified economy.

The mode of propagation in Insects partakes of some variety: in the lowest order, the Zoophytes generation resembles the growth of buds and branches in trees: in these the young shoot out from the surface of the parent; a small protuberance, analogous to a bud, is first of all visible; this gradually increases, and a new individual is at length evolved, which, when it has attained a certain size, becomes separated from the parent: they may be multiplied also by divisions, like plants; this is the most simple form, and requires no distinction of sex. The Mollusca display a difference of sexual structure; the Acephalous kind, such as the oyster, muscle, &c. contain both systems in one, and form a race of true androgynous animals. Other species of Mollusca, as the Snail, the Leech,

&c. contain also both systems in one, but require the union of two individuals; this is the case with most worms. As we ascend higher, we find the winged Insects approach the mode established among more perfect animals, and divide into male and female; the latter deposits her ova by an unerring instinct, in a proper nidus; at the regular period, these become evolved, a worm or caterpillar is produced, which sooner or later undergoes the usual transformations, takes on the winged form, proceeds to multiply its species, and then finishes its career.

Insects are indigent of that vital fluid, of which all the other forms of animal nature stand in such constant need; they cannot continue their living actions in a vacuum; they require a constant supply of oxygen, that *Alma Mater* of animal perfection; and in return they give out carbon like other animals: but the mode of respiration is very different; no white-blooded animals take in air by the mouth—they consequently have no lungs. In caterpillars, an air tube lies under the skin, on each side of the body, which has several openings, called stigmata, that absorb the air, which is distributed all over the body by numerous ramifications.

Respiration in these Insects is produced by absorption from the surface of the body, which

is the reason that oil is so obnoxious to them; it blocks up these orifices that imbibe the air, and thus obstructing respiration, destroys the animals by suffocation.

Some of the Vermes have a species of gills, which are very conspicuous in the Oyster. The Snail has a small cavity near the neck, which opens and shuts, and takes in air; it is, however, a simple cavity, and contains nothing like a pulmonary structure. The imperfection of the nervous system of Insects, and the paucity of their sensations, is another striking anomaly in their organization. The Vermes in general seem destitute of the higher senses; touch and taste may be allowed them, and of the seat of the latter, we seem to be ignorant; but the *Sæpia* or Cuttle-fish, is the only species in which organs of sight and hearing have been at all discovered. It has been doubted whether the two black specks on the horns of a Snail are organs of vision. How trifling is the superiority which this order possesses above vegetable systems! Insects are, however, much higher endowed than the Vermes; it is a remarkable circumstance, that they possess a larger supply of optical organs than any other animals. The more perfect systems possess but a single pair of eyes, whereas we find the number much increased among the Insects; the

Scorpion has six, and the Spider eight complete eyes. But a very striking peculiarity of structure in the eye, prevails among the Butterflies and Beetles; the convexity of the cornea is divided into an immense number of hexagonal surfaces, which may be considered as so many distinct corneæ. This compound structure does not exist in the larva; it is only formed when the animal takes on its last transformation to a fly; whence some have supposed these polyedrous eyes, are calculated for the view of distant objects, which in the larva state would be unnecessary. The sense of hearing cannot be denied to most Insects, though the immediate organ is often so obscured as to elude discovery. The antennæ have been supposed by some as the seat of this organ, but it has been objected that Spiders, who have no true antennæ, possess this sense to a great degree. The sense of feeling must be allowed them; the various operations carried on by many, could not be effected without a high degree of the sense of touch; when the Caterpillar or Silkworm spin their webs, we must suppose them endowed with a fine susceptibility of feeling.

“The Spider’s touch how exquisitely fine
Feels at each thread, and lives along the line.”

Such, then, is the structure, and such the

powers of these lowest forms of animal existence; these powers are the result of their organizations, and are adapted to the elements in which they are placed. And after all, when we consider the complexity of many of their operations, the subtle dexterity of their movements,* we must allow them to possess a certain perfection of powers, a plenitude of organic action, that in some degree compensates the want of higher energies.

After this slight survey of the Insect Tribe, we will now for a few moments direct our attention to another class, the Tenants of the Deep. The great expanse of the ocean, together with the rivers that run into it, and the lakes that are confined inland, all teem with organized inhabitants. Linnæus reckoned more than four thousand species, and probably the recesses of the deep may contain many others, that have not yet come under human observation. The instincts of this order seem to be very limited; the preservation, and multiplication of their kinds, seem to constitute the chief circle of their pursuits; to accomplish these, their appetites are of a ravenous character, and their prolific faculties astonishingly great; the

* Lyonet has calculated no less than five thousand muscles in the Caterpillar of the Willow Moth, while mighty Man does not possess as many hundreds.

number of ova in some females surpass calculation, and, indeed, such is the incessant system of carnage going on among them, that if provision was not made against this destruction, by a superfecundity, many species would long since have been annihilated. Nature has not furnished vegetable food for the support of Fish, as she has done on the land, for the supply of the other orders, whence they invariably destroy each other, and every one becomes a beast of prey. Destruction on the one hand, and superfecundity on the other, seem to be the counterpoising qualities, that keep up the equilibrium of numbers in the finny race.

Linnæus divided this class into four orders, depending on the relative position of the fins.—Blumenbach makes two leading divisions, viz. the Cartilaginous, where the skeleton consists of cartilage; and the Bony, where it is formed of harder substance. The first division is again divided into two orders, according as they possess gill-covers; thus the *Chondropterygii*, having no gill-cover, as the Lamprey, the Skate, Shark, &c. and the *Branchiostegi*, having a gill-cover, as the Sturgeon, the Pipe-fish, &c.; the Bony division is then arranged after the Linnæan classification into four orders, according to the position of the fins, viz. the *Apodes*, having no ventral fins, as the Eel kind; *Thoracici*,

having ventral fins directly, under the thoracic, as the Flounder, Turbot, &c.; *Abdominales*, having ventral fins under the thoracic, as the Salmon; Smelt, Herring, &c.; *Jugulares*, having ventral fins in front of the thoracic, as the Haddock, Cod, &c.

Fish respire by means of gills, which are placed behind the head. By these organs the animal receives its oxygen, from the water which is taken in by the mouth, and discharged through the openings of the gills. The gills are highly studded with ramifications of fine vessels, that absorb the oxygen from the water in its passage through the above channel.—Fish, however, require air; it is found necessary often in winter to break the ice in fish ponds, to admit the air, when the little animals are observed coming eagerly to the surface to imbibe air. When fish have been placed in distilled water, or in water exhausted by the air pump, they have uniformly languished and died. There is one singular piece of mechanism attached to the structure of many fish, called the air-bladder, by the expansion and contraction of which, the animal is rendered more or less buoyant. This bladder lies in the abdomen, along the spine, to which it is closely attached, and is commonly called the Sound. It communicates with the stomach, and is generally

found to contain azotic gas, which is secreted by a large gland situated in the bladder. Flatfish, which remain mostly at the bottom, do not possess this organ, and I believe the Mackerel is also without it. There are also some of this class endowed with the singular powers of displaying electrical phenomena. In the *Torpedo* this power is seated in the lateral fins, which are capable of giving a very strong electric shock. In the *Gymnotus* this faculty is placed in the abdomen, but in the *Silurus Electricus*, this formidable power seems seated all over the surface of the body under the skin. This power is voluntary in the *Torpedo*, and no doubt serves these animals as means of assault and defence from their enemies.

Fish have been always conspicuous for extreme longevity; the softness of their texture, and the element they exist in, serves to protract that hardening of the parts, which, in all animals, seems the prelude to age and decay. Carp, in gentlemen's ponds, have been said to live more than a century. There have been two methods devised of ascertaining the age of Fish, viz. the circles of the scales, and a transverse section of the backbone. When a scale is examined by a microscope, it is said to consist of a series of concentric rings, which, like those in the wood of trees, are formed every year, and thus indi-

cate the age of the Fish. In the Ray kind, who want scales, the backbone is transversely divided, and the rings discovered point out the age of the Fish, similar to what takes place in trees. Fish seem to possess all the senses, though some have doubted whether the tongue constitutes in them the organ of taste, as it seems to have no papillæ. The organ of Hearing, which was long unknown, is now very correctly ascertained to be in the head.

The mode of reproduction in this class is different from most other forms; there is an exact distinction of sexes, but without the necessity of intercourse. The ova are deposited in proper situations, and become impregnated out of the body by contact with the roe of the male fish. The stomachs and gullets of fish seem to form but one cavity; the food taken in being often comparatively large, is retained partly in the gullet till the lower end, seated in the stomach, becomes digested by the strong powers of the juices of that organ. The alimentary canal is, in general, very short, which is the usual structure with all carnivorous animals. The digestive powers of this class are very great, and capable of assimilating almost every thing that presents to them. The rapid movements of fish are performed partly by the assistance of their fins, and partly by the flexibility of the

extremity of the body, where a mass of muscle is inserted, that assists in propelling the animal in its course. From all that has been said it will appear, that Fish are much behind the more perfect animals in the extent of their enjoyments; their sensations are all less acute, and their happiness more of a negative kind, though perhaps nature, that does nothing in vain, has given these creatures a degree of enjoyment beyond what we may suppose.

We come now to a singular tribe of animals called Amphibiæ, comprising many individual species, of very opposite characters and habits, but who are classed in one large community, from their possessing the faculty of remaining a considerable time under water; they would seem to stand in less need of the atmosphere than terrestrial animals, who cannot live, in general, for the shortest space of time when removed from it. To account for this singular power in Amphibious animals, naturalists have supposed some deviation from the general structure of other animals; and, in consequence, a great organic difference in the form of the heart has been inferred. To explain this difference, it is necessary to remind you, that in the fœtus, the lungs not being in action, only require sufficient blood to effect their evolution. They are quite passive, and exercise no function. The

blood that comes to the right auricle of the heart, does not all pass into the corresponding ventricle, and thence into the pulmonary artery, but escapes through a patent kind of opening, called the Foramen Ovale, immediately into the left auricle, whence it is sent into the left ventricle, and propelled into the aorta. But when the child is born, being come into its natural medium, the air, the hitherto dormant lungs are called into action, and having a very important office to discharge, require all the blood that comes by the vena cavæ to the right side of the heart, and which is accordingly thrown from the right auricle into the right ventricle, whence it is passed into the pulmonary arteries, to be circulated through the lungs, where it undergoes considerable change and amelioration, from the stimulus of oxygen imbibed by the pulmonary veins. This opening, then, between the auricles, which now is not only unnecessary, but would, perhaps, be rather prejudicial, gradually closes, and remains shut through after life.—There is also a small vessel called the Ductus Arteriosus, which passes from the pulmonary artery into the aorta, and is auxiliary to the Foramen Ovale, in conducting the blood from the right to the left side—it follows its fate, and after birth becomes like it, soon obliterated. Now in Amphibious animals this direct open-

ing between the two auricles was supposed not to close after birth, but to remain open during life; consequently, when the animal is under water, and the lungs not in action, the circulation was supposed to go on directly through the heart, independent of what is called the lesser circulation through the pulmonary system. The idea of the lungs being a mechanical apparatus to assist in forcing on the circulation, though supported by the authority of Haller and Cullen, seems to be abandoned by subsequent anatomists. It was thought the collapse of the lungs after expiration, and the distension by inspiration, both acted as obstructing causes to the passage of the blood through the pulmonary vessels. This opinion is now generally given up, it being made evident, that the lungs are never in that state of collapse supposed by former writers, as a considerable quantity of air is always left in the cells after expiration, which only effects a partial discharge of the air.—The grand characteristic in the anatomical structure of Amphibia, then, would seem to be, according to this, the remaining open of the Foramen Ovale through life, while it closes up in land animals. I believe this has been the opinion received and taught, ever since the discovery of the circulation by Harvey, two centuries ago. But recent anatomists, of great science and in-

genuity, seem to doubt the whole. Blumenbach and Cuvier, the two most celebrated anatomists of this age, give the evidence of their most extensive observations against it. Sir Everard Home's experience is more in its favour. It is therefore now a point, by no means cleared up, whether the Foramen Ovale remains open during life in the Amphibiæ. One circumstance strikes me in its favour, which is, that in the turtle, an opening is always found between the two sides of the heart, by an aperture in the septum, that divides the ventricles; this communication *between the ventricles* constitutes a peculiarity in the comparative anatomy of that animal. All the anatomists of the eighteenth century adopted this notion, of the Foramen Ovale remaining open through life, as an orthodox tenet. Buffon instituted a set of experiments upon puppies just littered, some of which he immersed in warm milk; at the end of half an hour they were taken out, and allowed to respire, and again immersed, and this process repeated, with the same interval, a third time. The Count seemed satisfied, by these experiments, of the possibility of keeping the Foramen permanently open, and thus producing excellent divers; but, I believe, very few naturalists are now satisfied with the inference of that ingenious philosopher. If, then, it is found in

many amphibious animals, that the Foramen Ovale does not remain open during life, but continues closed, without altering the habits and characters of these animals, we must naturally have recourse to some other circumstance in their economy, that can account for this singular faculty, of being able to continue so long under water, deprived of that air of which other animals stand in such momentary need. There are two circumstances in their structure which seem satisfactorily to explain it. The lungs of Amphibiæ are not formed of that cellular structure which prevails in men and quadrupeds; they are of a texture less dense and more membranous. They are not so studded with blood-vessels as the cellular lungs of the Mammalia, consequently they do not oxydate so large a proportion of blood. It is plain, then, that the oxydation of blood in the lungs, is not a function of such vital importance in them as in the higher classes, and that they are constructed to possess a considerable tenacity of life, and to forego not only air, but food, warmth, &c. Toads have been found imbedded in solid rocks, and in the hearts of trees, where they must have been confined for an immense period, without any of the external stimuli of life, and yet they have been living and perfect; therefore it is not the prerogative of

being Amphibious *only*, which nature has intended them, as Mr. J. Bell says, “ if they can live two days without air, it is because they could bear any other kind of injury with equal ease, and could live two days without the heart or the head.”

This excessive portion of irritability, this extreme tenacity of life, with which most Amphibiæ are endowed, seems to arise from another peculiarity in their structure, the comparatively diminished magnitude of the brain. This organ, compared with the size of the body, is of very diminished volume in most of this class. We find in Man, that the proportion of the brain is to the rest of the body, as from about $\frac{1}{22}$ to $\frac{1}{32}$: whereas in the Serpent tribe it does not exceed $\frac{1}{800}$, and in the Tortoise its volume is reduced so much as not to equal $\frac{1}{2000}$. This diminished volume of brain, explains that independent vitality, which the parts of such animals possess. Each part seems to be endowed with inherent powers of life, exclusive of the brain. That sympathy or consent of parts, which distinguishes systems with large and elaborate brains, is unknown to these lower animals; consequently any læsion or injury in one member, is not propagated by a high wrought sympathy throughout the machine; the brain has not that sovereign influence over the body, that

obtains in higher animals ; they approach nearer to the rank of vegetables, which bear extensive mutilations without endangering the plant. This diminished sympathy, therefore, the result of a brain less elaborate, and of reduced magnitude, prevents all external stimuli from producing a general influence through the system, consequently a certain local irritability every where exists, a tenacity of living power is inherent in every part, which operates to the preservation and prolongation of life, under circumstances apparently the most extraordinary ; thus Turtles and Frogs will continue to live after their heads and hearts have been removed. A Snail in the hands of Blumenbach, as I observed before, absolutely reproduced its head, after a considerable space of time. If, then, such are the powers which these animals possess, of retaining their vital energy under such extreme circumstances, we surely cannot wonder at their being able to forego one element for a short period, and existing a few hours submerged in water. We need not look for any anatomical provision on this or on that side of the heart, the means are diffused over the whole body, and consist in an inherent energy of parts, not dependent on the brain as a common sensorium. It is found that this independent energy of parts, obtains only at the

bottom of the scale of animated beings ; it is directly as their distance from the elevated rank of Man, and inversely as the diminished volume of the nervous system. Man is a highly wrought, complicated, nervous animal ; as you recede from him in the scale, the nervous system descends gradually, till it seems almost lost, in the lowest orders of organic structure. The deviations in the anatomical structure of Amphibiæ, then, in addition to the circumstances already mentioned, of diminished brain, and membranous lungs, are a want of diaphragm, and external ear ; no hair, feathers, mammæ, and grinding teeth. Linnæus divides them into four orders ; 1st. *Reptiles* having four feet, as the Tortoise, Frog and Lizard Genera ; 2dly, *Serpents* having lengthened form, and no external members, as the Rattlesnake, Viper, and all Serpents ; 3dly, *Meantes* having both gills and lungs, of which there is only one species, the Syren Lacertina, found in Carolina ; this ambiguous animal is about two feet in length, and has a head something like the Lizard, but only two feet armed with claws. It has gills, as well as lungs, and hence seems the only true Amphibious creature with which we are acquainted ; 4thly, the *Nantes*, or Swimming Amphibiæ, as the Shark, Sturgeon, Torpedo, &c.

I will not intrude upon your attention by any description of individual animals of this class, as they are generally well known. The Syren seems to afford the most striking peculiarity. This class of animals comprehends some of the most determined enemies of Man; the Rattlesnake, the Boa, and the Cobra di Capella, are most noxious and irreclaimable adversaries, and convert the vicinities of their abodes into solitary deserts, where no other animal dare obtrude, without suffering for its temerity. The immense power of some of the larger Serpents, in overcoming animals of considerable size, would appear incredible, were it not sufficiently well attested; a Buffalo is said to have been destroyed with ease by one of these enormous reptiles, which curled itself round, and absolutely crushed the animal to death. The forbidding form of all these animals is such, that Man seems to feel an irresistible dread at their appearance. The minds of the most brave and firm, are often appalled by the approach of any of these disgusting creatures. This is perhaps a provision of Nature to preserve us from falling victims to their destructive power. The beneficence of Providence has thus afforded us a safe-guard against them. The almost instinctive feeling of terror, is evinced towards the whole tribe, and yet we find that out of 200

different species of Serpents enumerated by naturalists, only about 30 are of a poisonous nature, and destructive to man. This general horror is wisely excited against the whole tribe, by which we have a greater chance of escaping the baneful effects of that portion armed with such deadly weapons.

The Amphibiæ, then, comprise a list of animals of diversified forms and characters, endowed with an excess of irritability, which enables them to overcome injuries, and undergo privations, destructive to others, deriving their living powers from a higher degree of nervous organization. These animals come very little under the cognizance or controul of man; they minister nothing to his wants, they seldom meet him but as enemies; they nevertheless form an important link in the great chain of animated nature, where nothing is superfluous, but where every part belongs to a mighty plan formed by consummate wisdom, and the extent of which is too mysterious for the conception of our limited faculties.

I remain,

Dear Friend,

Yours truly,

L. S. B.

LETTER VI.

DEAR FRIEND,

THE transition from the loathsome tribes alluded to in my last, is easy and pleasant to that beautiful order the Tenants of the Air, the winged multitude, “that warble through the vernal wood,” and constitute some of nature’s chief ornaments. The infinite variety displayed in the tints of their plumage, and the native elegance exhibited in their various forms, added to the charming melody of their notes, make them a source of pleasure and delight to the contemplation of admiring man. One or two species of the Bird of Paradise I lately saw at Mr. Bullock’s museum were so beautifully and richly variegated, that I should never again question the correctness of any representation of the feathered tribe. The leading anatomical and physiological distinction of Birds consist, first, in their beautiful envelope of feathers, which defends them from the rain and cold: these are all so inserted as to lie backward from the head, and allow the water to run off without remaining. Feathers are elegant specimens of nature’s art. Dr. Paley has given a most ex-

cellent description of the structure of a feather, but to which I must refer you, it being too long literally to transcribe here. He says, "every feather is a mechanical wonder;" it unites two properties often very incompatible, strength and lightness: the quill part forms a hollow cylinder, and the vane is composed of threads which join together by means of a number of fibres which act like teeth, and clasp each other, thus holding the different threads in close and easy union; the form of these teeth or clasps is curved; those on the side towards the extremity of the feather are long, flexible, and bent downwards—while those on the other side are short, and turn upwards; they are constructed to fit each other's curves, and effect a complete junction. The pithy substance found in quills is the former vascular congeries dried up, which nourished the feather, and effected its growth: when the growth is completed this dries up, and leaves the appearance so usually found in quills. The forms of feathers in the different genera are innumerable; several have three or four feathers proceeding from a single barrel. A gland is situated in the rump of birds, which, in the Aquatic kinds, is large, and secretes an oily liquor, which lubricates the feathers, and enables them better to repel the wet. In many species of winter birds, the down about the

roots of the feathers is uniformly black; whatever may be the colour of the feather. Some have supposed this a provision of nature to give additional warmth to the bird in the cold season, black being the colour that retains heat for the longest space of time; but perhaps it may be objected to this, that many animals entirely change their colour in high latitudes during winter, and become perfectly white. We find the Bear, which is brown in warm climates, uniformly white in Greenland. The comparative warmth of the different coverings of animals, arising from difference of colour, is a very curious subject, on which I have often reflected, and seems not to be generally understood. We do not find that animals become in any instance higher or darker in colour in their transportation to warm climates;—the texture of the covering is materially altered; wool changes to a hairy form, and in going to very cold countries it becomes of a furry nature. As far as colour causes any alteration in the warmth of covering, we must have recourse to chemistry for an explanation.

I intend making a few experiments on the cooling power of coloured surfaces, the result of which I will give in some future correspondence. There is one circumstance in the Physiology of Birds, which is, that although the

males and females may have very distinct plumage, yet when the latter is so advanced as to pass the season of laying, it acquires the plumage of the other sex, and in some species may, at first view, be mistaken for the male. A change very analogous takes place in our own species; there are many circumstances denoting an approach towards the masculine figure. The Skeleton of Birds next claims our attention; this exhibits a considerable uniformity through all the class: the circumstances chiefly distinguishable are, first, that the bones of the Cranium do not unite by sutures as in Man, but are consolidated into one piece; the jaws are destitute of teeth; these are supplied by the bill, the form of which varies in the different orders, and indicates the character of the Bird; thus the rapacious kinds have it very hard and curved at the point, as have also the Parrot kind, the Woodpecker, &c.; others again, as the Woodcock, Snipe, &c. have it of a lengthened form and soft texture, which enables them to distinguish their food at the bottom of ponds: the bill is no doubt the organ of feeling in birds. The spine in birds is made up of a considerable number of vertebræ; those of the back are often anchylosed, and limit the motions of that part; this is, however, sufficiently compensated by a larger number in the neck, which gives it a

degree of flexibility not met with in any other orders. A Bird can place its bill between its wings, a situation to which none of the mammalia can bring the snout. The Swan has as many as twenty-three cervical vertebræ; this length, assisted by the mode of articulation of the vertebræ, enables the Bird to touch every part of its body with its beak. Birds have very few ribs—and the breast-bone, to which they are attached, is prolonged into a vertical process, which serves for the attachment of the strong pectoral muscles, which are called into action in flying, and gives them great purchase. Some Birds that do not fly, as the Ostrich and Cassowary, want this high ridge; the wings are attached to the sternum by the intervention of the two clavicles, and the intermediate fork-like bone commonly called the Merrythought. The respiration of Birds is carried on in a peculiar manner: the lungs are comparatively small and flattened, and adhere to the ribs and sides; the air passes through the chest into the cavity of the abdomen, where it is contained in membranous cells; not only the abdomen thus receives air, but even the bones become air cavities; the sternum, the ribs, the vertebræ, and all the long bones have their internal cavities filled with air from the lungs: this diffusion of air through the bodies of birds has been

commonly supposed to serve the purpose of lightening the body, and assisting it in flying, swimming, &c. by accommodating its specific gravity to that of the surrounding medium ; whence an analogy has been supposed between Birds and Fish, which are assisted in their ascent and descent in the watery element, by a spacious air receptacle within the body : but Mr. Hunter, from considering that the Ostrich, which does not fly, was more abundantly supplied with this pneumatic structure than Woodcocks and many birds of flight, and that Bats had no such peculiarity of structure, was led to suppose it only formed an extension of the lungs, and served as a necessary reservoir for air, auxiliary or subservient to respiration during their long and rapid flights, when respiration must of necessity be less frequent. Whence he deduces an analogy between Birds and Amphibiæ, who have long extended lungs in general, that reach through the abdomen, and serve as reservoirs of air while the animal is submersed. He, however, admits this air must be of some use in flying, as those birds that soar to the loftiest heights, as Eagles, Hawks, &c. have this general diffusion in the greatest extent.

Birds manifest very different habits and characters in pursuit of their food ; we find some

content with scattered grains at the barn door, and others, impelled by voracious propensities, devouring little else than flesh, and even the smaller individuals of their own class. The digestive organs of Birds take on a corresponding diversity of structure to this variety of character. In the Granivorous Birds we find a gizzard of strong muscular structure, capable of mechanically triturating the grains taken in, which it receives from the crop, which, with the *succenturiatus*, is a dilation of the *œsophagus*, and serves, like the Hopper of a Mill, to furnish the food to the gizzard as fast as it digests and passes it on. The mechanical force of this organ is immense; we are told by Swammerdam, that precious stones have been broken down, and that a Louis d'or lost 16 grains of its weight in four days. The trituration of the grains is assisted by a quantity of hard stones, which these Birds swallow with their food, and without which, we find, they do not sufficiently digest it; they grow lean and sickly, however abundantly they may be supplied with food, if they are denied gravel. Some have supposed these stones acted as substitutes for teeth; others, that they were useful in correcting acidity; but Blumenbach thought their use consisted in bruising the grain and destroying its vitality, which would otherwise resist the action

of the digestive organ, as worms, &c. do; and on this account it is found, that grinding oats, or heating them so as to destroy their vitality, will render them so much more fit for the stomach, that a horse will thrive equally well upon a much less quantity.

In the Carnivorous Birds, the stomach is a thin membranous bag compared with the gizzard of the Granivorous kind. The intestines are very short. They are capable of enduring hunger for a great length of time, and the females are larger and stronger, and more splendid in their plumage than the males.

Birds have been classed by Linnæus into six orders, dependent chiefly on the form of the bill; 1st. *Accipitres*, which takes in the birds of prey with curved bills and large talons; 2d, *Picæ*, the Pye Kind; 3d, *Anseres*, Birds of the Duck kind, with smooth bills, and web-footed; 4th, *Grallæ*, the Crane, with long bills, &c.; 5th, *Gallinæ*, the Poultry kind; and lastly, *Passeres*, or the Sparrow Tribe.

To illustrate the history of every striking species in this numerous class of animals, would carry us beyond our present bounds; they assume different characters, and exhibit most astonishing varieties, from the tall ostrich to the diminutive humming bird, and from the ravenous vulture to the innocent dove, the em-

blem of peace and social happiness. They are all oviparous ; and, while making these remarks on their comparative anatomy, it may not be amiss to conclude with a few observations on the structure, &c. of the Egg. The egg may be said to consist, in general, of the Yolk, the White, and the Shell. The Yolk is the ovum, which is usually seated in the loins ; one of these is taken up by a tube called the Oviduct, and, in its passage through the Oviduct, the White is secreted and added to it ; when it reaches the Uterus the Shell is added, which is formed of lime and carbonic acid, secreted by the vessels of the uterus. Sometimes the egg is produced without its calcareous covering ; this is owing to debility in the hen. We find it requires some vigour in the animal constitution to secrete lime, whence fractured bones in persons, weakened by age or scurvy, or any constitutional debility, do not easily unite, and recourse is often had, in such cases, to strengthening, invigorating means, to enable them to furnish the necessary supply of phosphate of lime. The Shell of the Egg is so porous as to admit air, and a cavity exists at one end, which always contains a portion of air. The Yolk and White are both contained in their respective membranes. A small white spot on the surface of the yolk bag is called the Cicatricula ; it is sur-

rounded by whitish circles. From each end of the yolk-bag proceeds a white body, ending in little flocculi in the white; the uses of these are not known. The process of incubation in the egg goes on as follows:—On the first day a spot of shining appearance is seen near the Cicatricula; on the second day a gelatinous filament is discovered; the cicatricula now disappears: on the third day rudiments of a heart appear; the spine and head are now visible: motion is observed on the sixth day: ossification commences on the ninth. The feathers appear about the fourteenth: on the nineteenth it can utter sounds; and on the twenty-first it breaks through its prison, and emerges. As incubation proceeds, the yolk becomes paler, and is, together with the white, gradually absorbed into the intestines of the chick, which it serves to nourish, till it is sufficiently strong to emancipate itself from its shell. In general, one intercourse is only sufficient to fecundate one ovum; but in turkeys, one intercourse fecundates all the ova in the ovarium.

These remarks conclude all I shall offer on the structure and economy of Birds, by which we have seen how admirably they are adapted to the element they exist in. They are formed for lightness and buoyancy, and embellished with every grace, and every colour, that fancy

could suggest to render them objects of the most splendid beauty. Their instinctive ingenuity in making their nests, and providing for their young, and in taking their extensive excursions and migrations, display the design of superior wisdom. Their rapidity on the wing is astonishing; it has been calculated at a mile in a minute. They soar to prodigious heights in the atmosphere.

“ ——— Ye birds
That singing up to heaven’s gates ascend,
Bear on your wings, and in your notes his praise.”

We now approach nearer the structure of that perfect organization, which is chiefly the subject of our consideration, and with a reference to which, we make all our observations on the different parts of animated nature. In examining the nature and condition of Quadrupeds, we shall find they approach nearer to our own species in form and attributes, than any of the other classes. They are more intelligent than Birds; these are more sagacious than Fish, and the cunning and dexterity of Fish, seems to exceed that of most of the Insect tribes.

Although considerable variety obtains in the structure of Quadrupeds, yet we find them all constituted upon one general plan. Besides a similarity of sensations, of the various functions

of digestion, circulation, &c. there is in the basis of their external form such uniformity as clearly evinces one original plan, upon which the whole have been constructed. Buffon says if you bend a Human skeleton, incline the pelvis, shorten the thighs, legs, and arms, join the fingers and toes, lengthen the jaws, and extend the back-bone, you have immediately the skeleton of a Quadruped; for it is only by shortening some, and extending others, that the skeleton of a horse differs from that of a man.—I shall say very little at present on the Cranium of the Mammalia, as opportunity will offer to touch upon it when speaking of the Human skull. We find the forms of the Brute skull much flattened and depressed, and the outline of the head distinguished by an elongation and projection of the face and jaws. The area of the Cranium is less than that of the face, the contrary of which holds in the human head. The jaws of the Mammalia contain teeth, with the exception of the whale tribe and two or three others. The Whale, instead of teeth, is provided with an apparatus formed of that well-known substance whalebone, which is of a horny texture, and lines the palate in the form of two inclined planes, containing vertical plates of this substance projecting into the mouth. These plates are parallel, and to the

number of two or three hundred on each plane; their edges are loosened into a fringe-like form, which gives a rough surface, that enables it better to retain the slippery molluscæ, &c. which constitute the food of this animal.

The form and number of the teeth have been taken by Linnæus as data to distinguish this class into different orders. The texture of teeth differs from that of other bones. The enamel is of peculiar and flinty hardness, and has been found to contain fluete of lime.* The tusk of the Elephant seems to be without this enamel, and the ivory is different both from the texture of teeth and bone.

The form of the teeth strongly indicates the habits of the animal. In those that cut and gnaw their food, as the Squirrel, Rat, Hare, &c. and the whole order of Glires (the Rodentia of Cuvier) the two front incisores are long and large, and these animals are deficient in grinders. But the ruminating animals, as the Ox, Sheep, &c. are on the contrary without the incisores, and largely supplied with grinding teeth of broad surfaces. In Beasts of Prey the canine teeth are long and pointed. In the Graminivora the teeth have a third component part, very observable in the Elephant, Horse, Ox, &c.

* A combination similar to Derbyshire spar.

called the Crusta Petrosa. The renewal of the teeth takes place in many animals as well as man. A great singularity is however observed in the dentition of the Elephant; there never appears more than one grinder, and part of another in the gum; the anterior one is gradually worn away, and its root absorbed; the posterior one then advances to supply its place; a third tooth then appears in the gum, which goes through the same stages. This process is repeated eight distinct times, and each new grinder is larger than the preceding. This curious mode of teething, seems to exist in the Wild Boar, and according to Sir Everard Home probably obtained in the Mammoth. Many of this class are provided with horns, which in some species add considerably to the beauty and defensive power of the animal. The Antlers of the Deer are not horn, but true bone, and the casting and renewal of these, are attended with some peculiar circumstances in the economy of these animals. Proceeding from the head we find the trunk of the skeleton divided into three parts, the Spine, Chest, and Pelvis. The Spine is the most constant part, and prevails through the whole tribe of red-blooded animals, which have thence been called Vertebral, in contradistinction to the white-blooded, which are termed Invertebral. All the

Mammalia are said to agree in the number of the vertebræ of the neck, which is uniformly seven. The number of Dorsal Vertebræ is regulated by the number of the ribs. The Lumbar Vertebræ vary in number in different species. The form of the Sacrum and Os Coccygis admits of variety; the latter is often extensively prolonged, and made up of several vertebræ. The chest in all animals is narrower than in man, but deeper. The number of ribs vary; man has twelve pairs, the horse eighteen, the elephant nineteen. The breast-bone in man is flat; in some animals it is rounded; in the mole it takes on the form of a pointed figure, like a ploughshare, which is useful to the animal in digging its way under-ground.

In speaking of the limbs of animals, we find a closer analogy of structure with those of man than we should *a priori* suppose. A thigh-bone varying in length, moving upon the trunk; an arm bone also of various length. This bone is so short in some animals, as the horse, that it scarcely extends out of the trunk, whence the popular mistake of calling the carpus of the horse, the knee-joint; it is, in fact, the wrist-joint. A bone, called a cannon-bone, which becomes consolidated with two small metacarpal bones, proceeds from this joint downwards, where it articulates with the pastern, &c. which

are analogous to the fingers. The same kind of structure holds in the hinder limb. The thigh-bone is short; the bones of the leg consolidated terminate at the hock, which is, in fact, the ankle, and the protuberance at the back of this joint is the true heel of the animal, and has the Tendo Achilles inserted into it; from this downwards a cannon bone, which is the instep, or tarsus, reaches to the lower bones or metatarsus; consequently a horse may be said to have but one finger or one toe.

From the skeleton of quadrupeds we proceed to consider their internal organs. You will perceive, that the viscera of the thorax in this class, evince a great similarity of structure and function with those of man. They possess cellular lungs and a double heart. But in the organs of digestion they manifest considerable diversity of structure, and consequent variety of character. One tribe, who constitute a distinct order, take the name of *Ruminantia*, from the circumstance of ruminating their food, or, as it is commonly called, chewing the cud. These are herbivorous animals, and have the faculty of bringing up the morsel again from the stomach into the mouth, to undergo a second grinding or mastication. It appears that these are furnished with four different stomachs. The food, after mastication, is thrown into the first

stomach, where it remains some time, after which, the animal forces it up again into the mouth, where it is further masticated; it is then sent into the second stomach, from whence it passes gradually into the third and fourth; in which last, digestion is completed. It is then sent on to the intestines, through the long convolutions of which it is finally conducted. Naturalists do not seem agreed as to the final cause of Rumination. Some have supposed that, by its means, the animal can take in a large quantity of vegetable aliment, which it can afterwards masticate and digest at leisure, and thus quantity might in some degree compensate for quality. But then the Horse, the Ass, the Hare, and many animals that live on vegetable food, do not Ruminant.

Upon the whole, the final purpose of Rumination is not well understood*. The Camel

* The animals which chew the cud comprise, the Ox kind, the Sheep, the Antelope and Goat, the Deer, Camel, Musk, &c. creatures which display passive innocent qualities. Under the head of Quadrupeds, there ranks a very singular animal, which is a native of New Holland; it is called the *Ornithorynchus Paradoxus*: the head resembles that of a Duck; the jaws form a Beak, whence it has acquired the name of the Duck-Billed animal. It is web-footed. Sir E. Home has dissected more than one. It displays great peculiarity of structure, and is altogether the most anomalous animal that ever came under the view of the anatomist.

has a peculiar structure of stomach, which enables it to take in a quantity of water sufficient to last it during a journey of two or three days across the desert. It appears this water is deposited in cells of the two first stomachs, closed by strong bands of muscular fibres, over which the animal exercises a power of voluntary motion: these cavities have been found to hold four gallons. In the Camel, as well as in the rest of the Ruminantia, the stomachs are connected by a groove that runs through them from the œsophagus, which groove possessing prominent edges and strong muscular fibres, is capable of being drawn together into a complete tube, which then forms a direct communication between the œsophagus and third stomach, so that the food is passed on without disturbing the water in the cells of the second stomach, which is therefore preserved so clear as to be drinkable by the traveller in the event of an emergency.

In Herbivorous and Ruminating animals the intestines are longer than in any other order; in the Ram they sometimes measure twenty-seven times the length of their body. The Carnivorous animals have stomachs much smaller, and their intestines shorter, perhaps not more than four or five times the length of the body. Animal food is more easily reduced

to chyle, and assimilated to the system than vegetable; hence the stomach is more simple, the intestine less extended, and the time taken up in the process of digestion much shortened. Omnivorous animals, as the Hog, the Rat, &c. have their stomachs and intestines of a middle nature between the two last.

There prevails a great similarity throughout this class in all the auxiliary organs of digestion, as the liver, pancreas, spleen, kidneys, &c. The gall bladder is wanting in the Horse, Goat, Deer, Camel, &c. All those animals that want it are Herbivorous; it would therefore seem to be an organ exclusively attached to Carnivorous systems.

To glance only at the leading varieties of the different species of this numerous class of animals would occupy considerable volumes; their diversity of character branches out into every supposeable shade of difference: the untameable ferocity of the Hyæna, the playful innocence of the Lamb, the sagacious cunning of the Fox, the dull heaviness of the Ox, the generous nature of the Lion, the treacherous temper of the Cat, the huge magnitude of the Elephant, and the diminished figure of the Mouse, afford us striking contrasts, and teach us that nature has established in this class every possible variety, that there is scarce any passion, but is made to

predominate and take the lead in the characters of some particular species.

These forms of animated nature are, then, the destined companions and assistants of Man in this temporary stage: with many he must for ever inevitably live estranged; their natures are opposed to his condition, their qualities are unsuitable to his wants; with others he enters into association, he tames their dispositions, he bends their qualities to his own use. He makes a friend of the Dog; he gains cloathing from the Sheep; he deifies, and derives various comforts from the Ox; but the generous Horse becomes his right hand in effecting his own civilization. Had the Americans known the Horse, Pizarro and Cortez had never achieved the conquest of the New World. The Horse was a great instrument in effecting this conquest. The poor astonished natives, opposed by this spirited beast, and destitute of the use of iron, surrendered their physical strength to a handful of the most cruel, insatiable mercenaries that ever the thirst of gold sent forth to commit crimes, desolate nations, and disgrace humanity. Many animals are attached, by their particular natures, to particular spots, and afford to necessitous Man his best blessings. To the Arab, his Camel is every thing; without it the desert would be the confines of his world. The Asiatic

tames, and wields the strength of the Elephant against his foe. The poor Laplander delights in his Reindeer. In every climate, and in every society, the Horse and the Ox are heaven's best presents to this presumptuous, but needy Lord of the Creation.

Human nature must ever be studied with a reference to surrounding agency. Man is not an insulated being; he relies on the friendship and assistance of others; he is part of a great circle; he is exposed to the influence of active elements; he is, like the rest of the universe, under the impulse of laws implanted, immutable, and unerring; laws beneficent, and indulgent. As an author says, "Let him study these laws, let him understand his *own nature*, and the nature of *the beings that surround him*, and he will know the springs of his destiny, the causes of his evils, and the remedies to be applied."

Man came into a world already tenanted with inhabitants of various characters and qualifications; beasts are his elder brethren; he must ever be studied with a certain relationship to them; he conquers some, by others he is conquered; each species pursues its own good alone; animal devours animal, till an equilibrium of powers alone, produces peace in the creation. Man entered a world inhabited by active energies, where war and strife were the

predominant features ; he had to fight his way for dominion by the superior endowment of his mind, but still his boasted understanding deigned to stoop, and gain information from the Brutes. These were the living sparks, from which he kindled all his flame of knowledge. Born himself without their instincts, he possessed only the capacity of imitating their movements, and improving them to his own advantage.

- “ See him from Nature rising slow to art,
- “ To copy Instinct then was Reason’s part ;
- “ Thus to Man the voice of Nature spake,
- “ Go, from the Creatures thy instruction take ;
- “ Learn from the Birds what food the thickets yield,
- “ Learn from the Beasts the Physic of the field ;
- “ Thy arts of Building from the Bee receive,
- “ Learn of the Mole to plough, the Worm to weave ;
- “ Learn of the little Nautilus to sail,
- “ Spread the thin oar, and catch the driving gale.”

Thus the universe forms a lively, an animated circle of social happiness.

We readily perceive, in looking back on the various forms of animated natures we have been considering, that they are all constructed on a similarity of plan ; one standard pervades the whole. As I observed above, in the red-blooded animals we find a head and spine form the basis or foundation of all the rest. The spine is, as it were, the keel upon which the

trunk is projected ; from this trunk issue limbs or extremities, and within it are contained organs for the nutrition, the growth, the propagation, &c. of the individual. This general plan branches out into much variety in the different orders, but through the whole can clearly be discerned *one grand model of organization*. Each creature varies in its parts, and in its functions, according to the elements it is destined to act in, and the part it has to act ; every thing is adapted to the sphere of its movements, and actions. A regular gradation is observable from the lowest upwards to nature's master-piece, Man: uniformity, harmony, symmetry, shine through the maze ; the hand of a Divine artist is every where visible ; power and wisdom are conspicuous in the page of nature. He who can look through this range of nature's works and not admire ; he who can admire and not adore, falls short of what nature intended him, and is deficient in the first blessings of an enlightened mind ; a rational conception of the Supreme Attributes, an enjoyment of the beauty of the universe, and a modest knowledge of himself. He who traces surrounding phenomena up to their great First Cause—who studies nature with a reference to its Author, possesses the basis of religion within himself, enjoys the true sublime, and demonstrates the Being and

Beneficence of the Deity in every part of
Creation ; such a mind

“ Finds tongues in trees, books in the running brooks,

“ Sermons in stones, and good in every thing.”

It is a source of never failing comfort to itself,
and of admiration to others.

I remain,

Dear Friend,

Yours, &c.

L. S. B.

LETTER VII.

DEAR FRIEND,

WE have now to direct our observations to the state and condition of Man, situated as he is in the universe, endowed with paramount faculties and attributes, and surrounded by a crowd of animated beings, appointed by nature to accompany him, to assist him, and to share with him the occupancy of this globe. Enquirers into nature have differed materially in their views of the character and qualities of humanity. Some have delineated the species in every colouring of virtuous embellishment, adorned it with every tint of rational perfection, and armed it with extensive powers of intellectual energy; while others have clouded its character in shades of vicious propensity, obscured its first motives in a mist of imperfections, and exceedingly contracted the sphere of its mental endowments. Either of these extremes, perhaps, are wrong. Man holds evidently a middle course in physical energy: we shall find, perhaps, he has the same rank in moral perfection. At present, however, we have only to do with the constitution of his Physical Powers;

the consideration of his Moral condition will occupy a future letter.

Whatever difference of opinion may exist among Casuists, as to Man's moral perfection; all are agreed in doing homage to the perfect organization of his anatomy; here every one seems anxious to bestow the meed of praise.

In tracing animal forms through all the gradations in the scale, we at length arrive at the acknowledged superiority of Human Physiology; we find Man placed on the confines of another world, embracing in some degree the two modes of Material and Spiritual existence, and as Mr. Locke says, forming the *Nexus utriusque mundi*. We see displayed in him faculties superior to any thing visible in the most perfect forms of brute creation. The approaches which some animals seem to make towards Reasoning, fall far short of it; the chasm is impassable that separates these creatures from the fulness of Human Intelligence. We see Man going forth, then, a finished specimen, a master-piece of sublunary creation; we exclaim with the poet, "What a piece of work is Man! —how noble in reason, how infinite in faculties, in form and moving how express and admirable, in action how like an Angel, in apprehension how like a God, the beauty of the world, the paragon of animals!"

It has been said in praise of the Human faculties, that Man is endowed with all the powers and capacities of every other animal; that he is, in short, a summary of animal perfections. This is, however, overstepping the modesty of nature. It is an hyperbole grounded in mistake. The attributes and faculties of the various species of animals are so numerous, so complicated, and so opposite, as to be perfectly incompatible in one system. Could he possibly combine the enormous muscular strength of a lion, and the exquisite touch of the spider; could his optics soar with the eagle, and view the range of an extended horizon; and contract with a fly, and peep into a pore? His senses and powers are wisely and justly adapted to a middle rank of physical energy. Had he these finer gifts, what would be their use?—they would do a violence to his organs—they would convert his pleasures into sufferings. Were his olfactory senses more elaborate, it might only serve him, as the poet says,

“ With quick effluvia darting through the brain,

“ *To die of a rose in aromatic pain.*”

In contemplating the outline and figure of Man, the first thing that strikes us is, his upright form. He stands alone in this attribute; he is the only erect figure on the surface of this

earth. No animal besides treads the ground with the whole surface of the foot. The monkey and the bear make the nearest approach to this faculty; but in neither does the os calcis touch the ground; they tread on the fore part of the foot. In most quadrupeds, as I have observed before of the horse, only the last phalanx touches the ground. The prolongation of the metatarsus removes the os calcis to such a distance from the ground, that it is situate midway between the trunk and the hoof, and takes the name of the Hock. When the Monkey stands up, we perceive his knees bending under the weight of his trunk, which consequently inclines forward; when Man stands erect, the axis of his trunk stands perpendicular to the plane of the horizon, a position which the trunk of no other animal ever attains. It is recorded, however, that more than one person, who had been early lost in the woods, and who, from constant intercourse with the brute creation, had acquired a brutal mode of existence, had absolutely attained the gait of the quadruped, and bent forwards on the superior extremities; a striking instance, if true, of the paucity of every other human instinct except Imitation. Man walks erect by virtue of the perfection of his organization; it is the posture in which nature has

placed him ; it is an attribute of his physical pre-eminence.

In contemplating the relative Anatomy of Man, let us begin with the organ that is the seat of that noble faculty, which gives him the paramount superiority over the rest of the animal creation. We find the Head a bony case, containing a complicated substance of elaborate structure, in which is seated the God-like attribute of Mind. By means of this structure, Man exercises a sovereignty over all below, and is capable of directing his faculties to all above.

The perfection of his superior energies is found to bear a certain ratio to the quantity and form of that highly-wrought substance, the brain. The Brain very accurately fills up the cavity of the Cranium, consequently the quantum and relative proportion of the Brain can be ascertained by the form of the Skull. The figure of the Skull has therefore been taken by anatomists, to denote the comparative magnitude of this important organ. The general outline of the Cranium is most materially influenced by the prominence of the Facial Bones ; a projection of the upper jaw is the circumstance operating most usually ; to ascertain the degree of this, Camper instituted the facial line, which consists in two lines drawn on the profile of the

Face, one horizontal, from the external Ear along the bottom of the cavity of the Nose, which is intersected by a perpendicular line proceeding from the convexity of the Forehead, to the most prominent part of the upper Jaw. This last is the true facial line, and the angle it makes with the horizontal one just described, indicates the difference in the form of the Cranium. This angle is found in the European adult to be about 85° ; in the Negro to be about 75° ; in the monkey tribe to be reduced below 70° ; and gradually diminishes as we descend in the scale, till at length in some birds and fishes, the two lines become almost parallel, and we are justly led to associate stupidity with the lengthened snouts of these animals. The Crane, the Snipe, &c. have been proverbially remarked for want of intelligence.

The Ancients are supposed to have had some notion of this line, as they have uniformly represented all their great men with an elevated facial line of 90° , and in their busts of gods and heroes, have even exceeded the limits of nature, and raised this angle to the unnatural extent of 100° .—The Owl has the two tables of the frontal bone much separated to form air cells, which gives this bird an elevation of the facial line, without increasing the volume of its Cranium, and consequently a false air of intelli-

gence, that occasioned its being chosen by the Ancients as the emblem of wisdom. The situation of its eyes near together has also contributed to give it a distant resemblance of the outline of the human face.

This facial line, however, does not hold universally as an indication of the relative intelligence of different animals. It differs very little in many animals of very divergent character; whence another view of the Head has been hit upon by physiologists: this is the relative proportions of the areas of the Cranium and Face. The Brain must be considered as exercising a two-fold function; it appears to be the instrument of Thought, and also the organ of our Sensations. The perfection of our intellectual faculties depends upon a perfection in the volume and structure of the Brain. The activity of the senses is also dependent on the state of this organ: in proportion, then, as that part of the Brain, which is the immediate origin of the nerves of the senses, is exceeded by the remainder, which may be considered the organ of thought, in such proportion is the animal elevated in the scale of intelligence. Therefore, where the quantum of medullary substance, which makes up the general mass of the Brain, and constitutes the organ of Thinking, far exceeds that smaller portion, which gives nerves

to the senses, so does the animal excel in intellectual capacity. As the general substance of the Brain, therefore, or the organ of mind, exceeds that of the senses, so are the Mental endowments of the individual. Now, the Face is principally made up of the parts containing the two organs of smelling and tasting; in proportion as these parts are more developed, the size of the Face bears a greater ratio to the Cranium; and *vice versa*, when the Cranium is large, it indicates a large volume of Brain, with smaller organs of sense. A large Cranium and small Face, therefore, denote in general a superiority of intelligence, above the converse of these relative proportions.

Now, the facial line does not give us exactly these proportions; they must be looked for in another division of the Head; and a vertical section of the Skull longitudinally, shews us the relative proportions of these parts. It exhibits to us the area of the Cranium, compared to the area of the Face, consequently we can by this means compare the intellectual with the sensual structure in each: the lower jaw in these calculations is entirely left out.

According to the above, the area of the Cranium to the area of the Face, is discovered to be as 4 to 1 in the European Head; in the Kalmuc

Tartar about 4 to 1.01 ; and in the Negro about 4 to 4.02 ; less in the Ourang Outang, and gradually diminishes as you descend in the scale. Mr. Lawrence observes, that the outline of the Face in the above section, forms a Triangle, the longest side of which is the line of junction between the Cranium and Face ; the front of the Face forms the shortest side of the triangle. In Monkeys, the front of the Face forms the longest line, and the junction between it and the Cranium the shortest.

The ancients, and indeed the moderns, till very lately, supposed that Man had the largest Brain of any animal in proportion to his bulk. Recent physiologists have, however, detected the fallacy of this position, by discovering many striking exceptions ; they found that the proportion of the Brain to the body in many birds, exceeds even that of Man, and that several of the Monkey tribe and others are equal to him. But it is found that the portion of Brain, as I observed above, which is destined to the noble office of Thought, is proportionally larger in Man, compared with that part which is the immediate origin of the nerves of sense, than holds in any other animal whatever. Here Man exceeds all animals that have hitherto been examined ; it appears, then, that the quantity of Brain, over

and above that portion which directly ministers to the senses, is in a direct ratio to the intellectual capacity of the animal.

One inference to be drawn from the relative proportion of these parts, in different tribes of Men is, that on those where the facial organs prevail, they will enjoy greater acuteness of the senses; and such is found to be the case: the Kalmuc and the Negro far exceed the European in the sense of smelling, in particular. The American excels him in sight; he will follow the track of his enemy, where an European could discover no vestiges of human footsteps. We are told, the wandering Arab possesses a very acute sense of hearing.

The form of the Skull we find takes on a corresponding figure to the intellectual capacity, and has given rise to the science of Craniology, which Dr. Spurzheim is at this time illustrating by a course of interesting lectures in London, wherein he deduces the qualities and propensities of the mind from the configurations of the Skull, and has made some curious comparative inferences from the busts and portraits of the greatest characters of both the ancient and modern world.

Mankind have been principally divided into three great tribes, *the European, the Tartar, and the Negro*; in these we trace considerable

variety in the form of the Head. The *European*, according to Blumenbach, has a round head, the forehead of moderate extent, the cheek-bones narrow, without much projection, the front teeth ranged perpendicularly. The *Tartar* has his head almost square, the cheek-bones projecting outwards, the nose flat, the eyes angularly situated outwards, the chin slightly prominent, the skull assumes a square form, and exhibits a tendency to lateral projection. The *Negro* has the head narrow, compressed at the sides, the forehead convex, the cheek-bones projecting forwards, the nostrils wide, the jaws lengthened, the teeth of the upper jaw turned obliquely forwards, the lower jaw large, the skull thus manifesting a character of lateral compression. We trace, then, the superiority of Man to consist in the structure of his Brain, of which the figure of his skull forms the exponent outline; so that the less an animal has of jaws, and the more of skull, the nearer it approaches the rational structure of the Human Head. Nothing gives the Human Face a more brutal aspect than protruding jaws, with a Head pushed back; in this case, we find the point of the chin projecting beyond the line of the face, the teeth prominent, the nose somewhat flattened, the eyes separated by a narrow space, the forehead receding, the skull terminating in a

sharp point above and behind;—a Man with such a Head will never make a Lord Chancellor.

The elaborate texture of the Brain, added to its relative magnitude, constitutes Man the most perfect of all animal organizations: he is endowed with a Mind, which has its seat, and displays all its operations in the Brain; it is owing to the energy of the Mind, that all the voluntary powers of the body are directed to a rational end. The function of the Brain is the only one, in which Man excels all other animals. There is no other organ in his body, (except that of the voice,) the powers of which are not exerted to greater perfection, in some species of animals than in Man. The senses and instincts of animals are much beyond him. The Ox surpasses him in strength, the Deer in swiftness; some elude him by superior cunning; some suspend their vital functions, and dive into the watery deep; others sit in majesty above the clouds: but none, like him, possess the Heaven-like attribute of Consciousness.

Having made these observations on the Brain, let us examine, for a few moments, its grand exponent, the Countenance; this is the great index of the Brain; here it has been supposed, as in a book, Men's passions and emotions might be read—here all the secret springs of the soul be traced in characters strongly marked: but this

expectation has been overrated. The Countenance is a fallacious dial of the mind ; in part it is true, but it is only in part ;—whoever expects to make Physiognomy a science accurately reduced to line and figure, and to find the secret springs of the Mind upon the tip of the nose, or the point of the chin, supposes a mistake. Hogarth has judiciously observed, that Handsome Faces will often hide foolish or wicked minds, till they betray themselves by their actions ; a bad man, he says, may so manage his muscles, by teaching them to contradict his heart, that little of his mind can be gathered from his countenance ; so that “ *the character of the Hypocrite is entirely out of the power of the pencil.*” “ Nature,” he adds, “ has afforded us many lines and shapes, to indicate the deficiencies and blemishes of the mind, while there are none that point out the perfections of it, beyond the appearance of common sense and placidity. Deportment, words, and actions, must speak the good, the wise, the witty, and the brave. All that the ancient sculptors could do, notwithstanding their enthusiastic endeavours to raise the characters of their Gods to aspects of sagacity above human, was to give them features of Beauty. Their God of Wisdom has no more than a handsome manliness.”

We must, however, avoid the extreme ; there

must be allowed a certain turn of expression in every countenance which awakens the attention of the observer. The animated intelligence of the Eye, and the whole aspect of a well-turned Face, exhibit constant changes of expression that arrest our attention ; and we seem, in conversation, often to gather the speaker's meaning before his words are uttered. The Face will always please and entertain by its various changes. Lady Mary Wortley Montague, with a levity peculiar to her, said, that was the whole body constantly exposed, the Face would be but little noticed. Hogarth, however, with more science, observes, that the rest of the body, not having those advantages of variety in common with the Face, would soon satiate the Eye, and in a short time have no more effect than a marble statue.

The outline of the Human Face is described in the beautiful figure of an oval, which blending variety with simplicity, is infinitely preferable to the circle, or any curvilinear form. The effect is heightened, by the easy and gradual diminution of the curve, from the broad arch of the Forehead downwards to the Chin. The prominent Chin, crested as it were by the lips, forms a striking and beautiful finish to the Human Countenance, which no other animal face possesses. The Lips and Chin are peculiar to

Man ; no creature besides has a prominent Chin, or has the Mouth rounded by a rich edging of lips.

The Eye is the feature which animates the whole Face ; these, with their Brows, constitute the Countenance, which derives its chief expression from them. The Nose adds much to the beauty of the Face, but having no motion, is not capable of expressing any great variety of passion. The Eye-lashes add much grace and beauty to the Eyes. Man, and some of the Monkey tribe, are the only animals that have Eye-lashes on both lids.

Descending from the Head we find the Trunk projected, as it were, from a bony keel the Spine, which in Man consists of twenty-four vertebræ. The different modes of articulation among different parts of this chain, give the whole a variety of motions, but the general flexibility of the Spine is not so great in Man as it is in many animals, where other modes of articulation prevail. Each vertebræ is connected with the next, by the intervention of a cartilaginous elastic substance : this substance yields to pressure, and slowly recovers itself ; whence a Man, who has been all day carrying heavy loads, will be found at night somewhat shorter than he was in the morning : and indeed the compressibility of this intervertebral substance, renders all persons

in a trifling degree shorter at the close of day than they were in the morning. Twelve pair of ribs issuing from the sides of the vertebral column, and meeting by their cartilaginous extensions in the Breast-bone, form the cavity of the Thorax, which contains the Heart and Lungs, those important organs, which have been designated by anatomists the seat of the *Vital Functions*, in distinction from those of the Brain, which have been termed the *Animal Functions*, and the offices of the Digestive Organs, which have gained the appellation of *Natural Functions*.

The Human Heart is a hollow muscle, consisting of four cavities, *viz.* two auricles, and two ventricles; the former receive the blood from the veins, and the latter send it forth again by the arteries. The Heart is situated nearly in the centre of the body, a little towards the left side; a vertical line dividing the Thorax, would pass through the right side of this organ; it lays flat on the Diaphragm: it is what anatomists call a double Heart, having two sets of cavities and vessels. In Fish, and simpler systems, the Heart consists of only two cavities. The course of the Blood, or what has been termed the Circulation, and which was discovered by our countryman Harvey in the 17th century, is as follows:—The Blood returning

through the veins from the different parts of the body, is poured into the Right Auricle from the Vena Cava ; this cavity, when distended, contracts, and forces its contents into the Right Ventricle, from whence it is by a similar contraction of the walls of this cavity, propelled into the Pulmonary Arteries, which circulate it through the Lungs : the Pulmonary Veins return this blood, improved by absorbing Oxygen in its passage through the Lungs, to the left side of the Heart into the Left Auricle ; this forces it into the corresponding ventricle, from whence it is projected into the Aorta, by which it is passed on through the different ramifications of the arterial system to every part of the body, from whence it is again returned by the veins, which gathering in size at length near the heart, unite in one trunk the Vena Cava, which pours the blood into the Right Auricle as before mentioned. This is a rough outline of the course of the Blood, which is called the Circulation.

The Blood so circulated is the grand pabulum which supports the structure, and supplies the waste of every part of the system ; it is reducible into several constituent parts, and is formed from the chyle which is elaborated from the food in the process of Digestion. The red colour of the Blood is supposed to arise from its con-

taining a portion of Phosphate of Iron: the rapidity of its motion may be conceived, from the following calculation:—Each ventricle is supposed to contain rather more than an ounce; the heart contracts or pulsates, at an average, about 4000 times in an hour—consequently 4000 ounces of Blood, or nearly 300 pounds, passes through it in that space of time. It is moreover estimated, that the whole mass of Blood in an adult is about twenty-five pounds; therefore this quantity circulates through that organ nearly twelve times in an hour, or about once every five minutes.

Mr. Hunter advanced an opinion, which I believe had been entertained by many philosophers for ages before, *viz.* that the Blood contained the principle of vitality; that it possessed a living power within itself, by virtue of which it manifested all its active qualities. Mr. John Bell has chosen to designate this theory “the most monstrous of all absurdities.” He says it is against all the laws of nature, that any fluid should be endowed with life. He considers a fluid as a body, which can have *no perfect character, no permanent nature, and no living powers* connected with it: but a solid, he says, is the reverse of all this. It may, however, be answered to this, that the Blood certainly evinces clear signs of possessing preservative

properties, and of imparting living powers to the organized forms it is concerned in moulding ; and we know that many fluids secreted from the Blood possess evidently strong living powers: the Liquidus Seminalis, the Gastric Juice, the Interstitial Fluid, all evince indubitable living properties. Among inanimate bodies, Mr. Bell's definition of a fluid certainly does not hold. Has Light, has Caloric, has Electricity, or has Oxygen Gas, which are all most active fluids, *no perfect characters, no permanent natures?*—are not these bodies the most powerful, the most homogenous, and the most permanent agents we meet with in nature? The Blood must, I think, be considered to have a certain share of vitality in common with the rest of the system, and the tenet of the Mosaic philosophy that “in the Blood is the life thereof,” must be allowed its full weight in its literal as well as figurative sense.

The next organs of the Chest are the Lungs, which are divided into two Lobes, and each lobe into smaller lobules ; they are covered by a fine membrane, and when dilated, they fill up the distended cavity of the Chest. The air enters the Lungs during inspiration by the Mouth, and passing down the wind-pipe, fills up the cells into which the Lobes are divided. The enlargement of the Chest in this case is effected

laterally, by the Intercostal Muscles elevating the Ribs, which enlarges the cavity of the Thorax from side to side. The longitudinal enlargement arises from the movement of the Diaphragm, which is a muscular partition that forms the floor of the Thorax, and separates it from the Abdomen. The Diaphragm is usually convex towards the Thorax—but when it contracts in inspiration, the convexity is drawn downward, and the surface of the muscle forms a plane, consequently the Thorax is thus while lengthened below. This action of the parts is quickly succeeded by a reaction of the muscles of the Abdomen, which press the Diaphragm back again ; the Intercostal Muscles relax, the Ribs descend, the whole cavity of the Chest is in consequence contracted, and the air so recently received is again expelled. This is the process of Respiration so necessary to animal life, and which must go on incessantly in all the more perfect orders, so that we find in Man it cannot be interrupted for the shortest space of time without destruction. Respiration takes place about four times in a minute.

The indispensable frequency of this process indicates its high importance in the animal economy. It is only within these few years that the changes effected by Respiration on the system have been clearly ascertained. We are

indebted to chemistry for all our knowledge on this subject. That science teaches, as I have before observed, that the atmosphere we breathe is composed principally of two Gases, *viz.* Oxygen and Nitrogen, in the proportions of about twenty-two parts of the former, to seventy-seven of the latter: now, it is found that Oxygen is the air that is absorbed by the blood-vessels of the Lungs, and that the air, Nitrogen, is of itself unfit for animal Respiration. The final purpose of Respiration, then, is the receiving into the system, at each inspiration, a certain portion of Oxygen Gas, which we find has very sensible effects on the blood in the Lungs. The blood which returns by the veins to the right side of the Heart is of a dark purple; in its passage through the pulmonary vessels it throws off a quantity of Carbon and Hydrogen, and in the pulmonary veins imbibes Oxygen, which gives it a bright scarlet in returning to the left Auricle. It is thus renovated in quality, and fit to stimulate the arteries, and perform all its functions. The office of the Lungs is therefore to purify the Blood, by separating Oxygen from the air taken in by breathing: this has been proved by a multiplicity of observations on different animals.

Some experiments have been made to ascertain the contents of the Human Chest, and the

volume of air taken in and given out, at each process of Respiration. The results of these have been variously given, but the Lungs, when fully distended, have been supposed to contain about 220 cubic inches. In natural breathing, we draw in and expel about 40 cubic inches—consequently we never wholly discharge the air from the Lungs; they always may be said to contain 180 cubic inches of air. If four Respirations take place in a minute, and 40 inches are discharged each time, we may say, that about 9600 inches, or rather more than 40 gallons, are expended every hour—consequently about 1000 gallons in a day.

The cells of the Lungs are coiled up, but when fully extended are supposed to be almost equal in extent to the whole square surface of the body: upon this surface the extreme vessels are spread that absorb Oxygen from the air. The air inspired is the atmosphere; the Oxygen of which is absorbed, and communicates by its stimulus, living energy to the Blood. The air given out in Expiration is a compound of Carbon, of Hydrogen, and of Nitrogen, which having, in various combinations, been the round of the circulation, and undergone many mixtures and separations, are at length become effete, and necessary to be discharged from the system; the Lungs are therefore highly important excre-

tory organs. The compound air expired is unfit for Respiration or Combustion ; it soon contaminates the air in close places, and renders it no longer respirable. When given out, it enters into new combinations with other bodies, and thus a constant change is going on in the Creation by an harmonious and well-adapted circle of operations.

“ 'Tis surely God

“ Whose unremitting energy pervades,

“ Adjusts, sustains, and agitates the whole.”

Many very ingenious theories have been invented to explain the Temperature of the Blood in the Human Body. Dr. Crawford supposed that the source of animal heat is in the Lungs—that the Arterial Blood possessed a *greater capacity* for heat than Venous Blood, which prevents too sensible an accumulation of heat in the Lungs. By the decomposition of Oxygen Gas in breathing, Caloric is evolved, which is immediately taken up by the Arterial Blood without its temperature being increased, owing to its *greater capacity* for it. When the Blood, in the course of the circulation, passes into the veins, its *capacity for Caloric* is diminished, and its latent surplus is in consequence given out ; and this gradual and constant evolution of heat, in the extreme vessels, is the cause of that uniform

temperature which is felt all over the surface. Mr. John Bell rejects this hypothesis, and observes, that it is a law of nature, that a body, while it passes from an aerial to a fluid form, or from a fluid to a solid form, *gives out Heat*; that all over the body there is constantly going on an assimilation of new parts, by which they are continually passing from a fluid to a solid form, which must necessarily produce a constant evolution of heat, by virtue of this chemical change of fluid into solid matter. This argument of Mr. Bell is certainly ingenious, and holds good as far as it goes; but it appears to me to shew only one side of the question; for the reverse of that law he quotes, or the conversion of a solid into a fluid, or of a fluid into vapour, necessarily *produces Cold*. Now the change which is unceasingly going on in the extreme vessels of an animal body is not confined to the former operation of converting fluids into solids; there is also another process, the converse of this, to be taken into account. The Solids are constantly being absorbed; their absorption cannot take place till their solid texture is broken down, and they are *changed into fluids*. This last operation balances the former; it keeps pace with it, or otherwise the bulk of the animal would be augmented indefinitely. There is a constant necessity for this removal of parts, that

have served their office and become prejudicial by longer continuance. All the excretions contain salts and solid matter in solution. All the parts of the system, even the hardest bones are, we know, in time removed by the activity of the absorbents; so that, in the space of a few years, not one particle of the body is left that formed it before—the whole animal frame has lost its Material Identity. Here, then, we must admit, a process is constantly going on that converts solids into fluids, and according to Mr. Bell's own chemistry, must necessarily be *productive of Cold*. This must balance the evolution of Heat alluded to by that gentleman, and I think much embarrass his theory.

The usual temperature of the human body in all weathers is about 97° or 98° of Fahrenheit, and this portion of heat is constantly tending to fly off from the surface of the body; whence the necessity of using clothes, which, by their loose spongy texture, holding a quantity of air, act as non-conductors, and confine the heat. Fur is a worse conductor than wool, and consequently a warmer covering; hence the animals of the Arctic regions are clothed with this comfortable substance—while again, the natives of the Torrid Zone have neither fur nor wool, but a thin coat of hair. The inhabitants of Portugal, like the traveller in the fable, who could blow hot

and cold with the same breath, erroneously indulge a prejudice in favour of a leading article of their dress, the Capota. This huge woollen envelope they wrap carefully about them in the middle of summer, as well as in winter. In the latter season they argue justly enough, it keeps out cold, and, by a mistaken analogy, suppose in summer it keeps out heat; they, therefore, wear it every day in the year.

The tenacity of Life in some of the lower species of animals, to which I have formerly alluded, is in nothing more conspicuous than in the power many of them possess, of resisting the destructive effects of cold. Frogs have been found so much frozen as to chip like ice, and yet when they have been gradually thawed, have resumed all the functions of animation. The temperature varies in different animals;—in Man, and most of the largest quadrupeds, it is 98° ; in the Amphibiæ, it is as low as 40° ; in Fish, it is according to the temperature they live in.

Having taken up so much of your time on the Vital Functions, I will conclude, and remain

Yours truly,

L. S. B.

LETTER VIII.

DEAR FRIEND,

IN my last I offered a few remarks on the organs of the Head and Chest, the seats of the *Animal* and *Vital Functions*; if now we descend to the Abdomen, we perceive a different set of organs, designed to elaborate matter, to repair the waste of the solid fabric of the body; their offices have obtained the designation of the *Natural Functions*. The organ which here takes the lead, and to which most of the others seem auxiliaries, is the Stomach, the great receptacle of the food, which it acts upon, and assimilates to the nature of the system, by a process as wonderful as any thing we meet with in the whole range of nature. The digestion of the food has been in different ages, and by different authors, variously explained. At one time it was accounted for on the supposition of a violent fermentation, which taking place in the stomach, converted its contents to the nature of chyle. When the mechanical philosophy prevailed, it was attributed to the muscular fibres of the stomach exerting a mechanical action on the food, which became triturated and ground

down, exactly like so much corn in a mill. Chemistry, in its turn, had a share in the business—and so late as Cullen, we find every thing in the stomach balanced between the contending agencies of acid and alkaline principles. Medical philosophy has, however, of late, like other branches, thrown off the yoke of systematic theory, which so long tyrannized over all the phenomena, and warped every fact to its own purpose. The former practice was to set up a preconceived theory, and make every circumstance in nature bend to it in some way or other, however great might be the degree of distortion: at last, however, physicians have become philosophers, and have learned to reason by induction from the facts and circumstances which nature presents, and we shall find that observation and experiment have completely exploded all the above speculations, and thrown considerable light on the real state of the case in digestion.

The stomach is composed of several distinct coats, from the inner of which is secreted a peculiarly active, highly organized fluid, called the Gastric Juice, by the living energy of which the assimilation of the food is accomplished. This elaborate fluid acts upon the *ingesta*; and converts it to the nature of the system; this is the fair induction from several suites of experiments made by different physiologists. Beau-

mur enclosed small quantities of different kinds of food in small perforated metallic tubes ; these he introduced into the stomachs of Carnivorous animals, and after a certain time, it was found that the articles in the tubes were dissolved. Spallanzani pursued this mode of experiment, by means of small metal and glass balls and tubes, which he filled with barley and different grains, and introduced them into the gizzards of Turkeys and other poultry, and left them there for different spaces of time : he then killed the animals, and found that whenever he employed bruised grain, it was dissolved in proportion to the time it had been in the stomach, but the whole grains were left almost entire. In Birds with strong gizzards, he found tin tubes were crushed and distorted in every way. He then tried the effects of pointed bodies : he fixed twelve strong tin needles in a ball of lead ; these were cased in paper, and forced down the throat of a Turkey ; the needles were all but three broken off to the surface of the ball, without any injury to the coats of the Stomach. A more horrid instrument was then tried ; he fixed twelve sharp lancets in a ball of lead, which he gave to a Turkey ; at the end of eight hours the bird was killed, and no vestiges of these were found in the Stomach ; the ball was quite naked ; three of them were discovered in the

intestines; the Stomach, in this case, had received no injury. He extended his experiments to animals of membranous stomachs, where he found the Gastric Juice sufficient to break down the food, and reduce it to a pulp.

About the year 1777, Dr. Stephens published a treatise on Digestion, in which he gives an account of a series of experiments he made upon a German mendicant, who was in the habit of swallowing stones for the amusement of the people. This man would swallow six or eight stones as large as pigeon's eggs. The Doctor made him swallow a hollow silver sphere, divided into two cavities, and perforated with a number of small holes; into one cavity he put four scruples of raw beef, and into the other five scruples of raw fish; in a few hours, the beef was found to have lost one scruple, and the fish two scruples. Pursuing these experiments, he found that dressed animal food was sooner dissolved than raw; that masticated food sooner than other; and that vegetable matters, both raw and dressed, were soon reduced. The German, however, left him before he had finished his course of experiments; he then pursued them on Dogs, and found that the Gastric Juice of a Dog was capable of dissolving hard pieces of bone, and even pieces of ivory, but would not exert much influence on vegetables, such

as Potatoe, Parsnip, &c. In the ruminating animals, as the Ox, the Sheep, &c. he found the Gastric Juice would on the contrary dissolve vegetables, but made no impression on animal substances. As the Human Stomach, therefore, in these cases evidently acted upon both animal and vegetables substances, he concluded very justly, that Man comes under the head of the *Omnivora*, and is destined to eat both animal and vegetable food.

Mr. Hunter followed up the above experiments with nearly similar inferences, and in his paper on Digestion has treated the subject with his usual scientific precision. He obtained a quantity of the Gastric Juice of different animals, by means of sponges thrust into their stomachs, and immersed different articles of food in separate portions, in various temperatures. By these experiments, the fact was sufficiently established, that the Gastric Juice possessed a solvent power over the matters taken in; and that this power did not arise from any chemical agency in that fluid, but produced its effects by virtue of a living power inherent in it, by which it is enabled to act upon and assimilate the food to its own nature.

Mr. Hunter observes, that living matter possesses within itself a power of resisting the action of the Gastric Fluid; but that, when it is dead,

it loses this power, and becomes immediately acted on; hence, he remarks, we find many animals live in the Stomach, and increase there, as the Intestinal Worms, &c.; but the moment they die, the Gastric Fluid dissolves them in common with other matters taken in. If it were possible, he says, for a man's hand to be introduced into the Stomach of a living animal, and kept there for some time, it would be found, that the dissolvent powers of the Stomach would have no effect upon it; but, if the same hand was separated from the body, and left there, the powers of the Stomach would exert their full influence in destroying it. He further observed, that the very coats of the Stomach which contain this fluid, *while in the living state*, are not in any way acted on by it; but *after death* this most active agent immediately exerts its power, and dissolves the coats; often passing through into the cavity of the Abdomen, and affecting the texture of the different viscera. This is a most curious fact, and evinces, in opposition to Mr. J. Bell's definition of a fluid, the powerful, *permanent* energy of this highly-organized liquid.

The power of the juices of the Stomach is strongly manifested in the Serpent tribe, which swallow their prey whole, and dissolve and break down the mass by virtue of their strong solvent properties.

These effects of the Gastric Fluid cannot in any shape be attributed to chemical agency ; it is the result of an animal power, different from any quality to be met with among chemical elements. We find bread from the same loaf, water from the same brook, ministering to the life and growth of Man, and animals of very different natures. We, therefore, infer it is a *Living* energy, and not a *Chemical*, that produces these effects. A chemical combination is uniform and undeviating in its effects : two chemical bodies when mixed will always produce the same results ; but in the economy of animals, the very same substances are converted to very different systems. No greater error, perhaps, ever befel philosophy than the attempt to make all the functions of organized bodies subservient to the laws of dead matter. Animated beings possess a system of movements, the result perhaps of spiritual agency, over their particular organizations ; by which they overcome the *inertia* of their particles, and carry on their various functions.

Dead matter, on the contrary, is passive, and submits to the influence of external agency. There are, therefore, two systems of laws in the physical world ; one, that of organic structure ; the other, that of common inanimate matter. Digestion, therefore, belongs to the former ; it

is a living action totally different from any other action to be met with in chemistry, mechanics, or any branch of physics.

There has been some discussion among philosophers as to the particular kind of food most congenial to Man; whether nature intended him to feed upon animals, or to confine himself to vegetable diet alone. The evidence of his anatomical structure would seem to be decidedly in favour of his claim to both. The number and form of the teeth in the Mammalia, have been supposed to bear a reference to the proper diet in each species. The *Carnivora* possess in general long incisores and canine teeth, with only moderate grinders; while the *Herbivora* have large grinders and small, and often no incisors: the form and texture of the digestive organs are also further criteria. The Herbivorous animals have numerous complicated stomachs, and very *long* intestines; while the *Carnivora* have simple membranous stomachs, with *short* intestines. Man holds a middle course in regard both to the form of his teeth, and the structure of his digestive organs: he has, like the *Carnivora*, a membranous stomach, and intestines of a somewhat *intermediate* length between the extended tube of the *Ruminantia*, and the short intestine of the *Carnivora*: he also possesses that appendage to the liver the gall bladder, which seems wanting

in many Herbivorous animals, but is constantly present in Carnivorous systems : he is supplied with incisor teeth much after the manner of the Glires* of Linnæus, and has an establishment of grinding teeth similar to those animals living on vegetable food. To this may be added, that the experiments of Dr. Stephens and Dr. Hunter above alluded to, prove, that the Gastric Juice of the Human Stomach is capable of acting equally upon both animal and vegetable food. A proper mixture of both would therefore appear most congenial to our species.

The Mosaic History renders it somewhat doubtful whether the Antideluvians used animal food, as it does not seem that at the Creation any positive mention is made of any other than vegetable. “ And God said, behold I have given you every herb bearing seed, which is upon the face of all the earth, and every tree in the which is the fruit of a tree yielding seed ; to you *it shall be for meat.*” After the Deluge, the first positive injunction concerning animal food is recorded ; “ *Every moving thing that liveth shall be meat for you ;* even as the green herb have I given you *all things.*” From this period we know that the Hebrews, and other

* Cuvier forms these animals having large incisor teeth into an order called *Rodentia*.

nations, used animal food, both at their feasts and sacrifices.

There is a circumstance to be considered in the moral history of mankind, which would seem to indicate that nature intended animal food for the use of Man. Agriculture is an art which belongs not to Man in the infancy of civilization ; it indicates some progress in the social fabric. Many generations of men will necessarily have passed away, before a nation can have established a regular system of agriculture ; indeed it is a point in the scale of human progression, to which very extensive and numerous tribes have not yet attained, notwithstanding the remoteness of their origin. Hunting and Fishing are the early occupations of men ; we find all savage tribes constant and expert in the pursuit of their prey ; it is not till after some time that they collect and domesticate flocks, and become pastoral. Man is first a Hunter ; his next step makes him a Shepherd ; and arts and civil polity must have gained some ground before he feels himself sufficiently secure to till the earth, and wait to receive the fruits of his toil in the harvest. Now prior to the establishment of Agriculture, it is difficult to conceive that the spontaneous fruits of the earth, could afford sufficient food for the support of the community ; and indeed we always find uncivi-

lized nations using animal food in large proportion ; as, therefore, at his first going forth, Man is unable to cultivate the produce of the earth to any useful extent ; it seems to follow, that nature gave him that abundant supply of animal forms to minister to his hunger and his wants.

It is curious to trace the varieties that obtain among mankind in the use of food : many nations derive their chief subsistence from the animal kingdom, while others principally depend upon the vegetable for support. In the cold Northern countries we naturally expect to find vegetable growth narrow and stinted, and here accordingly mankind place their great dependence on the beasts of the chase, the fowls of the air, and the fish, which their shores and rivers often supply them in abundance. These men form a Carnivorous race, and, with the exception of a scanty use of grain, may almost be said to leave the vegetable kingdom untouched ; witness the inhabitants of Lapland, Greenland, Labrador, &c. In the warmer regions of the earth, where vegetable life shoots up with a luxuriant abundance, and branches out into rich variety, the natives use comparatively little animal food, but live principally on the fruits and roots with which nature so amply supplies them. It appears, then, that as we recede from the Pole, a less quantity of animal food becomes sufficient for

the inhabitants. Every habitable latitude enjoys a mean temperature of 60° for two months, and seems capable of producing some species of grain; whence almost every country has adopted the use of some kind of bread. Bread being a dry and friable substance, has been supposed necessary to be taken in with other kinds of food, in order to expose them to a sufficient mastication in the mouth; it is, therefore, generally eaten with animal and other food, at most of our meals. In order to obviate a supposed unwholesome tendency, it is usually mixed with a certain quantity of yeast, and exposed to a degree of acescent fermentation; it then becomes more spongy and tender: it however is not absolutely necessary thus to ferment bread. A very large portion of mankind use their grain unfermented; the Asiatics live upon Rice, a most nutritious, wholesome grain*, which they never ferment; the American Indians, &c. use their Maize in a similar way; and to come nearer home, the peasantry of Scotland make their Oatmeal into cakes without exposing it to any degree of fermentation—and Dr. Cullen says, he hardly ever met with a disease among them that could be

* The unfavourable opinion so generally entertained of the properties of Rice as an article of diet is now pretty nearly done away, and may be classed among the many vulgar errors so prevalent with the multitude.

attributed to their oatmeal. Wheat seems to make the most perfect bread, and is perhaps specifically the most nutritious grain, although Rice has been by some considered superior. The Potatoe is a root for which we are indebted to the discovery of America; I believe it was introduced among us by Sir Francis Drake; it is found extremely nutritious. Dr. Adam Smith thinks the Irish peasantry, who subsist chiefly upon this root, acquire that superiority in healthy athletic appearance over the peasantry of Scotland, from the superior qualities of the Potatoe to the Oatmeal, with which the latter are mostly fed. Since Adam Smith wrote, the culture of the Potatoe has however been much extended in North Britain, and promises to improve the condition of the Scotch peasantry. This author observes, that if Potatoes could be stored like Corn, they would become of great national importance, and would be more advantageous than Corn, as the same space of cultivated ground would produce a greater surplus of food for Man, and consequently maintain a larger population, similar to what is found in the rice countries, where a space of ground will produce enough of this grain to support a much greater number of persons than an equal space cultivated with European corn.

In speaking of the comparative qualities of

Animal and Vegetable diet, we should be led to infer *a priori* that animal food rendered the body more robust, and better able to undergo labour and fatigue, and that a man wholly fed on beef or mutton, must necessarily excel in all physical energies another who subsisted on vegetables only. This inference seems fairly to flow from the most rational theory, and yet how numerous are the exceptions. The Irish Peasantry, who are as healthy, as handsome, and as brave a race of men as can be produced, eat very little animal food; potatoes and coarse bread, with an occasional scanty meal of meat, is all that falls to the lot of these Patagonians of the British islands. A great portion of the labour of England is carried on by men, who get a very spare allowance of meat. I have seen the Gallician porters in Portugal, who work much harder than any set of men in London, and endure greater fatigue; they are a strong race of men, and eat little or no animal food; bread, savoured with a Sardinha or Pilchard, a piece of Garlick, and some sour Wine, forms the diet of these athletic, industrious fellows, whose honesty and moral worth adorn the province that gives them birth. Throughout France less animal food is used in proportion than in England.

It would seem, therefore, that Vegetable aliment alone is sufficient, accompanied with

exercise, air, &c. to give the body a very considerable degree of strength and vigour, and that in every country of Europe the labouring classes depend principally upon it, and enjoy a very limited use of animal diet.

After these few observations on the Stomach, the other viscera of the Abdomen come into view; the use of most of these organs is however very obscure, and as in all probability they act as auxiliaries to the Stomach in the office of digestion, I shall not dwell upon them here. Many anatomists consider the Liver an excreting organ, and think the Bile is a secretion necessary to be regularly carried out of the system.

On the outside of the Trunk, are situated the upper and lower extremities; the former have little more than a muscular attachment to the Trunk; the Scapula upon which the arm moves is situated in a bed of muscle behind the shoulder; a small bone (the Clavicle) unites it to the Sternum. The arm is articulated with the Scapula, by a round head of bone held in a superficial cavity of the latter, by a powerful set of muscles.

The form and situation of the Muscles are intended by nature to combine convenience and ease with purchase; they are consequently Levers of the third order, *viz.* with the power applied near the Fulcrum, and between it and

the point of resistance. The Biceps Muscle for instance, arises above the Shoulder Joint, and passing in a compact form along the front of the Arm, is inserted into the Radius, just below the bend of the Elbow: its use is to lift the Forearm, which, with any weight it holds, forms the resistance or weight; the Joint of the Elbow is the Fulcrum, and between both, and near the latter, the Muscle is inserted, and the power applied; of course the acting part of this Lever is shorter than the resisting, and requires great strength in the muscle. Had this Muscle been formed to give it the greatest mechanical advantage of the Lever, its insertion must have been near the wrist, which would have made it very bulky and unwieldly; but nature acts in all cases upon principles of the wisest mechanism. What is here said of the Biceps applies to all the rest of the Muscles in the body. The whole Muscular System is therefore constructed upon a mechanical disadvantage; they act upon *a leverage of the smallest power*; this is however compensated by being less bulky, and not so much in the way, as they must necessarily have been had their points of insertion been nearer the extremities of the limbs on which they act. Convenience and elegance here make up loss of power, and manifest a wisdom of design.

To accomplish the varied and multiplied

movements of the Arm, nature has finished it by the ingenious construction of the Hand, which is formed of different ranges of joints, moved by the forcible action of muscles and tendons most elaborately and elegantly contrived. “*Manus ipsæ sunt artium organa.*” The Thumb is, however, the part that gives the human hand its chief superiority; it can be brought so much in opposition to the fingers, as to allow them to grasp, and hold firmly any object taken in the hand, and it so assists and extends the general powers of the fingers, that it has been considered in the light of a second hand. No animal but man has a thumb so separated from the fingers, and so capable of enlarging their powers of holding and grasping. Galen, after giving a description of the structure and uses of the Hand, exclaims, *Considera igitur hic etiam mirabilem Creatoris sapientiam.*

With respect to the lower extremity, we find it moving on the Pelvis, by the action of the voluminous mass of Glutæi Muscles; these form in the Human subject a remarkable degree of magnitude, and with the bulk of the calf, constitute the peculiarity in the appearance of the human leg. As I observed above, no other animal has the privilege of placing its *foot flat, and resting the heel on the ground*, which becomes absolutely necessary to enable man to

maintain his upright posture, by giving a broad basis, within which the centre of gravity of the whole body might fall. The breadth of the Human Pelvis, and the obliquity of the neck of the thigh bone, throw the legs farther distant, and allow the feet a wider separation, which taken altogether give our species the noble prerogative of standing upright. Man, therefore, stands erect from these circumstances, and from the balancing powers of all the muscles which move the Pelvis on the thighs. When these muscles are all relaxed by Death, or any other cause, the body falls forwards ; it would, therefore, seem to be almost an artificial state, accomplished by a combination of numerous muscular actions.

These remarks form a cursory view of the Physical outline of the Human figure, the size and dimensions of which, notwithstanding the fables of the Giants, seems to remain much at the same level as in the remote ages of antiquity. The Egyptian Mummies which have been preserved, and which are perhaps three thousand years standing, exhibit no difference in stature with the men of our own days. The Emperor Augustus was considered by the Romans of a middle stature ; his height is recorded at about five feet nine inches of our measure.

In closing our observations on the general

Anatomy of Man, we cannot fail looking back on the sublime mechanism of his structure, and the ingenious adaption of the different parts. We behold in him a complex organization, but evincing a harmony and unity of plan, and manifesting the wisdom of Divine Intelligence. We perceive contrivance and design that bid scepticism defiance. Every one is acquainted with the great impression the organism of the Hand made on the Roman anatomist. We trace in Man, then, the Image of his Maker, and looking up from the Creature to the Creator, finish in the words of the learned Bellini, "*Magnus Dominus! Magnus Fabricator Hominum Deus! Magnus atque Mirabilis! Conditor rerum Deus quam Magnus es.*"

It is a law of nature, that all organized bodies, after accomplishing their evolution, reproducing their species, and fulfilling the final ends of their creation, should cease to exist, their bodies decay, and return to the elements of which they are formed; this is a positive law that operates throughout all animated nature. Every created being enjoys life on the condition of mortality. Man comes into life, is prematurely cut off, he is nipped in the bud; or if he arrives at maturity, accidents and diseases hover around him, all which if he still escapes, at length comes the fatal scythe of time; age waxes within him, he

carries in his texture the seeds of his decay, these ripen and consume the capability of his organs, his glass is run out, his earthly career is at last finished, and as the Psalmist says, "Man goeth to his long home." The period allotted for his course below is short ; at present, as in the days of David, three score and ten years may be considered the number of his days, and how few reach this extent ! It is computed, that three generations of men pass away in a century, consequently the whole human species cannot be said to divide one with another more than thirty-four years of existence. Of children born, not more than one in 80 reach seventy ; indeed one half that come into life leave it again before the eighth year ; of a thousand children born in London, 650 die before the tenth year.

The astonishing longevity of the Antediluvians has given rise to much discussion among the learned ; some have contended there was a difference in the mode of computing time ; others have attributed it to certain changes, which the surface of the earth sustained after the Deluge, which rendered it less salubrious. It appears, that from the Deluge to the time of David, a period of 1300 years, the age of Man gradually decreased. Noah lived to 955 years, Abraham to 175 years, Moses to 120, and David

to 70, which has ever since been considered the age of the Human faculties. A few instances of extraordinary longevity are recorded, which are only exceptions to the general rule.

It holds in general, that out of every thousand, thirty die off annually. Tables of Mortality have been constructed to measure the ratio of deaths in given numbers, and at given ages, which are of great use and importance in calculating Annuities, and throwing light on this interesting subject, in which we are all so materially concerned. The leading facts and circumstances to be gathered from these calculations, I will endeavour to throw together in the following observations. We find from the Bills of Mortality there is a disparity in the duration of life between the town and country very much in favour of the latter. In London the greatest expectation of life is 36 years, which holds at 6 years of age, whereas at the same age in the Country the expectation is 41. In London about one in 25 die annually; in the Country not more than one in 35. Half the children in the Capital die before the 3d year, in the Country one-half reach 10 years. At birth the entire expectation of life in London is 19 years, while at Northampton it is 25. At 28 we may say that one-half of life is gone, the probability being only 28 more. It is found also that Females

are longer lived than Males, so that from their birth to the 8th year, there is a greater expectation in their favour by 2 years and an half than in Males ; and this excess extends with a trifling variation, till about the 59th year, when the difference becomes very inconsiderable ; but through the whole range of the Table the excess is in favour of the Females. Nature seems to have established a pretty near equality in the number of the sex, which seems to confirm the observation that Polygamy is a trespass against the laws of nature, and incompatible with an increase of population ; but it is a most extraordinary fact, that this balance between the numbers of the sexes is only maintained by a *surplus of male births*, which takes place generally throughout the world, in the proportion of about 20 males to 19 females. Among the adult population, however, we find more women than men, and it is supposed that the waste of war, emigration, climate, &c. is not sufficient to explain the difference. Dr. Clarke has remarked that at the Lying-in Hospital in Dublin, during near 30 years observation, *one half more boys than girls are found among the still born*. He gives several anatomical reasons for the fact. It appears, therefore, there is a greater destruction of males during the foetal and infant state than of females, and therefore that the number

of young women who grow to maturity in every country, *somewhat exceeds* the number of young men.

Marriage is an institution so essential to Population above all other conditions of society, that many enlightened legislators have used their exertions to encourage it. The Romans, from the great extent of their conquests, and the immense armies they were under the necessity of sending forth to maintain these conquests, suffered materially in their population, as Montesquieu says, “they wore out like a weapon kept constantly in use;” to remedy this, they had recourse to every means calculated to encourage Marriage. They granted honorary distinctions and privileges to married persons, in proportion to the number of their children, and they inflicted penalties and disabilities on those who remained single, or being married had no offspring. Modern statesmen have wisely dropped all these institutions, finding by experience that where the means of subsistence are plentiful and *well diffused*, there needs no encouragement in the multitude to matrimony. There are very few young persons but incline to marry, provided it holds out no prospect of deteriorating their circumstances, and throwing them back from the rank in society which they have been accustomed to hold; hence there are proportionally

more single persons in genteel life than among the common people. It is a trite observation, that sea-port towns abound in children, and a very trite explanation of the fact has been given in the supposed physical qualities of particular diet: but the fact is, that on the coast there exists a greater abundance of provisions; almost every man becomes more or less a Fisherman, and adds to the general stock; this increases the means of subsistence, and the poor man, relying on this abundant supply, feels more encouragement to marry than the man in inland towns, and therefore undertakes the maintenance of a family. Marriages are in such places consequently more numerous, and this explains the fact. Each marriage is computed to produce above 4 children, that is, 10 marriages produce about 45 children. The number of marriages is in the proportion of about 170 to 1000 persons.

When no check from scantiness of provisions, from luxury, or any unwholesome political regulation occurs to discourage Marriage, it is astonishing with what rapidity the population goes on increasing; it was found in the American settlements to double in 25 years, and is capable of increasing much faster under circumstances more highly favourable. Whatever, therefore, tends to augment the expences of life, checks

Marriages and impedes the progress of population, which is the basis of all political prosperity.

The Mortality of the Human Species at different ages is a subject of curious enquiry. It is supposed, one-third of the number of the species die in the foetal state ; after which it is pretty accurately ascertained, that half of all that are born, taking the average of both town and country, never reach 8 years of age : after this, when the usual maladies to which children are exposed have passed by, the chances of life are wonderfully multiplied in their favour. If such is the extent of infant mortality, how imperative it becomes in parents and nurses, to adopt those means suggested by plain reason and nature, in the treatment of infants, instead of those monstrous practices, that so generally prevail, and consign so many to early tombs, and so greatly offend common sense.

The expectation of life is greatest about 8 years of age ; as manhood arrives, the expectation necessarily diminishes ; the young man is now called out into life, and exposed to those vicissitudes and contingencies, that are constantly curtailing our numbers ; his vascular system becomes more unyielding and liable to acute diseases. Drawing on beyond 40, the latent pre-dispositions to particular diseases, that

had hitherto lain almost unperceived, begin now to develope themselves. At 50, the vigour of the system declines, and can no longer exercise that plastic energy necessary to keep under controul those morbid tendencies that unfold themselves in different organs. The joints feel a degree of rigidity, the muscular strength fails, the senses of hearing and sight become insensibly impaired; the secretions alter, and before 60, old age has arrived, and is announced by the accession of various infirmities; but which often come on by such easy gradations, as to be almost imperceptible, and leave the unwary sojourner not conscious of his real condition, till some inconsistency perhaps reveals the fatal mistake. At length, three score years and ten approach, all beyond which truly may be designated "*Labour and Sorrow.*"

An opinion prevailed very generally among the Ancients, and has obtained among many of the Moderns, that at certain periods of the age of Man he is more exposed to mortality: these periods bore a reference to the arithmetical number *seven*, and were called the *Climacteric years*; the number seven was multiplied by 3, 5, 7, and 9, and thus formed the 21st, 35th, 49th, 63d years as climacteric: every seventh year was also considered critical. The bills of Mortality, however, furnish a catalogue of facts,

which prove the fallacy of this system, and demonstrate that human life does not more generally terminate, in the above years than in any others in the scale. Hippocrates and Galen supported the existence of critical days in Fever, which have been advocated by Hoffman and Cullen among the Moderns, but to which few physicians now pay much attention.

It is supposed by many physiologists, that there is a certain ratio between the period of puberty and the general term of life, as a very small difference in this period causes a sensible alteration in the limits of manhood and old age; that, therefore, in those climates where puberty soonest arrives, the course of existence is necessarily shortened, and *vice versa* in cold Northern latitudes, where this period is protracted, the duration of life is proportionally lengthened. Whence, in the Torrid Zone 11 or 12 years is the age of puberty, and they accordingly become grey and wrinkled at 40, and seldom see 60. But in Lapland, Finland, &c. the above period does not arrive till near 20; consequently the term of life is prolonged till near a century; so that the old adage, *Cito Fit, Cito Perit*, seems established in fact. It is in the Temperate Zone Man attains the greatest scope of longevity; more instances occur here of extreme old age than in any of the other divisions. More

old men are found in mountainous than in low districts. A late publication makes the number of inhabitants on this globe to be 896 millions; of these it computes 226 millions are Christians, 10 millions Jews, 210 millions Mahometans, 460 millions Pagans. Of those professing Christianity, 50 millions are Protestants, 30 millions of the Greek and Armenian churches, 90 millions of Catholics. If we calculate that three generations pass away in a century, then, in about 34 years, the present generation of 896 millions will be born and die—consequently 74 thousand each day, and better than 3000 each hour. With this sketch of Human vicissitude and change—this short outline of the brevity of all Human duration—I will conclude my letter in the emphatic words of the Poet,

“ The man

“ Is yet unborn, who *duly weighs an hour.*”

Yours truly,

L. S. B.

LETTER IX.

DEAR FRIEND,

THE question has often been agitated amongst philosophers, whither all the varieties we meet with in the inhabitants of the earth, have sprung from one common stock ; or whither there exist specific differences, in the different tribes of men, which can justify the supposition of there being several distinct species. Sir Wm. Jones, who explored the Eastern Hemisphere with the aid of much science, argues that the varieties among men, are only ramifications from one common trunk ; while Lord Kaimes advocates the existence of distinct species. The discussion of this question is of peculiar importance, and involves many subjects of curious interest. There is a particular law in the Animal Economy, which has been much dwelt upon by Buffon and Hunter, to prove the confines of different species ; it is this ; that Hybrid Animals, the offspring of different species, are wholly unprolific. It is by this means Nature preserves the identity of different animals ; were the case otherwise, we should observe a conti-

nual shifting of forms, and changing of natures, that would in time completely metamorphose the whole face of the animated world. It is contended, therefore, that where any two animals produce offspring that are prolific, those two animals unquestionably belong to one species; but on the other hand, where the third animal remains unprolific, the parents were as certainly of different and distinct species. This law is fairly deduced, from all the facts which occur daily to our observation, in the numerous domesticated animals in our possession, and from all we are enabled to gather, from among animals in an untamed condition; the exceptions are very trifling. Mr. Hunter inferred from these premises that the Dog, the Wolf, and the Jackal, belong to one species; but that the Fox is of a distinct tribe.

This physiological fact, then, leaves us very little difficulty in concluding, that all Men are of one species, it affords at least a very strong presumptive argument in favour of this opinion. We shall, however, perhaps gain most information on this curious subject, and arrive at closer induction, by tracing the uniform analogy that seems to run through all the varieties we meet with in the history of our species. We perceive all through the organized world, a strong undeviating tendency to assume great changes

and varieties, and this holds most particularly as to Colour and Form.

Man being subject to considerable variety of agency, from exposure to difference of climate, and many other circumstances, his condition therefore exhibits great diversity in appearance ; of these, the different shades and discriminations of colour, furnish perhaps the most prominent peculiarity. Among these differences the singularity of the Albino is most striking. These people have a complexion uncommonly light, mostly of a dull whiteness, disagreeable, and indicating disease. The hair is extremely white and soft ; the iris is of a bright red hue, and the organ of vision so extremely sensible to the stimulus of light, that they enjoy very imperfect vision in the day-time. This variety occurs chiefly among nations of a dark complexion, as the Negroes of Africa, the Ceylonese, and the inhabitants of Darien, among the latter of whom they exist in considerable number. Now a variety directly analogous to this, occurs in the Brute Creation ; it is often observable in Apes, Squirrels, Rabbits, Rats, Mice, Horses, Bears, &c. and also in Birds, as Crows, Blackbirds, Canary Birds, Peacocks, &c. which often have their feathers quite white, and their eyes red ; and in all these animals we do not attempt to consider this deviation as any way indicative of

difference of species ; consequently this variation in the Human Species cannot be considered as a criterion of specific difference. Besides this diversity, there occur, 2dly, the yellow hair variety, with light complexion, observable in the German countenance ; 3dly, the complexion white, with dark hair ; 4thly, those of yellow complexion, with dark stiff long hair, as the Tartars ; 5thly, Copper-coloured, with lank black hair, as the American ; 6thly, the Negro, with black woolly hair. All these varieties in the colour of the Human Species, are perfectly similar to those that accrue among the inferior orders of Animals. In one climate we find the Bear a dark brown, in another perfectly white. Horses vary from jet black to cream colour. The same diversity occurs in the Dog, the Ox, and many of the Feathered tribes. We therefore fairly infer, the varieties in Man proceed from similar circumstances in their economy, and are referable to the same natural causes, and do not in the slightest degree warrant a conclusion of arising from specific difference.

As I observed above, we perceive a constant tendency in organized nature, to take on considerable variety ; there is in every species an infinite diversity, which nature seems willing to perpetuate and render permanent in that species. In the Human race this general tenor is

abundantly conspicuous, and manifest not only in nations but in towns and small communities, and even in families, where we often perceive a common model of person run on from parent to child. In villages and detached districts, where the inhabitants intermarry, and have but a limited intercourse with other communities, we find a common cast of physical character very conspicuous. In nations and large provinces this operates upon a more extensive scale ; differences in language, in laws and religion, serve to estrange and keep them at a distance, whence they each acquire peculiarities of person and manner, and every generation rendering these acquired characters more divergent, a kind of national physiognomy becomes at length established. The people of the different provinces of Spain, and of the different states of Italy, are remarked by all travellers for an obvious distinction of manners and features. The casts of the Hindoos, though living on the same soil, and breathing the same air, yet being prohibited from intermarriage, preserve a strong peculiarity of countenance and character in each. In our own island a different outline of countenance is observable, between the Northern and Southern inhabitants : the prominent cheek bones and dark complexions of the Highlanders, have been handed down perhaps by inheritance from their

Celtic forefathers ; while the lighter German countenance is evinced in those, who may be traced as descendants from the Picts and the Goths. All these varieties are propagated through numerous successive generations, and from a lengthened want of intercourse, the peculiar character of each community becomes established in strong and indelible marks.

In the Human figure the most striking diversity of form manifests itself in the configuration of the Skull. In a former letter I remarked the varieties that occur, and the criteria adopted to discriminate the differences. Camper, a German anatomist, instituted the Facial Angle, to denote the variety of expression in the countenance, and its connexion with the mind. He traced the measure of this angle through the different orders of animated nature, and found that the largest angle obtained in Man, and was in general an indication of mental capacity. The Ancients, in the busts of their heroes, have in general carried this elevation of the Facial Line beyond the bounds of nature. I pointed out before the differences that exist in the Skulls of the three principal races, into which mankind have been divided—the European, the Tartar, and the Negro : all the varieties that occur in these three species, are referable to that tendency to deviation, before alluded to, and which pre-

vails so extensively through the whole range of organized nature. These peculiarities are not constant and confined to one particular race, but are often met with promiscuously among individuals of other countries. We sometimes see heads, among our own countrymen, taking on the form either of the Tartar or African character, and again among the last-mentioned tribes, many individuals are found approaching the outline of the European model. Whence we infer that all the diversities in the form of the skull are acquired, and afterwards transmitted by inheritance, but by no means spring from specific difference. Other varieties in the form of the body are not so conspicuous as this deviation in the figure of the skull. Among animals we perceive striking differences in form, which are more remarkable than any thing we meet with in our own species. In the breed of horses, for instance, we behold very great diversity ; what greater contrast occurs than between that noble animal the Arabian charger, with his well-formed head, and handsome muscular neck, and the slim race-horse, with his neck tapering towards a small head? The waggon-horse, and the different breeds that are found in our own island, exhibit such varied structure as would almost lead us to infer difference of species. The same deviation to an equal extent takes place in

Dogs, in Sheep, in Oxen, and indeed in almost every species of animal with which we have much acquaintance. We however know how readily these differences are perpetuated and modified by mixed breeding, and how they are multiplied by the union of different sorts ; so that in none of these instances do we attempt to draw a conclusion of there being any specific difference between them.

Difference in the stature of various nations of men, cannot warrant the conclusion of a variety of races in mankind. The Greenlander and the Patagonian form a great contrast, but they are still one order of being. The latter were represented by Commodore Byron as men above seven feet high, but Captain Wallis informs us, no doubt with more correctness, that the average height does not exceed six feet. The Greenlanders are a foot shorter on the average. The woolly hair of the Negro has been considered by some as a criterion of a peculiar species, but it does not appear that the hair of the Negro is wool, it is merely a modification of hair ; indeed among many tribes of Africans, this woolly texture does not prevail ; they have, according to Mr. Park, soft silky hair. The Foulahs, the Caffres, and the natives of Congo, have long hair : again it is found in New Holland, that two races of savages who are similar

in every other respect, yet differ in the texture of the hair, one having the hair long and straight, and the other soft and woolly. Many animals also of the same species differ in the texture of their covering in different climates, having wool or fur in one climate, which changes to hair in another. The Goat exhibits considerable variety in the texture of its covering; as does also the Dog. All these circumstances lead us to conclude, that the varieties we meet with in the Human Species are all adventitious and circumstantial. The limits which nature seems to have established to the propagation of Hybrid productions is as fair analogical inference applied to mankind, as can be met with in the whole range of speculative science. If it is a fixed law in the economy of all other animals, that the different species shall not permanently intermix, that a boundary is soon formed against the perpetuation of Hybrid Animals, and that this check is a general criterion of diversity of species, then it amounts to a full induction, that notwithstanding all apparent varieties, *Mankind are all members of one identical species*. The various changes and differences we meet with in almost every genus of animals, are as pointed, as distinct, and as divergent, as those we observe among our own race. Every variety of form, of colour, and of habit, that can be suggested, occurs in the

different parts of the Brute Creation. These changes, then, the result of climate, of food, and various local and peculiar circumstances, are full as great as those that appear in the Geography of Man; we therefore think it equal to a *Demonstratio a Posteriori* that man forms but a single species; that Cuvier's order, *Bimannum*, consists but of one genus, with one species, Man.

Having considered this question of the Identity of Human Nature through all the different regions of the Globe, you may still be disposed to question, how far the different nations, although belonging to one species, may have sprung from one common Parent Stock. You may still be induced to suppose, that individual communities may have been created at the same time, to occupy various and remote parts of the earth, that nature might choose this plan, in preference to waiting for the slow effects of peopling the whole world from a single pair of individuals, as we are taught in the Mosaic History. To elucidate this important question, it will be necessary to take a view of what seems likely to have been the case with many orders of the Brute Creation.

In a survey of the Nature of Man, we are under a necessity of having constant reference to the facts observable in the rest of animated

nature. Where the functions of different organs are much obscured, and the early circumstances of human movements are involved in much intricacy, we are obliged to have recourse, and explore our way, by the Light of Analogy. Analogy, when built upon correct data, is sometimes as convincing as direct observation; it argues from similarity of circumstances to similarity of consequences—and when it takes general grounds, often leads to the most sublime truths. Without this mode of reasoning, the History of Man would be obscure and concealed. Man is but an animal of superior order: he possesses in common with brutes, many organs of similar construction, and of similar function: he has his sensations and wants; he is nourished, he grows, he reproduces, and finally dissolves like the meanest reptile that crawls the earth: he forms, in fact, a bond of union with them all; the whole chain of animation is connected by close links, and forms one great family, of which Man is, as it were, the grand Patriarch. In order to derive assistance and palliate his wants, he extends his care and protection to numerous tribes, who grow and flourish in his presence to be cut down to relieve his necessities; thus

“ Man, like the generous vine, supported lives,

“ The strength he *gains* is from the embrace he *gives*.”

Let us, therefore, cast a glance over the different orders of animals, and see if we can discover whether they were promiscuously scattered over the globe at the beginning; or, if it is not more probable, that each species originated in one quarter, from which it has subsequently spread itself, according to circumstances, over the rest of the surface. I believe Buffon was one of the first who advanced, that each kind had a determinate spot, which was its original only abode; and that from this region it afterwards issued, according to the perfection of its locomotive faculties, and spread through distant regions; and that the animals which range the Old World are different from those found in the New. He was moreover of opinion, that every species, which is found to be common to both Continents, is such as can endure the extreme cold of high latitudes; and may therefore have passed from one Continent to the other, where they approach very near in the neighbourhood of the Arctic circle. He illustrates this opinion by a view of some particular kinds, and is borne out in his inferences by the recent researches of that celebrated anatomist Cuvier, who observes of the Monkey Tribe, that the true monkeys are found only in Asia and Africa; they differ materially in anatomical structure from the Monkeys of America. Now the whole class of

Monkeys are confined to warm climates ; they are found in either Continent separately, but no kind seems common to both ; and in the Old World some are common to India, and others to Africa. These tribes, then, appear unquestionably to have a local origin, and to be derived each from a particular region. The Bat tribe, which is very numerous, seems confined each species to a particular region. The Bear evinces a similar history. All the largest quadrupeds are natives of the Old World, and unknown in the Western Hemisphere, as the Elephant, the Rhinoceros, Hippopotamus, Camel, &c. The fossile remains of animals of superior magnitude have been discovered in America, but no living animals of any considerable size were found there. The Megalonyx, and the Megatherium, two species of the Sloth tribe, are found in a fossile state in America ; they are both now extinct. That peculiar animal the Ornithorynchus, of which I spoke in a former letter, has only been discovered in New Holland. The Opossum of America, and its marsupial kindred the Kangaroo of New Holland, are both of local accupancy. The local character and habitation of the Rein Deer, and its fitness for the particular region destined for its abode, as also the same circumstances in the Camel, the Elk, the Elephant, and numerous other tribes with which

you are perfectly well acquainted, seem to establish the hypothesis, that nature did not form any animals to be tenants of the globe at large, but originally placed each in a particular region. Buffon's opinion, therefore, that no animal was common to the warm latitudes of both continents, seems grounded in fact. No European animals are found in America but what are natives of the North of Europe; no Asiatic species appears in America but what is a native of the North of Russia. All these considerations lead fairly to the conclusion, that the tribes now common to both continents, passed from one to the other, by those approaching points in the neighbourhood of Behring's Straits; therefore all the aboriginal animals in both hemispheres were peculiar to each. The Inhabitants of the Deep seem also amenable to this law. We are told, there is not a single animal of the Northern Ocean of the same specific character with any of those in the South Seas. The Medusæ and the Testacea, are in their different varieties also subject to this law. Whence we deduce that nature originally created particular species in particular regions, and that these subsequently covered distant portions of the earth, as accident and circumstances impelled them to emigrate, till at length they have from one Parent Stock diffused themselves over a large portion of the

globe, and derived adventitious characters, which have branched them out into innumerable varieties.

To return now from our analogy with Animals, let us consider the different races of Men, and how far it is probable they have been the offspring of one single stock, the wide-spreading branches of one common trunk. After the discovery of America, the source of its population was a theme, that for a long time puzzled the most intelligent historians ; but since the geographical outline of that extended continent has been more accurately explored and ascertained, no doubt is felt, but that the Americans are of Asiatic origin ; the proximity of the two coasts in the latitude of 65° N. and longitude of 160° W. is strongly indicative of this ; and the similarity of the physical character of both, is a striking circumstance in corroboration ; and indeed a traditionary account is handed down among the Mexicans, of the migration of their ancestors from the North West coast. Dr. Barton, of Pennsylvania, has, in his work, made a very elaborate comparison of the different languages of America with those of Eastern Asia, and discovered many striking affinities between them. The American skull partakes of the Tartar character ; it is broad, with prominent cheek-bones, having the figure of lateral pro-

jection. The Americans exhibited such a uniformity of appearance throughout the whole continent, as left no doubt of the perfect identity of their character and origin, with the exception of the Esquimaux on the coast of Labrador, who differ in very few respects from their neighbours, the Greenlanders, from whom they are supposed to be derived.

With respect to the inhabitants of the South Sea Islands, although these barbarians are scattered over an immense expanse of water, and separated many thousand miles, it is a most extraordinary fact, that all their languages seem incontestably derived from one common source. We are told, that an inhabitant of one island can understand a native of almost any other, and that the languages of Madagascar and Easter Island possess many striking instances of the closest affinity, though they are separated by a distance of not less than 11,000 miles.

Affinity of Language and Physical Character are the principal criteria, by which the Histories of Nations are elucidated. Where any two communities, however separated, evince a conformity of physical outline, and a similarity of speech, we may unquestionably consider those people as descending from one source. The South Sea Islanders are remotely situated, and distributed through great variety of climate, and

diversity of local agency, which gives us an opportunity of examining the effects, which different physical causes produce on the human species. These people have arrived at different ranks in the scale of civilization : some are in a very uncultivated state, and can deserve no other term than savages ; others have made some advances, and even display a division into two different orders, or ranks in society, exhibiting a difference of manners and features. It is from the language the historian derives his chief information concerning these scattered tribes. Mr. Anderson, who accompanied Captain Cook, tells us, that on a diligent enquiry into the languages of these people, he has no doubt of establishing the position, that all the people from New Holland eastward to Easter Island, have been derived from the same common root. I understand, Marsden, in his History of Sumatra, has expressed the conviction, that one parent language prevails all through, though altered and modified by peculiar circumstances, in each island. Dr. Prichard, in his excellent work on Man, has given a list of many of their words. The Numerals in the comparative Table of Sir Joseph Banks, afford an astonishing similarity of sounds, and evince a common trunk of language.

In addition to the uniformity of language, the great similarity of physical structure may be

taken in proof of the identity of their origin. The principal circumstance is an approximation towards the African character. The Facial Angle is reduced, and the forehead low, the head narrow, and much like the Negro, the nose flat, the legs long, and the calf deficient: the complexion is of a black hue, like the Negro; but of a lighter shade among the better orders in those islands, where any progress has been made in civilization and improvement: the hair is woolly and short in most, but in some it is long and lank, and in a few cases often found of a lightish red. Thus, then, all those people seem to possess a similitude of physical character and of language with those people of New Guinea or Papua, who, from their approach towards the African character, have been designated the *Eastern Negroes*. These occupy New Guinea, and many other islands in the Indian ocean; and their origin is clearly traced to the Indian continent—for, in the mountainous districts of Malacca, these black Negro savages are found in considerable numbers. The chief seats of these savages seem to be in New Guinea, New Holland, the New Hebrides, &c.; all these clusters exhibit in their natives the physical character of the African Negro in marks of the strongest affinity. The black complexion, the woolly hair, thick lips, flat noses, and turn of the limbs,

form a complete counterpart of the African Black. This outline of form extends itself with some occasional deviations, through all the islands in the Southern ocean, and joined to that similitude of language before alluded to, leaves no doubt, that all these remote tribes sprang from one stock, which is traced from the Indian Continent, where, in the mountainous districts, remnants of them still remain. In Malacca and other parts of India, numerous hordes of these black savages are found, who occupy the interior. As I observed before, it is in the mountains of all countries the vestiges of their Aboriginal inhabitants are alone to be traced; this is conspicuous even in our own island. The Welsh, as you well know, are the remainder of the early natives who retired to this remote corner, to avoid the cruelties and persecutions of their Saxon conquerors; where they continued to enjoy an unmolested freedom for many centuries, while the soil of England, a prey to foreign incursions, often changed its masters. “The heath-covered mountains of Scotia” afforded a secure shelter to a hardy race of Aborigines, who, in defence of their native hills, valorously withstood the overwhelming force of the Roman arms. The historian and the poet have often dwelt with delight on the exploits of those gallant mountaineers. The muse has oft,

in strains of rapture, celebrated the achievements of Galgacus and his heroic bands, who resisted the conquerors of the world, and maintained a degree of independence unknown perhaps in the annals of any other European nation. No country can boast so immemorial an independence, and so remote and uninterrupted a course of sovereigns as the Caledonians. Fergus is said to have reigned in Scotland about the end of the 4th century before the Christian era, and from him, they trace a regular succession to the present monarch.

Having traced the natives of the Western continent, and of the wide-scattered islands in the Southern Hemisphere, according to the opinion of the best historians, to be of Asiatic origin, and thus brought all these far-spread tribes within the confines of the Old Continent, in my next I will make some general observations on the leading characters of the chief families that occupy this extensive surface, till when,

I remain, Dear Friend,

Yours truly,

L. S. B.

LETTER X.

DEAR FRIEND,

IN my last I offered some transient remarks on the uniformity of the Physical History of Man throughout the different regions of the globe, and proceeded to remark the conviction very generally felt, of the Asiatic origin of the Americans and the natives of the South Sea Islands. We will now endeavour to follow up the investigation, and see what light the general train of Civil History seems to throw on our first position, that all mankind are derived from one Parent Stock.

In a synthetic view of the History of the World, one early circumstance that strikes and arrests the attention, is the great similitude that appears in the political, the religious, and the physical characters of those two great tribes of people, the Indians and the ancient Egyptians. These nations, although distantly removed, exhibit greater uniformity than is to be met with in any two classes of people remotely situated. The whole population of Hindostan was originally divided into seven distinct casts, who were

strictly prohibited from intermarrying, and the individuals of each class followed the occupations of their parents; each branch of business was therefore hereditary in each family, from which they could not emancipate themselves. At present the people are formed into four classes, viz. the Brahmins or Priesthood, who are invested with the sacerdotal functions of explaining the Vedas, of managing the sacrifices, teaching and assisting the poor, &c.; the defence of the nation, with other subordinate offices, is entrusted to the Cshatriya; the cultivation of the land, the care of the flocks, and the prosecution of trade, are carried on by the Vaisya; and the menial offices, subordinate to all the former, are performed by the Sudra. The Brahmins are subdivided into two divisions, one of which are allowed greater latitude than the other, and take upon themselves various public offices and duties. These different casts have remained separate and distinct, for ages, and have in consequence derived considerable diversity of physical character. The political fabric of ancient Egypt was erected upon a similar base, the whole population of that celebrated region, which has justly perhaps been considered the *Alma Mater* of science and civilization to surrounding countries, was divided like the early Indians into seven distinct Casts; insulated by

particular prohibitions, which prevented intermixture, and kept each division entire and separate. The Priesthood, the Military, the Shepherd, the Cultivator of the Soil, and the Artisan, were employments confined to particular families, and handed down from Father to Son, as is still the case in India. The Egyptian religion was of the same common cast with the Hindoo. The Metempsychosis was adopted and cherished, and they entertained the same superstitious veneration for particular animals, from the use of which as food they scrupulously abstained. They offered sacrifices sometimes of Animals, and sometimes of Men; they deified the Ox and some others, and paid the same homage to the waters of the Nile, the Orientals are still accustomed to offer to the streams of the Ganges. The priests of both countries were the sacred depositories of the science and information of the people; they inspected animals, were skilled in the mysteries of augury and divination, practised physic and astrology, and assisted at the councils of the Sovereigns, over whom they generally exerted a strong superstitious influence. A great similitude is observable in the persons and attributes of their principal Deities.

Thus the Political and Religious Institutions of these two distant tribes, place it almost beyond a doubt that they sprang from one common

origin. The senior stock, and the period of their separation, have been points of discussion. The best authorities consider Egypt as the Parent Stock, and suppose that the whole fabric of their peculiar institutions, were probably overthrown by the Babylonians, at the time Cambyses invaded and conquered Egypt, about the year 525 before the Christian Era. The physical aspects of the ancient Egyptians and Hindoos, evinced so striking a similarity in the opinion of the best historians, as furnishes further proof in confirmation of their identical origin. The former are supposed to have come from Ethiopia, and to have been Black, with all the characters of the African Negro—the woolly hair, thick lips, flat nose, &c. The Sphinx and all the Artificial Monuments found in Egypt, partake very strongly of the Negro countenance; and the Mummies exhibit this correspondence in features. This sable complexion and African outline became, however, in time much modified, and by degrees softened down by means of that culture and civilization, which seems to have considerable impression on the physical character of man, in proportion as he rises in the scale above the condition of savage life.

It appears, from the testimony of good authorities, that the ancient Hindoos were a Negro race; there appears a connected chain of

facts to warrant the inference, that a Negro tribe must at one time have had paramount ascendancy in India. Besides the evidence of Diodorus, and other writers, the statues of Gods and Heroes found in the caverns of various parts of India, are all from the African model*. The combination of all these circumstances, and common features in their histories, seem to afford unquestionable evidence of the identical origin of these two great communities, the Egyptians and the Indians.

The origin of Nations, the foundations of Human Society, are necessarily involved in impenetrable obscurity—the enquirer becomes lost in a bewildering labyrinth. Man, in his early state, possesses but few means of recording the events of his progressive movements; with a poverty of language and a fervour of imagination, he substitutes fiction for narrative, and leaves the future world no instruction, but the glimmering, uncertain light of allegory and fable: whence, after all the labours of the learned in erecting a colossal pile of Historic Literature, we are still in darkness as to the infancy of Human Society; it is hid behind a cloud, and prior to the middle of the eighth century, before

* Whoever wishes to obtain information on this curious subject, will derive much from the writings of Sir W. Jones, Buchanan, Wilford, and others, in the Asiatic Researches.

the Christian Era, all history is a mere fable, of which we can derive no certainty. It appears, however, from all that can be gathered from the Hebrew records, and other sources, that Man was created in a garden, in the fertile plains of Asia, on the southern side of that mountainous ridge that separates this district from Tartary. That portion of the Earth, therefore, which is comprised between the Caspian Sea, the Levant, and the Euphrates, was first tenanted by Man; here he commenced his career, in a mild genial climate, where smiling Nature teemed with abundance for his enjoyment, and where pre-existing elements had been distributed for his purposes. In proportion as these fertile plains became surcharged with population, communities went forth under Patriarchal Leaders, and sought new abodes, and attached themselves to new soils. These communities, composed of individual wants, leaning towards each other, established regulations to bind the whole. Each, moved by the irresistible impulse of that active stimulus, Self-love, exchanged a portion of his natural attributes to secure the remainder. The Parent, or Elder, became the Patriarch, the Priest, and Prince of his little state; Self-love, the spring of the human soul, taught him to receive by bestowing, to gain by conferring. His mind gradually softened into humanity; neces-

sities and wants, the impressions of surrounding agents and elements, called forth his dormant energies, and developed his hidden capacities ; his faculties by degrees ripened into action, and Man soon stood pre-eminent over organized nature, and displayed a Master-Piece of Divine Mechanism.

“ Nor think, in Nature’s state they blindly trod,

“ The state of Nature was the reign of God.”

A knowledge of property became soon understood ; laws and regulations were founded, and by degrees these rudiments were matured into all the perfections of civil polity. On their fertile plains the Chaldeans emerged from the uncouth form of savage life, and, laying aside the fatigues and dangers of the chase, took up the more tranquil and civilized path of pastoral pursuit. Here the wants of man being limited by a fertile earth and a serene heaven, his genius slumbered, the active energies of his mind here remained unawakened, those grand features of the universe, which could not fail to strike his senses, here engrossed all his attention ; he saw God in his works, and adored the majesty of the Supreme Cause, in praising his sublime effects. He led out his flocks to pasture, he partook of their innocence ; his wants were few. He enjoyed the serenity of a mild sky, and worshiped those

brilliant orbs that, glittering in his firmament, delighted his astonished mind*. He *adored and invoked* those splendid bodies that filled the immense expanse above him, and which, in the

* Of all the modes of worship adopted among the Heathen nations, that of the Celestial Bodies seems the most simple and rational. One of our celebrated poets, impressed with the sublime appearance of the glittering firmament, as inducing always a reference to its Great Author, has affirmed, that “an undevout Astronomer is surely mad.” The knowledge of Natural Religion, like every thing else, springs from the objects of the Physical World. It is from the surrounding scenery the imagination and understanding of man is naturally elevated to the great First Cause of all, and taught to

“Look through Nature up to Nature’s God.”

A distinguished writer says, “The worship of the Stars, under their proper forms, was a *simple process of the understanding* :” and in proof of the superiority of this kind of worship, we have only to trace its mild operation on the minds of its votaries. Dr. Robertson, in speaking of the worship of the Peruvians, observes, that by directing their veneration to that glorious luminary, the Sun, which, by its universal and vivifying energy, is the best emblem of Divine Beneficence, the rites and observances of their system were humane and innocent. They offered a part of the productions matured by his genial rays ; but the Incas never stained their altars with human blood. Their religion, their laws, and customs were, in consequence, of a much milder cast, and infinitely superior to the imaginary system of the Mexicans, replete with cruel and sanguinary ceremonies. Their superstition was mild, benevolent, and highly preferable to any other met with in the whole Western Continent.

words of a sacred poet, “ declare the glory of God, and shew his handy works.” This was the first step in the amelioration of the human race ; necessity first impelled individuals to hunt for prey ; experience afterwards teaching them the superior advantages of taming the most useful animals, they betook themselves to train and domesticate them. The playful kid, the timid sheep, the stubborn ox, and the noble horse, were subjected to their dominion and their purposes. By the assistance of these they gained leisure and tranquillity ; and from wandering ferocious hunters, they became peaceful and happy shepherds. But the wheel once put in motion, the human mind rested not here ; their leisure gave them opportunity to communicate their ideas, and cultivate their intellectual powers ; arts and sciences poured in from one community to another, and on or near the spot where Man first enjoyed the dawn of Creation, proud Babylon reared its stupendous towers and gigantic walls. The Chaldeans, like their polished neighbours, the Egyptians, made another advance in the scale of improvement, and derived strength and happiness from the soil on which they stood ; they gave up the wandering course, and, fixing themselves to a spot, cherished agriculture, and laid the foundation of a populous and powerful empire. But still the Babylonians, in

a fruitful soil, and a mild climate, did not display those lofty energies, that the local nature of the surface in Egypt called forth among its inhabitants. It was from this Nursery of Human Arts surrounding nations received all the great benefits of cultivation. Babylon derived instruction from Egypt, which has been considered by the best historians as the Cradle of Human Science. The Lower Egypt was peopled subsequently to the Upper Division. It was near the sources of the Nile that this nation had its origin ; their mechanic skill empowered them to gain the lower country from the mud of that celebrated river. They formed canals, dykes, and embankments ; and, as the poet says of the labour of the modern Hollanders, they

“ Scoop’d out an empire, and usurp’d the shore.”

These people were peaceful and industrious, and pursuing only those arts which have the happiness of mankind as their end, they make no very conspicuous figure in the page of history ; but they have left behind them a number of monuments, that have braved the ravages of time, and bear testimony of the ancient grandeur and industry of this remarkable kingdom. But these are all the remains of a great nation. It has, like all other Human Institutions, mouldered away. Memphis, the splendid Metropolis of

the Pharoahs, like Babylon, has vanished from the earth, and no man knows exactly where either stood. These cities are gone, with all their glory, “and, like the baseless fabric of a Vision, left not a wreck behind.”

The Persians possessed, according to the opinion of several historians, many analogous characters with their neighbours the Indians and Egyptians. The affinity of their Languages have induced many learned men to suppose, that the Persians and Hindoos were derived from one common stock : the reasoning upon which this probable hypothesis is built will be found in the Oriental Researches of Sir W. Jones. To go into a particular history of Persian manners and customs would be foreign to our purpose, and only walking in a beaten path. Persia had its elevation and its downfall ; it sprung up under Cyrus, and trod the haughty Babylon under foot, and in its turn gave way to the successful arms of the victorious Alexander ; and has made no very conspicuous figure in the page of history since. Taking it for granted, on the authority of learned enquirers into Asiatic Literature, that the Persians were of similar origin with the Egyptians and Indians, we proceed in substantiating our position of the common stock of the different tribes of mankind. The grounds on which this inference is built of the identity

of these two nations, is the close relationship between the Zand, or ancient language of Persia, and the Sanscrit; the great conformity in many leading points of their religion and laws; and from a comparison of early historic records, which adduce many facts in support of the opinion. The same analogy holds with respect to all the nations which composed Upper Asia. The Phœnicians, the Syrians, the Philistines, and the various tribes into which these nations were divided, seem evidently to have branched off from the Egyptian stock; at least such is the opinion of learned historians, both ancient and modern*. Babylon and Egypt exhibit so many common features as leave no doubt of their common origin; but which formed the antecedent stock, I am not prepared to advance; but, as far as I can judge, the weight of evidence seems in favour of the priority of Babylon. I think Babylon must have been the Mother of Egypt; but the Daughter outshone the Parent Nation, in arts, sciences, and every species of learning, owing to the local circumstances of their country, which called into action higher energies of mind, than were necessary to the Babylonians on their fruitful and placid plains. Man is the creature of time and place; every nation and community takes on its peculiar form and complexion, from

* This subject is admirably elucidated by Dr. Prichard.

the time and situation in which it grows, and the external agency in which it may be immersed. Astronomy, Geometry, and all the Mechanical Sciences were carried to great perfection here; they were necessary to enable the Egyptians to accomplish their stupendous labours. Those magnificent works on the banks of the Nile could not have been effected without the assistance of science and arts; whence, as every faculty, both mental and corporeal, improves from exercise, we find the industry of these people carried knowledge to a great practical extent; and from hence learning was propagated over the civilized world.

If we turn our attention to the Eastward, we perceive wandering shepherds, who continued to traverse the extended plains of Asia for ages; and on the Eastern side of that great Continent, where the ocean has fixed a boundary to human migration, a great society remotely situated, insulated, and detached from the view of the rest of mankind. Of the internal character of the Chinese our knowledge is very limited; they exhibit the phenomenon of a great people remaining stationary at one point in the scale of human improvement, for many successive ages; this is in a great measure owing to the peculiar construction of their language, aided by their nonintercourse with other nations, and the con-

sequent peculiarity of many of their laws and customs ; hence a refinement in trifles, and a want of invention in the great, characterise those singular people, whose pursuits are like those of children, the glittering of gilt paper and varnish, painted lines, and the jingle of fine sentences. Destitute of great invention, they display manual adroitness in imitation of what they deem useful ; as a German author observes, “ This empire is an embalmed mummy, wrapped in silk, and painted in hieroglyphics ; its internal circulation is that of a dormouse in its winter sleep.”

The Tartar outline of countenance and figure, which prevails from the Caspian sea to the coast of China, sufficiently demonstrates that all these tribes are the offspring of one Parent Stock, who have traversed this immense tract with their flocks, and occasionally established themselves where circumstances seemed to invite. These herdsmen have now and then broke in upon their Southern and Western neighbours, and under a Genghis Khan, and a Tamerlane, carried slaughter and devastation through this division of the earth. Even warlike Rome felt the ravages of these shepherds, and trembled to its foundation at the approach of the sanguinary Attila. The first step in the advancement of society, that from Hunting to the Pastoral condition, gives

considerable power to the Barbarian. Dr. Adam Smith remarks how contemptible an Indian war in America is, compared with irruptions of the Shepherds of Asia; but he adds, should the American Indians ever emerge from their present condition, and become Pastoral Nations, the consequences might be severely felt by the European settlements in that quarter*.

It appears, then, that all the Asiatic Nations display so much in common both in Physical and Moral character, as leaves no doubt on the mind of the enquirer of the common origin of these people. It was, as I have before observed, in Asia that Man was first established; the different tribes went and settled in different soils, and as Man is in all respects the creature of accident, of circumstance, and of situation; all these agents acted more or less in various proportions in different societies; and added to that tendency to variety, which is almost a law of his physical nature, gave birth to those diversities we behold, in the particular features of distant communities.

* The great improvement in the Art of War, by the invention of Fire Arms, the practical advantage of which must for obvious reasons ever be confined to cultivated society, is perhaps now the surest bulwark the civilized nations of the world possess against any future overthrow by the people in savage life.

What an instructive theme do the varied pursuits of different nations afford the mind ! To trace the varieties of Human Nature to their sources, is a most interesting occupation ; we find every where that Man has derived more assistance from the imitation of what is going on around him, than from any thing innate or instinctive in himself ; his practical understanding has grown up under his wants, and though it is conformable to his organization, yet it is influenced by accidents of time and place, and in every region swayed by custom, by tradition, and by habit ; whence as different situations afforded different circumstances, so the Human Mind moulded itself into different forms, and each tribe took on a specific character*. Situ-

* The Human Understanding is in every region of the earth a Blossom of the Genius of the People, and this genius is every where nurtured by accident and situation. Herder observes, “ the Bedouin, the Mungal, the Laplander, and the Peruvian, are all Shepherds ; but how greatly do they differ from each other ! while one pastures his Camel, another his Horse, the third his Rein-deer, and the last his Pacoës and Lamas.” In many of the islands of the South Sea, a fertile soil producing all the fruits of the earth, keeps Human Nature in peaceful serenity ; here all is comparative calm ; while in other islands situated in higher latitudes, the means of subsistence being more remote, the Human faculties are called into action, and Man partakes of the boisterous qualities of the climate and soil. The New Hollander pursues the Opossum and the Kangaroo, and the New Zealander becomes a Savage.

ated on the shores of the sea, one community became Fishermen ; in the forests and wilds of America, Hunting was the occupation of the native : Scythia and Arabia afforded employment for Shepherds ; and Egypt and other countries cultivated the Soil, and cherished Agriculture ; and upon this last grew in time all the benefits and all the evils of foreign commerce.

No mode of life has produced such influence and change on the condition of Man as Agriculture ; it produced the arts and embellishments of life, gave birth to villages, towns, governments and laws. No nation without Agriculture has ever made any great advances in improvement and civilization.

The Californian and the Esquimaux conform to simple modes of life. On the continents, men and animals crowd more together, and in some instances enter into mutual friendships, and in others exercise reciprocal hostilities, and call forth respective and hidden energies. The American was kept in the back ground by the want of this alliance with the Brute Creation, and the use of Metals. The Negro, the Greenland, the Tartar, all conform to modes of life congenial to the peculiar nature of their situations ; in all this conformity, the mind accompanies the body, and the same man, who piously kneels at Loretto, would have been a zealous devotee at Mecca, or a sincere worshiper at Juggernaut. We often give vent to prejudices against the particular tenets of other nations, without considering that the mere accident of being born a few leagues distant, is the only difference between us. Man is every where *essentially* the same animal.

But now let us direct our observations to the Westward in pursuit of, and in confirmation of our favourite assumption, that all mankind are derived from the same source. Having traced the Americans, the Southern Islanders, and all the tribes of Asia as fraternal offspring from a common parent, what do we behold in Europe? Europe that has at length outshone all the rest of the world in arts, in arms, and in every noble attribute, is of very modern date, compared with the remote periods of Asiatic History. At the time when Babylon, Nineveh, Memphis, and Persepolis, lifted their proud columns to the clouds, and were the seats of learning and civilization, Europe, with the exception of that small portion which formed Greece, was a barren uncultivated desert; where, if human nature existed at all, it was at a very low ebb. The era of European civilization comes nearly within the scope of authentic history. Cæsar and Tacitus have given us considerable information on the early state of this quarter. It appears that the Western world was originally occupied by the Celtæ, who were settled here before the Goths, the Vandals, and the German tribes came into possession. The Celtæ were no doubt an Asiatic race. Cæsar, in his History of the Wars in Gaul, speaks of them as being inferior in prowess and arms to the German Nations, and

as giving way before them, whence, from originally occupying the heart of Europe, these people were eventually driven into its Western and remote corners; hence we find in this, as in the Eastern Hemisphere, the vestiges of the Aboriginal natives are only to be found in the mountains, and concealed parts of the country. In our own island, Wales and Cornwall afforded retreats for the Celtic natives, who fled before their German conquerors. All the circles of stones, &c. to be met with in these districts are uniformly of Celtic character, and partake in no respect of the better-finished features of the German monuments with their Runic inscriptions.

The Political and Religious Institutions of the Celtæ were doubtless of Asiatic origin. The division of the people into privileged orders, savoured much of the Indian Casts. The Druids and the Nobles were invested with peculiar powers and immunities, which remained hereditary in their families, while all the rest of the people were little removed above the condition of slaves. These bore a striking analogy with the Priesthood, and Military orders of the Indians. The affinity of the laws and customs of the Druids and the Brahmins has been dwelt on with great emphasis by many writers. Mr. Reuben Barrow has declared it beyond a shadow

of doubt, that the Hierarchy of the Druids was a ramification of the worship of the ancient Hindoos : their offices and privileges were of exactly a similar nature ; they administered all the religious ceremonies, they managed the sacrifices, they instructed the people, by whom they were looked up to as sacred oracles and depositaries of all the learning and information of the times : they even taught similar doctrines ; the transmigration of the soul was a leading dogma ; they worshiped various divinities, and sacrificed to them sometimes animals and sometimes human beings ; they abstained from eating certain animals ; their funeral rites also partook of the Eastern character ; they burnt the body on a pile, and with it often the favourite wife or slave. It appears, therefore, a fair inference that these original occupiers of Europe were descended from an Asiatic Stock ; that they were driven by other tribes gradually into the western limits of this quarter, where alone any vestiges of them are now to be found. The physical character of these people bears out the foregoing position ; they were of a dark complexion, the cheek-bones projecting, and the head taking on the Tartar outline. These characters are still observable in their descendants the Highlanders and the Welch.

The Goths, the Vandals, the Normans, and

all the Slavonian and German Nations, as well as the Huns, emigrated, no doubt, from that immense storehouse of the Human race, as it has been called, the Plain of Asia. These are of recent origin, compared with others. We find our position then, that all the Varieties among Men are derived from One Stock, gains probability from every side on which we view it; it seems to flow regularly from the circumstances of every country in the known world; it is analytically and synthetically a fair induction, from all the phenomena presented to us in the History of Nations. The languages of Europe corroborate the opinion; they are all of Eastern birth, as, indeed, are most of the arts and embellishments of European refinement. Europe has only improved; it has not invented. Greece was the instructor of Europe; but Greece was the pupil of Egypt and Chaldea: nothing originated in Europe: the great men of Athens travelled to the Eastward, and brought home the fruits of the learned labours of these countries. Every thing here, then, is borrowed. No European Society so much as invented an Alphabet; they have copied even their letters and their cyphers from the East. Their Religion has proceeded from the same quarter, and even their Laws have been transferred from the same fertile source. The Grecian Legislators studied

diligently the civil polity of their friends the Babylonians and Egyptians. The illustrious Solon incorporated these into a System; the Romans borrowed these in forming their Twelve Tables; and this code was the fountain of that pile of Civil Law which has diffused itself, more or less, over every part of Europe, except England, where peculiar circumstances, fortunately for us, prevented its introduction, and cherished a better and more genial system. It was, however, imported into Scotland, and forms part of the basis of its jurisprudence.

Let not Europe, then, boast of its superior endowments, and its transcending genius; the foundation of all its greatness was laid in the splendid countries of the East. The Tree of Modern Knowledge was planted in Egypt. Europe has been a servile imitator: length of time has given it the knowledge and the discovery of more facts; but the lofty emanations of Human Genius are still with the Ancients. Those learned Greeks, the disciples of the schools of Memphis and Babylon, excel still the Moderns in works of genius and invention. Practical Science time has given the advantage in; but the palm of merit in Poetry, in Sculpture, in Architecture, and in Eloquence, must be ceded to the Ancients. Europe, then, has invented little, but she has improved much; and,

enjoying the advantages of a mild religion, containing the finest system of ethics ever practised among mankind, she outshines in happiness and rational enjoyment the polished nations of antiquity. But this religion, the sublime boon of God to his creatures, like other blessings, came to the European from Asia; like most other things valuable to him, this too was an Exotic.

With these remarks I shall close this letter, and follow on the investigation in my next, till the establishment of our assumption seems complete, *that all Mankind compose but one great family.*

I remain,

Your's, &c.

L. S. B.

LETTER XI.

DEAR FRIEND,

THE Identical Origin of our Species was a theory I wished to establish in my last ; I traced back analytically the different tribes of Europe and Asia to a particular source in the neighbourhood of the Euphrates, the extensive and fertile plains of Shinaar. Here the History of Man commenced ; from this spot different flocks went forth and laid the foundations of distant societies. Hunting and fishing were the necessary occupations of Man at first, and the former tribes scattered themselves over an immense extent of territory, quite across the Continent of Asia, to its confines on the Indian shores, and peopled the Indian Archipelago ; others spread to the Northward and Eastward, and in time passed the narrow straits that separate this part of Asia from America, and extended themselves over the Continent of the New World. Some tribes took on the Pastoral state ; others made greater progress, and established Agriculture and Arts. Commerce formed the occupation of some, and the arts and elegances of one nation, were transported to enrich the natives of another.

The Celtic branch of the Eastern stock advanced into Europe, and under their Druids enlightened a dark region, and animated the western wilderness.

Let us now consider some apparent varieties in the Physical characters of different flocks. The various hues of colour observable in different communities, have occupied the attention of physiological enquirers, and various opinions have been offered in explanation of the phenomenon; some have hastily supposed that the sable complexion was the effect of Solar Heat upon the Skin, and therefore that the degree of shade was in a direct ratio to the intensity of the Sun's rays; but this is not found to be consonant to fact; the colour of man varies in no such positive ratio. Many tribes very distant from the Equator are considerably darker than others intermediate to them and that great circle; even in high latitudes we find dark people: the Greenlanders are swarthy, and the Samoiedes in the North of Tartary have acquired the appellation of the Northern Negroes. Some have supposed the blackness of the skin to be owing to the influence of heat on the Bile, producing a state very much analogous to Jaundice. This is an hypothesis not very tenable; the stout athletic structure, and great animal strength of the Negro, cannot be supposed compatible with

a state of permanent disease and debility *. A modern writer, Dr. Prichard, has treated this subject in a very perspicuous manner, and is worth your perusal. Buffon and Hunter have by their reasonings and discoveries led to the inference that Black was the proper colour of the primitive races of men. Let it not wound your pride, or be any insult to the supposed dignity of your clan, if we proceed to establish this opinion upon a certain basis. Mr. Hunter observes, that the changes of colour in man and all animals has been from darker to lighter tints. Black parents sometimes produce white children, and often those of lighter shades than themselves, but I believe the reverse of this never occurs; no white parents ever produce black children, or

* It is surprising that any persons at all conversant with the Animal Economy, either in its healthy or morbid condition, should have entertained this incongruous opinion.—Jaundice is a disease, in which the exit of the bile from the biliary vessels is obstructed, and in consequence it is taken up by the absorbents, and moves retrograde into the blood-vessels. The stoppage of this excretion, and the absence of this necessary stimulus in the intestines, excites frequently a general sympathy in the system, which is manifested by considerable debility, that mostly accompanies this complaint. That a perpetual disease should be transmitted through endless generations, and produce no general effects on the Constitution, is one of the many errors of that system, which sets out by framing previous theory, and afterwards warping all the phenomena of nature to support it.

children of a colour darker than themselves.—The analogy runs through the Brute creation; many of our domesticated animals in their wild state are black, or at all events much darker than in their tame state. The Albino, who often proceeds from parents of the darkest hue, as the African Negro, is an animal of debility; he is of a relaxed habit; his sight and other senses imperfect; and he is looked upon with a degree of pity, and often of contempt, in those countries where he is most frequent. All debilitating causes in the maternal system have a tendency to produce these offspring, and all changes of colour from dark to white seem to spring from such circumstances as occasion debility. White spots not unfrequently appear on the skins of Negroes after fevers and other diseases. In the debility of old age, the hair acquires a hoary whiteness. Rabbits, Mice, &c. are known to be weak when white, and less robust than the black. Sickness, and all debilitating causes, effect a change in the countenance from healthy brown or ruddiness to paleness. The Negro is strong, and possesses a large share of animal strength, compared with the European; and the strongest individuals in Europe are of the darkest complexions. We associate by experience and observation ideas of weakness and imperfect stamina in those of light delicate

skins*. Nature does nothing in vain ; the physical strength of the Negro is best adapted to the rude state of uncultivated nature ; the fatigues and hardships to be encountered in savage life, would be too much for the wan, sickly faces we meet with in our large cities,

“ Where the pale artist plies the sickly trade,”

and continues in a state of emaciation and debility from childhood to premature death. The dense firm constitution of the body, with a large scope of the senses, render the Negro fitter for the active condition of the savage state ; hence, we find, all those tribes that have not emerged from barbarism still retaining the Negro character, as the Papuas, the New Hollanders, and the natives of most of the islands scattered through the Southern Ocean, in all which, the quantity of Negro outline and attribute seems almost inversely as their progress in civil habits and improvement : and where traces of amelioration in their condition are discovered, there also are found improvements in their complexions and figures.

Dr. Prichard thinks, a strong secretive action gives the Negro his peculiar colour, and as this

* I have observed in practice, those patients of fair delicate complexion, are much soonest reduced by the antiphlogistic means so often necessary in acute diseases.

strong action becomes weakened in more refined habits of life, the complexion in consequence becomes lighter, and the proportion goes on, till, at the lowest degree of action in the Albino, we have the dead white complexion, or, in old age, the hoary whiteness that always accompanies it. All these considerations induce us to consent to the position that Black was the original colour of Man; that it is the colour denoting greater physical strength, and therefore best adapted to savage life. All changes have been uniformly from darker to lighter shades in both men and animals, and never in the reverse order. In proportion as communities or individuals have emerged from savage life higher in the scale of improvement, in such proportion has the surface of the body taken on lighter shades of complexion. Lord Bacon long since designated White as “the colour of defect.”

Thus Man, then, was originally Black : let it not offend your delicacy; the distinction of colour is a mere nonentity; we all proceed from a common stock, and our aversion to the sable hue of our ancestors arises from an associated prejudice, that has been heightened by a traffic the most horrid and disgraceful to humanity, which philanthropists have been labouring to overthrow, but which a great nation, at the suggestion of its merchants, have determined

to continue. Africa must be kept in barbarism, the rights of mankind infringed on, and the laws of God violated, to consult the interests of a few sugar dealers at Bourdeaux and elsewhere. How long will Nations and Governments continue to bow at the shrine of Commerce, and sacrifice the best interests and principles of mankind upon the Altar of Trade, whose votaries in general know no excellence but the virtue of getting rich, and recognize no measure of merit but the standard of Gold?

If a superior religion should not find its way, and exert its benign influence among the Africans—if they are destined still to remain in their native ignorance and idolatry; I trust they may make a new apotheosis, and place the name of Wilberforce as the Prince of Idols in their Pantheon*.

The relaxation of White people in hot climates, and the many diseases to which they are liable, and from which the Negroes are mostly exempt, is observable in all our West Indian Colonies, where the yellow fever crops the flower of the British youth, without having much effect on the people of colour. The savages of North America will undergo hard-

* It is principally owing to the indefatigable perseverance of this virtuous senator, that African slavery has received its great check: he has done much in the great cause of humanity.

ships and privations in chace of their prey, or their enemies, or eluding the pursuits of the latter, that appear frightful to Europeans.

In speaking of the colour and complexion of mankind, we come to consider those peculiar aspects of men which have given rise to the distinction of Temperaments. The Doctrine of Temperaments is of very ancient standing; it divides the human race into four leading divisions, the Sanguine, the Phlegmatic, the Choleric, and the Melancholic. The *Sanguine* is distinguished by a fair and ruddy complexion, light hair and eyes, soft delicate skin, and often a large stature. The *Phlegmatic* display a pale unhealthy skin, with light hair and eyes. The *Choleric* is characterized by blackish, or sometimes reddish hair; the skin is swarthy and somewhat ruddy, and of a rough, thick texture, with much hair; the countenance lively, the muscular movements of the body rapid. The *Melancholic* is marked by black hair and eyes, a dark complexion, sometimes a very sallow countenance.

These distinctions constitute the Temperaments, which, in the Galenic school, were thought to harmonize so well with the doctrine of the four elements, that we find them accounted for on the supposition of a preponderance of one particular element in the com-

position of the blood. This Ideal Philosophy is now entirely superseded by the superior light of modern science*. The fact seems very clear of the existence of this diversity of Temperament, and of a corresponding disposition of mental character. Thus the Sanguine has been remarked for great flow of animal spirits, love of pleasure approaching to voluptuousness, want of steadiness in attachments, and seldom acquiring any great proficiency in the sciences. The Phlegmatic are slow, and less sensible than the last; grave and inanimate, but prone to intense thought, and fixed in their attachments. The Choleric are extremely irritable, and prone to anger, liable to be carried away by every gust of passion, consequently less capable of deliberate exercise of judgment: they seldom display magnanimity under trying circumstances, and are arbitrary and cruel to inferiors. The Melancholic are of gloomy tempers, patient and per-

* Hoffman has the credit of being the first to reject the errors of the Humoral Pathology, which, as illustrated by Boerhaave, long kept possession of the schools, and influenced the practice of medicine, and the movements of mankind. Cullen, his great commentator, who enlarged upon Hoffman's Theory of the important agency of the Living Solids, could not sufficiently emancipate himself from the trammels of the Humoral Theory, as you may perceive in his remarks on Digestion, and on the proximate cause of Scurvy.

severing, prone to revenge, thoughtful, and often of the strongest understandings. Such is an outline of the temperaments of the human body as delineated by physiologists: on what circumstances in the animal economy these temperaments depend, I am not prepared to offer an opinion.

A great diversity of opinion has prevailed on the changes we meet with in the Human Species. An author, whom I have often quoted, remarks, that nature has a constant tendency to transmit from parent to offspring any characters that originate; but that acquired properties are not thus transmitted; that therefore the dark hue of the skin acquired in going to hot climates is only of temporary effect, and not transmitted to offspring. The new-born children of Europeans in Bengal or Jamaica, are as light in colour as if born in London, notwithstanding both the parents may have been considerably tanned by long residence in those climates. Many parents from accidents, diseases, and other sources, have blemishes and mutilations, which never go down to posterity. The Hebrew Nation, from an early epoch in their history, afford a direct negative to all the reasonings of Buffon and Monboddo, on the transmission of acquired modes of structure in successive generations; and indeed the pre-eminence of Creative Wisdom

is conspicuous in this law ; for were it otherwise, and every mutilation, or acquired circumstance in the animal economy was easily and constantly transmitted to posterity, the face of animated nature would exhibit no permanency ; each species would be continually diverging from its original stamp ; every thing would be in perpetual mutation, and organized beings would be retrograde and deteriorate.

I have remarked before, that in the economy of Man and Animals, there is a strong tendency to assume, under particular circumstances, certain varieties, and to run into differences. This manifestly extends to the Vegetable Kingdom also ; and the abundant variety into which trees and shrubs ramify in particular situations and under certain modes of culture, is well known to all persons accustomed to Nurseries and Green Houses : but among animals this is more conspicuous ; it has been said, that if a pair of brown mice were kept immersed in a dark cellar, their young would be white with red eyes, and these white mice thus produced, would form a distinct race. Domestication among animals is a great cause of the variety we find in them : when animals are brought in from a wild state, a few generations produce a considerable divergence from the primary stock ; the mixtures and varieties in the breeds of

horses, sheep, &c. occur daily to our notice. The differences which occur in our own species may be attributed to the varied habits and modes of life. Civilization, compared to savage life, affords a wider contrast than is exhibited between the wild and domesticated state of animals ; and this improvement in the condition of man operates so strongly as to prevail over every other circumstance of climate, food, or any mode of physical agency. The changes, therefore, among nations and individuals are more influenced by moral than by physical causes in every climate and quarter of the globe. Much is continually said on the influence of Climate upon the character and condition of society. If, however, we take a survey of the different races of men at present scattered over the earth, and look back in the page of history on those who have gone before, we shall be forcibly struck with many circumstances tending to convince us, that Climate has not any very considerable influence on the condition of Human Nature, and that its power over the character of mankind has been most materially overstated. In the wide theatre of the New World, a Continent extending from 70 degrees of North Latitude to 54 degrees South, a distance of eight thousand miles, exhibiting every diversity of climate and soil, the inhabitants displayed such a uniformity of ap-

pearance in Physical aspect, as left no doubt on the minds of their discoverers, of their being children of one common stock, with the exception of the Esquimaux, on the coast of Labrador, who have a great resemblance to the Greenlanders. Climate, therefore, evidently had no effect upon their physical character. Dr. Robertson remarks, that “ Man is the only living creature whose frame is at once so hardy and so flexible, that he can spread over the whole earth, become the inhabitant of every region, and thrive and multiply under every climate.” Many animals are confined to particular regions, beyond the limits of which nature never intended them to wander ; but Man roams from Pole to Pole, and settles equally in every part.

The Negro race extend over a great tract of country, and inhabit very different and distant quarters of the globe, as the Papuas or Eastern Negroes, who exhibit the same model of features and complexion as the Africans. But some tribes of the African Negroes, though dwelling on the same soil, and under the same sun, yet manifest considerable differences in features and complexion, as the Foulahs, who are of a tawny colour, and have soft silky hair ; these are much more civilized than the other tribes, and follow pastoral and agricultural pursuits :

and to this improved moral condition may be attributed the physical difference in a tribe living in the same climate with others in a state of savage life. The same is said of another tribe, although in a less degree, the Jaloffs.

In several of the South Sea Islands a degree of civil improvement manifests itself, and there are a superior rank of people, who form, as it were, an Aristocracy, while the rest of the multitude remain on the confines of barbarism ; now these better orders are always found to differ in physical character, and evince a tendency to emerge from the Negro form of their fellow islanders. The inhabitants of Van Diemen's Land, in latitude 45° South, are in a complete savage state, and as black as the natives of Guinea, with woolly hair. In New Zealand the natives are in an uncultivated state, and universally display the Negro character in strong lines ; whereas, in the Society Islands, an approach towards civilization shews itself in one portion of the inhabitants, who, in consequence, display improved features. We are told, that in the United States an improvement in the form and complexion is often very visible in the second and third generations of the domestic slaves, and those who live in towns and enjoy mild treatment. It is said, the nose becomes more ele-

vated, the lips less prominent, and the contour of the face much amended. The same observation is made in the West India Islands.

Another striking instance of the small share climate seems to have in affecting mankind, takes place among the Hindoos. The peculiar laws and religious ordinances of these descendants of a very ancient stock, keep each cast perfectly insulated and detached from the rest; each division, in consequence, exhibits a peculiar turn of countenance, and acquires a distinct physiognomy. The Brahmins, who live more at ease, and from their habits attain more refinement, have a more fair, handsome complexion than the lower casts. The natives of Northern Asia, the Samoides, are of a very dark complexion, approaching to black, although they live in the rude climate of the Arctic Circle.

In Europe, we find that a diversity of religion and laws, have produced a great influence on the condition of society at different periods in the history of the same nation. The Ancient Greeks carried the arts and sciences to astonishing perfection; all the refinements of the civilized world may be traced to these enlightened people, who by their skill and valour became masters of the world. But their descendants, the Modern Greeks, under the yoke of Turkish tyranny, display only vice, pusillanimity, and meanness.

Turning to Italy, where do we perceive the least vestige or remains of the majesty and dignity of a Roman citizen? Italy, that for ages was the theatre of war, and the nurse of arms, whose natives were the chosen sons of Bellona, and carried conquest to the boundaries of the world, is now, from a change in moral circumstances, though standing in the same latitude, and enjoying the same climate, become a land of men the reverse of their warlike ancestors, where, as the Poet says,

“ In florid beauty groves and fields appear,

“ *Man* seems the only growth that dwindles here.”

This change cannot be the effect of climate or any species of physical influence; it is the result of a change in the moral circumstances of the society. In Spain, each province exhibits considerable difference of physical aspect, although a uniformity of climate prevails through the Peninsula. The Portuguese, a few centuries back, evinced a spirit of enterprize, and a share of science, that enabled them to become a maritime people. The genius of Vasco di Gama discovered the Western route to India, by exploring the coast of Africa, and the passage round the Cape; a circumstance which had a considerable effect on the condition of this part of Europe. The peculiar laws and religion of these people

have, however, prevented their deriving much benefit from the above discoveries; and they have now lost their martial character, and materially degenerated, though still occupying the same parallel.

In our own island we discover a striking difference of character, as I have before remarked, in the dark complexion of those Highlanders who are from the Celtic stock, with the yellow hair and light countenance, among their countrymen descended from Gothic original. Every traveller of correct and acute observation will discover a peculiar stamp of character, both physical and moral, in the inhabitants of the same country in different districts, arising entirely from local causes. Mr. Hume observes, that the boundary of a river, or the intervention of a hill, often separates communities very different in character.

The states of Ancient Greece exhibited considerable diversity, which must have arisen solely from the difference in their laws and governments, infusing a different genius among the various communities; thus the polished Athenians and the rustic Bœotians evince a lively contrast.

The Circassians, so celebrated for their personal beauty, live in the same parallel with many tribes of Tartars conspicuous for the converse

attribute. And the Abyssinians have for ages lived in the same climate, and been surrounded by nations of the blackest hue, and strongest Negro outline, and yet they remain a very distinct and superior people.

All these circumstances, in a review of the situation and attributes of different nations, naturally lead us to a fair logical inference, that *All Mankind are derived from one Parent Stock.*

If in a philosophical investigation, the testimony of history may be admitted, the ancient records of the Hebrew Nation may be called in evidence. They are of the most remote antiquity, and form the oldest book now in the world. It is more than three thousand years since the sacred historian lived. But the truth must not be concealed, that the insisting upon the exact literal sense of this narrative in all its minutiae, has endangered the credibility of the whole, by overstretching its application. The Mosaic account of the Creation is a tradition that existed near four thousand years since, among an enlightened and peculiar people; it had been handed down, like all other points in the history of Man, by oral communication, and had partaken of a certain degree of that marvellous divergence which so strongly pervades men's minds in the infancy of society; till Moses, skilled in all the learning of that age, digested

and formed it into a written story. Another consideration must also go along with it ; it was written more than 3000 years since, when language was so much in its infancy, that it possessed all that figurative form, and was so enveloped in metaphor and allegory, that it addressed itself, on all occasions, more forcibly to the imagination than to any other faculty : facts were recorded by figures and similes, that struck the fancy and relieved the understanding. Had the plain argumentative style adopted by Historians of the present age been chosen, this narrative would not have been suited to a people young in literature, and accustomed to bold figures of fancy, that glittered before and enlivened their imaginations. The writings of David and Isaiah abound with expressions of passion and metaphor. This is a style not peculiar to the Hebrews, but is universal in the early stage of Man all over the World. Homer and Ossian are in the same style of poetic allegory. Hence, in receiving the evidence of Mosaic History, we are to look for the essence of its truth under the accustomed veil of allegory, common in early society ; and we shall find, that of all the systems which the Eastern Nations presented to the world, no one has harmonized so well with the general order of nature as this ; it commences with the Formation of Light, and proceeds re-

gularly to that of the Earth from Chaos; the Waters upon that Earth; Vegetable Life succeeded by Animated Beings; till, to crown the pile, *Man is created in the Image of his Great Maker.* All this is accomplished without the aid of that superfluous machinery, which obscures and disgraces the Eastern Mythology; it is effected in a mode best suited to our comprehension—*the simple fiat of Omnipotence.*

The Mosaic History of the Creation is therefore a Tradition, reduced to form early in the progress of man, and conveying its truths under that veil of allegory common in the infancy of society. This narrative, the oldest record in the possession of mankind, confirms the train of reasoning in the foregoing sheets, and establishes our favourite assumption, that the whole human race have gradually and regularly descended from one identical source—that they are the *offspring of one Primitive Stock—the ramifications of one Parent Trunk.*

With these remarks on the Origin of our Species, I conclude this letter, and remain,

Your's, &c.

L. S. B.

LETTER XII.

DEAR FRIEND,

AFTER a survey of the Physical character of Man, we naturally arrive at the consideration of that noble attribute that constitutes the final end of his existence, and the essence of his superior organization. The Mind of Man is the grand masterpiece of sublunary creation; it is the distinguishing prerogative which lifts him above all the rest of organized nature; it is in this quality the saying of the historian is correct, that Man was made in the Image of his Maker. The Brain is the immediate organ of the mind: I observed before, that many philosophers have supposed the faculties of the mind to be the necessary result of the organization of the brain; that this organ displayed the powers of thinking, by virtue of the physical arrangement of its parts; that therefore organization was a physical property of matter, and Thought the necessary effect of organization. I then remarked that this hypothesis sprang from an error not uncommon in metaphysical speculations—the blending and mistaking effects for causes. The organization

of the Brain is not a cause ; it is the effect of the energy of the living principle ; it is the particular power of life (the *principium vitæ diffusum*) which fabricates the form and texture of this organ, and gives it the specific arrangement of its parts. It is moulded and fashioned by the active instrumentality of the living principle, and possesses no inherent powers of thinking in itself. Nature has created a certain arbitrary connection between Mind and Matter, without which, the phenomena of intellectual existence cannot be displayed. A certain structure of parts is, therefore, a necessary rule of nature, without which, the attributes of intelligent beings are not displayed. We find that man is a compound of two substances, Body and Mind ; the former is the mere machine, the latter is the artist that excites and puts into action the powers of this machine ; the Brain is an organ that bears the same relation to its active stimulus, the living principle, as the harpsichord does to the skill and taste of the musician : it is from the combined powers of both that the phenomena of living action are produced in one, and the harmony of corresponding sounds in the other.

Different opinions have been formed concerning that particular condition of the Brain, which produces the phenomena of Mind, and as to the mode by which the Brain and Nerves effect

their different faculties and movements. One set of physiologists have assumed the existence of a certain subtle ethereal fluid, fraught with exalted spiritual energies, which is secreted, and issues from the Brain, and passes along the internal substance of the Nerves, which they suppose tubular. The influx of this fluid into the structure of muscles, gives them their action ; its reflux to the Brain explains the cause of our sensations, and by its movements and properties all the phenomena of intellectual energy become displayed. The motion and action of this subtle fluid is ever under the controul of Volition, and determined to every part, according to the inclination of the mind, and the necessities of the system. This hypothesis has long been taught in the schools, and has had as its advocates, the great names of Des Cartes, Locke, Haller, and Cullen. It is, however, objected to it, that it is built upon mere supposition ; that the existence of this fluid, which is the main pillar of the theory, is a gratuitous assumption, and has never been reduced to any thing like demonstration. The supposed tubular structure of Nerves, also, does not accord with facts, as they appear to be solid cords ; and the theory altogether, does not seem sufficient to explain the complex operations of the human intellect, in a satisfactory manner. Another theory explains all the func-

tions of the Brain upon the supposition, that the Nerves are continuations of the substance of the Brain ; that impressions made upon them excite vibrations in their minute particles, which vibrations are communicated to the Brain, where corresponding ones are excited ; that, therefore, all the phenomena of Mind, are produced by means of vibrations effected and propagated throughout the nervous system. Sir Isaac Newton, Drs. Hartley, Priestley, and others, have supported this hypothesis, which has opposed to it some of the objections against the former theory ; *viz.* that the existence of these vibrations has never been proved, but rests on a mere *petitio principii* ; and, moreover, that vibrations necessarily suppose tense cords, and that it is difficult to conceive how vibrations can be extended along the soft loose texture of nerves. And some have been led to think this theory tends to resolve every thing into Mechanism, and is built on the ground-work of Materialism.

I believe very little stress is laid on either of these theories in the present day ; physiologists are content with observing the facts which the nervous system manifests, without expecting any great success in explaining their immediate causes.

Different systems have differently arranged the faculties and powers of the human mind, to

enumerate which would be a task of some labour. Dr. Hartley has, I think, fixed on a concise and explicit arrangement ; first, *Perception*, or the faculty by which we acquire sensations and ideas.—*Capacity for Pleasure and Pain*. *Association*, which is a primary faculty, by which one sensation, idea, or muscular motion being excited, calls up others with which it may have been previously united. *Sensation*, or internal feeling by the agency of external impressions. *Understanding*, by which we contemplate, combine, separate, and compare our ideas. *Memory*, by which we retain, or call up past ideas in their natural order. *Imagination*, the power of combining ideas in a manner different from their natural order. *Affections and Passions*, feelings arising from the view of pleasure or pain, good or evil, &c. *Volition*, or the will. And lastly, *Power*, or the faculty of executing our volitions. These are the different faculties into which the Human Mind has been divided, on each of which I propose offering a few remarks.

It has been contended by some, that all the powers and attributes of the Human Mind are original principles ; that all our affections, and many of the truths which we understand, are the result of instincts implanted in us by the Author of our Being ; that therefore man possesses an innate sense of right and wrong, ante-

cedent to reason and instruction, which flows spontaneously, and performs the office of a vigilant and constant monitor; and all this is triumphantly asserted to be the evidence of common sense. Now, on the other hand, it is with more justness and propriety contended, that all our ideas are the result of impressions made upon the senses; that without the presence of an external agent to make this impression, no sensation can be excited; that the Senses are the grand inlets to all our information and knowledge. An impression on an organ of Sense, excites in the mind a sensation or feeling of the presence of the external agent. This constitutes a simple idea. Two or more of these ideas, combined or compared, form a complex idea; hence every idea is derived from sensation, and nothing is innate. The whole of Human Knowledge, therefore, is grounded on the comparison and association of those ideas taken in by the senses. If the faculties depended upon instinct, and any of our ideas were inherent, it would necessarily follow, that all mankind would evince a uniformity of feeling with respect to the same objects and ideas; whereas, there is nothing in nature which presents such a diversified field as the various opinions of men upon the same subjects. All innate ideas or propensities must of necessity be universal, they must operate in the same

manner, and produce the same effects upon every mind. It must be unconditionally granted, that *Universality* and *permanent Uniformity* are the natural attributes of all instincts. The movements of the Beaver and the Bee are precisely the same in every region; they are limited by the instinct of the animal, and can in no degree whatever undergo any alteration; they are not susceptible of the least change. But in Human society, we find each individual exercises the powers of reason upon the nature of every object presented to him, and that a subject which in one person produces feelings of a certain character, will in another excite ideas and views of a very opposite tendency. This difference extends to every object and circumstance in any way cognizable to our minds, from the sublimest truths to the most common-place concerns; whence all the leading points in the foundation of religion and politics have been so differently interpreted in different communities, that the nature and attributes of the Deity himself have been variously construed in various countries. There is hardly a Crime in our catalogue, but what has either been tolerated or elevated even to a Virtue in some country of the earth; so that Conscience, or the sense of moral obligation, has always been an arbitrary standard, set up in each society according to the peculiar mode of

thinking, accidentally taken up in that community. Suicide in Cato was an exalted virtue; with us, the law loads it with disgrace. The exposure of infancy and deformity to destruction has been, and is still, from political motives, tolerated in some nations, while we punish it as murder. Polygamy is felony in London, but legal at Constantinople.

Religion has, in consequence of this want of fixed innate principles, branched out into every ramification that the exuberant fancy of the warmest imagination could suggest. Among one society, we find the Supreme worshiped in the degraded form of a wooden image, or a lump of earth; with others, adored in the effulgence of the sun's rays, or directing in the clouds the rage of the frantic storm; one nation glorifying Him in that active emblem the flaming element; and another paying divine honours to His supposed presence in the flowing streams of a great river. To conceive Him in all His sublime attributes, to view Him in all the majesty of His glory, belongs only to the highest office of Reason. Reason, which some sects affect to depise, is nature's guide in teaching Man his relationship to the Deity. To teach that Revelation has no reference to Human Understanding, is to libel the sublimity of its doctrines, the finest system of ethics ever

presented to mankind, and decorated with all the richness and elegance of rhetorical ornament. The instincts of animals are generally in their performance, combined with a certain degree of pleasure; but the operations of the human mind are attended necessarily with a certain share of labour and trouble. Almost every animal at a certain age is in full possession of its quantum of instinct, but few men acquire an average share of mental plenitude; it requires great leisure, constant application, and laborious exercise, to bring our intellectual powers to maturity; whence the axiom of the ancient sage, *Ars longa, sed vita brevis*, is a conspicuous truth. The human perceptions and associations often wander from truth, owing to accidental circumstances; but animal instinct is spontaneous and prompt, as the Poet says,

“ Reason stays till we call, and then not often near,

“ But honest Instinct comes a volunteer.”

Instinct, as far as it goes, is superior to Reason, but it is for ever fixed; it has its precise limits, and cannot improve or vary its application to difference of circumstance; wherefore animals gain nothing by experience; they are bound up in mechanism, and remain eternally at one standard. Reason, on the contrary, takes wing, soars aloft, and explores every part

of the universe ; it lifts Man above himself, shows him the confines of another world, and gives him an alliance with superior beings.

Perception is that faculty of the mind by which we acquire sensations or feelings from the impression of external objects ; these excite a sensation of their presence or nature on the mind, which is called an Idea : the mind recalls those ideas at different times, after the external object or archetype is withdrawn. Ideas are at first all simple, but by combination and comparison become very complex, and form the basis of all our knowledge. The seat of perception is evidently in the Brain : if the communication between any organ of sense and the Brain is cut off or interrupted, the function of that organ is immediately lost. Many physiologists have attempted to trace the different affections of the mind to different portions of the Brain ; but this has exercised their time and fancy to very little purpose ; no progress has been made in the discovery. Des Cartes, who had the usual speculative ingenuity of a Frenchman, supposed the Pineal Gland* was the seat of the soul.

* The Pineal Gland, of which so much has been said, is a small body situated in the base of the Brain, in a depression of the Sphenoid Bone called the *Sella Turcica* ; it is perhaps improperly termed a gland, as it has no excretory duct ; it generally contains a small portion of phosphate of lime.

The Senses are five in number*, and from these we derive sensations and ideas, which, by their combinations and comparisons in the mind, generate the affections and passions, and all the pleasures and pains of intellectual existence. All the emotions which constitute the rationality and felicity of human nature, therefore, spring from simple impressions on the organs of sense; if any one doubts this, let him examine the condition of a child deprived of only one sense, that of Hearing; let him behold the immense deficiency consequent on the absence of this single sense; having done so, let him contemplate the additional loss of another sense, that of Sight, in the same child, and if the woe-ful and invincible negation of the mind of this child, notwithstanding the entire condition of its Brain, does not convince him, that the Human Creature is the Pupil of his Senses, and particularly that of the Ear, I know nothing that will overcome his obstinacy.

The sense of Feeling is either general, or that

* Many animals possess the different senses to a greater extent than Man, a fact observable among the Ancients—Pliny says, “ Ex sensibus ante cœtera Homini Tactus, deinde Gustatus: reliquis superatur a multis. Aquilæ clarius cernunt: Vultures sagacius odorantur: liquidius audiunt Talpæ obruta terra, tam denso atque surdo naturæ elemento.”

which extends over the whole body, or it is that particular exquisite degree of it that exists at the extremities of the fingers, and informs the mind of all the tangible qualities of the various bodies in nature, such as smoothness, roughness, magnitude, figure, heat, cold, &c. It is observed, that this sense and sight often become mutual exponents, so that we every day judge of tangible qualities by visible appearances, and *vice versa*. By the touch, blind people acquire a tolerable idea of the visible appearances of many bodies, but on this subject a sort of metaphysical puzzle has been stated; whether, if a person born blind, who could accurately distinguish by his feeling the difference between a Globe and a Cube, should suddenly acquire his sight, and both these bodies be suddenly presented to his view, he could from his sight alone point out which was the Globe and which the Cube? I confess, I believe the man in those circumstances would be unable to distinguish them; the sensations of light affect the mind by experience only. The sense of Touch cannot be denied, perhaps, to any individual in the whole range of the scale; a certain degree of it has been supposed even in vegetable life. Pliny observes, “*Tactus sensus omnibus est, etiam quibus nullus alius; nam et ostreis, et terrestribus vermibus quoque. Existimaverim omnibus sensum et Gustatus esse.*”

The senses of Smell and Taste are perhaps nearly allied in their natures: they are, as well as that of Feeling, under the influence of associations, and administer much to the intellectual pleasures and pains.

The sense of Vision is the most noble and elegant; and the structure of the organ which is the seat of this function, is the most interesting and instructive in the whole range of the animal economy. To give but a brief outline of the Eye would far exceed the limits of a letter*. It is a ball made up of three distinct coats, having in its cavity three different humours, which refract the rays in their passage through them, and converge them to a focal point on the retina at the bottom of the Eye, where an inverted picture of the object is most accurately painted; which picture, from its impression on the retina, which is a continuation of the optic nerve, excites in the brain an idea of the visible object: so that the Eye, taken of itself, is merely a Camera Obscura; it is a dark chamber with a small aperture, and a lens in that aperture, which throws an inverted picture of the surrounding landscape upon the curtain opposite. Light

* “In dissectionibus anatomicis vix aliquid admirabilius, aut artificiosius structura oculi humani, meo quidem iudicio, occurrit: ut merito, per excellentiam, Creatoris appelletur miraculum.”

and Colours are the objects which become the media of Vision. This sense conveys to the mind the Figure, Magnitude, Distance, Position, and Motion of Bodies: but it acquires all its perfection by experience and custom; for instance, no one can judge of the form of a sphere or cone but by habit; the visible appearance of these bodies are flat, with diversities of light and shade; hence the metaphysical puzzle before mentioned. It is the same with regard to Distance and Magnitude. Whatever causes an error in our judgment of Distance, creates a corresponding error in our judgment of Magnitude; a fly on a window is often referred to a distant field, and in consequence taken, perhaps, for an animal grazing. Ships at sea in a fog appear from their indistinctness at a greater distance, and therefore become much magnified in the mind. The Celestial Bodies when in the horizon appear much larger than when in the zenith, because the mind then associates a greater distance with them. Children acquire all their knowledge of distance, and consequently of magnitude, by experience, as do also grown people; it is not till a landsman has been some time at sea, that he can form any correct judgment of the distance and magnitude of ships, or distant head lands. The intervention of objects is of great assistance in judging of dis-

tances ; hence our imperfection with respect to the Celestial Bodies, which we are apt to consider as equally remote: More stress has been laid upon the Optic Axis, and the angle under which bodies are seen, than seems warranted.

The inner surface of the Choroid Coat, which lines the interior of the Eye under the Retina, is in the human subject of an ash colour in the centre, but covered all round its margin with a perfectly black secretion, (*called Pigmentum Nigrum,*) which absorbs the superfluous rays of broad sunshine, and enables Man to enjoy the day-light. Animals that graze, as the Ox, Sheep, &c. have this membrane of a very bright green colour, and in the Feline Genus, as the Cat, Tyger, Lynx, &c. this membrane is of a very bright yellow, and takes the name of the lucid *Tapetum*. This colour reflects all the rays, and prevents their seeing so clearly in bright light, but is of great advantage in the night, by reflecting a number of rays, that in the human eye become buried in the black matter secreted on the surface of the Choroid ; consequently these animals see better in diminished light than those animals who have the above-mentioned black secretion.

The scope of Vision, or the distance the human eye can see in a line along the curve of the earth's surface, is determined mathematically.

It is done by plain trigonometry in the following manner ; the height of the human eye above the earth's surface we will suppose 6 feet, which, added to 7,003,040 yards, the semidiameter of the earth, gives 7,003,042 yards as one leg of a triangle ; another leg of this triangle is from the horizon to the earth's centre, which is a semidiameter, and equal to 7,003,040 yards ; the third leg sought, is a line from the observer's eye to the extreme point of vision in his horizon, and this line being a tangent to the earth's surface, forms a right angle with the earth's semidiameter at that point, wherefore you have two sides and an angle given to find the rest, which is a common problem in trigonometry, and gives a product of almost $3\frac{3}{4}$ miles, as the distance the human eye can discern along the earth's curve, supposing you stand at the water's edge. But this distance is increased by refraction in the atmosphere, which elevates all objects near the horizon, and consequently enlarges the scope of our vision.

Ideas of Vision become associated with other ideas, sensations, and motions. Visible ideas form the mirror of most parts of human knowledge ; poetry, painting, and history furnish their instruction and entertainment to the mind by means of the association of visible appearances ; every fable and fiction pleases us by means of

the imagery it presents to us, which exercises and entertains the fancy ; indeed it is observable that visible ideas, in some form or other, associate themselves with almost all the internal feelings of the mind ; every intellectual affection of pleasure or pain is combined with a pleasing or displeasing imagery of visible appearance in the mind. The contemplation of the Beauties of Nature, and the study of the Fine Arts are attributes of this noble sense.

The Sense of Hearing is one, without which man would be a deficient and pitiable creature, destitute of the light and the blessings of reason. It is by means of this sense the understanding gathers food, and reaches to maturity ; to Sounds we have annexed Ideas, and the communication of these constitutes Language. These sounds become the signs of visible ideas ; the name of a horse calls up in the mind the visible appearance of that animal, and so of every subject with which we are acquainted. Sounds become associated with visible appearances, with tangible qualities, and every circumstance in surrounding nature. Man is, as I observed before, the Pupil of this organ ; he derives all his instructive knowledge by this channel, and gains no intellectual assistance without it, except by the most laborious and Herculean endeavours. The system of the Abbe de L'Epeè is a very com-

plex and operose undertaking, although the efforts of the Abbè, and others, have been attended with the most astonishing and beneficial effects on numerous individuals. Besides Language and the communication of Ideas, the Ear is the organ which receives the charms of Music, which is the first of the fine arts cultivated among mankind; it universally prevails; no community, however savage, are destitute of the charms of this art in some form. "This and the Dance constitute Nature's general festival all over the earth." Music is the basis of all Language; Eloquence is the adaptation of the tones of the voice, to please the Ears and move the minds of the audience; and it is generally allowed that the sound of a good speaker's voice has a considerable effect on the mind of the hearer, independent of the matter of his discourse.

The Understanding of Man, therefore, is derived from, and divided among his senses; they are the inlets of all his intelligence, and the stimuli that call into action the otherwise dormant excitability of his mental capacity. They form the link that unites the whole external creation to his sentient principle. By combination and comparison they form the basis of all our knowledge, and administer to every faculty of the mind, and every power of the soul.

It has been a question often started, whether our sensations have any positive existence out of the mind; for instance, whether on an unfrequented rock standing in the ocean, the beating of the surf produces any absolute noise, if no ear is present? This seems, at first, difficult to assent to, but it is impossible, perhaps, to conceive that sound can exist out of the mind. However this apparent paradox may astonish you at first, the more you reflect on it, the stronger will be your conviction, that no noise can positively exist independent of the organs of sense. Bishop Berkeley carried this opinion to a great extent, and came at last to the conclusion, that the whole material world had no existence; that sensations were excited without the intervention of material agents; that the being and essence of every body consisted only in its perceptibility. He says, of any body its *esse* is *percipi*, and goes on to state, “it is an opinion strangely prevalent among men, that houses, mountains, rivers, and in a word, all sensible objects have an existence, natural or real, distinct from their being perceived by the understanding. But with how great assurance soever these principles may be received in the world, whoever shall call it in question may perceive it to involve a manifest contradiction.” This is, I think, going into extremes; I know

of no operation in Nature but the action of Matter upon Matter ; therefore Matter must surely exist, and by its action impress the organs of our senses.

In addition to the five senses enumerated, some naturalists have supposed a sixth in the Bat, from the great care with which it seems to fly among trees, poles, &c. when blinded, without striking against them. I take this, however, to be only a modification of the sense of Feeling.

The Capacity for Pleasure and Pain is the next faculty of the mind. Of the real nature of these feelings we are but little acquainted. They are both very difficultly defineable. Consciousness and Experience give us a knowledge of their existence. Those philosophers who have favoured the doctrine of Vibrations have maintained, that Pleasure and Pain have no positive distinction ; that Pain is Pleasure carried beyond a certain limit ; they therefore only differ in degree, and all pleasure passes into pain if excited beyond a certain measure ; thus they say a pleasurable warmth may be converted to a painful heat, by continuance or increase ; and the same holds with respect to friction, light, sound, and most other stimuli : in this way they account for many painful, unpleasant sensations, becoming, after some time, pleasurable ; such as many of the acquired tastes, as port wine, olives,

celery, &c. which, though disagreeable to many at first, become from a little use sources of great pleasure. They suppose, in all these cases, that the vibrations which constitute pleasurable sensations; are moderate in degree, but that when they become multiplied in number or intensity, they then pass into painful feelings; that when vibrations at first so frequent as to be painful, continue for some time, they subside within the limits of pleasurable feeling, and become ever afterwards agreeable. This theory has much ingenuity to recommend it. Others, however, contend that Pleasure and Pain are opposite states of Positive qualities.

Association is that law of the human understanding, by which several ideas, sensations, and motions, are so united, that each one on its excitement shall call up all the rest. This law was first noticed by Mr. Locke; but subsequent writers have extended its operation to most of the phenomena of the mind. It has most extensive influence over all the movements of the Thinking faculty. There is hardly any idea but what has, from association, some other so linked to it that they are almost inseparable; it is this law which gives Language its great force and utility; ideas are associated with certain words; the mention of the word calls up instantly in the mind a vivid and forcible im-

pression of the thing expressed ; for instance, speak of a Judge, and immediately a lively picture of him occurs to the mind, attired in the usual costume of his office : speak of a Church, and instantly the imagination bodies forth to our view the building, with the minister, the congregation, the church-yard, and all the appendages. Until very lately, the smell of an orange never failed to call to my mind one of the London Theatres, where this fruit is usually so much handed about, and where the smell, in consequence, becomes so familiar ; and I never drink lemonade without thinking involuntarily of the climate of the West Indies, where I have so eagerly quenched my thirst with this beverage. Every individual may recollect similar associations in his own experience. This faculty of Association is of use in obtaining most of our information upon every branch of science. It is the basis of the use of language both oral and written. The combinations of abstract ideas, constitute all our knowledge in science and literature. In reciting a poem, or in going over a piece of music, the assistance of Association is very conspicuous ; if the person is at a loss, mention the first words, or tune the first few sounds, and the performer recollects successively all the rest. Indeed it is by the continued association of succeeding parts that we gain all our

learning and knowledge in every branch of art and science. A few very striking instances of the operation of this law, are generally quoted as demonstrative of its extraordinary influence. The well-known effects, for instance, of National Music; hence a particular tune (*le rance de vaches*) has infused among a whole regiment of Swiss soldiers in foreign pay an invincible desire of returning home. Captain King, in his voyage, at a miserable hut on the banks of the Awatska, met with an old, half-worn pewter spoon, with the word London stamped on it; this trifling incident he records “in gratitude for the many pleasant thoughts, anxious hopes, and tender remembrances it excited.”

This faculty of Association is primarily implanted; it is interwoven in the texture of our minds; it is the Parent of Habit, the fountain of all those pleasing sensations that spring from local causes and circumstances, and the companion of all those feelings that constitute the rationality and felicity of man in the whole history of his progress. Each individual looks back with tender remembrance to the hours, the places, and the associates where the world first dawned on his mental energies. In the voyage of life, he seems to drag a lengthened chain from this innocent, this lovely region; to which the aged mind ever reverts with pleasure and com-

placency. The recollection of the playful sports of childhood solace the imagination and the memory in the evening of life, as if Man, like a Plant, was physically attached to the spot on which he blossomed.

In my next I will resume these observations on our Mental Faculties.

Your's truly,

L. S. B.

LETTER XIII.

DEAR FRIEND,

IN my last I offered some remarks on Sensation and Association, as faculties of the Mind; we will now proceed in course to consider the remainder, which make up the sum of Human Intelligence.

Imagination and Memory are faculties, by which we either gain possession of ideas in a different order to that in which they naturally present, or we regain them in the exact form in which they occurred. The former faculty creates in the soul a world of its own; it embraces every subject of human knowledge, and presents an infinite field, where the fancy roams in possession of the most diversified scenery. The face of things becomes here metamorphosed, a Phantasmagoria of ideal essences sports before the Muse, and the universe is changed to an enchanted theatre, where aerial attributes seem to assume tangible existence.

“ Imagination bodies forth

“ The form of things unknown, the Poet’s pen

“ Turns them to shapes, and gives to airy nothing

“ A local habitation, and a name.”

Imagination is not a simple faculty of the mind ; it is a complex power made up of several others, as Conception, Abstraction, Taste, &c. it forms the basis of the poet's genius, and is the ground-work of all the Fine Arts. The painter and the poet build all their performances upon the vividness and fertility of the Imagination, which, with a cultivated taste, forms the particular genius. Without Taste, the bare Imagination would be a confused outline of our conceptions ; these qualities must, therefore, always go together to produce genius and invention in the Fine Arts. An Imagination well regulated and controuled, seems to constitute a great share of the happiness of the Human mind. It is one of the advantages of a liberal education, to detach our attention from mere objects of sense, and direct it to the elegances of intellectual pursuits. It is the Parent of that fine sensibility, which excites sympathy for the distresses of the unfortunate, and a benevolent satisfaction at the prosperity of virtuous merit. It is the spring of many noble emotions, and the native soil of Chivalry, and Heroic enterprize. It gives us a relish for the beauties of Nature and of Art, that affords the mind at all times internal resources, that enrich and elevate it to a world of its own. A man of a well-trained order of thoughts, can never feel that tedious vacuum, that chills and numbs the faculties of the vulgar mind. Mr.

Dugald Stewart observes, “ that the apparent coldness and selfishness of mankind may be traced in a great measure to a want of attention, and a want of Imagination.” All the social virtues in every man bear perhaps a direct ratio to the warmth and fervor of the Imagination. It is a most active principle, and the main spring of mental progress. It teaches us to view the actual state of things, and not to rest satisfied with uniformity and dullness, but stimulates us eagerly to pursue some good, some excellence, which it vividly paints to us, and appears to place within our reach.

The excess or over-indulgence of this power often, however, begets Enthusiasm, and leads us into mistakes and disappointments; it presents apparently to our grasp most delicious fruit, but when we hold out the hand to crop them, it is to experience the fate of Tantalus—the fleeting good vanishes from before us. We are all apt involuntarily to “ listen with credulity to the whispers of Fancy, and pursue with eagerness the phantoms of Hope,” till reason and experience in the sequel unveil the delusion. Youth is the season of Imagination; the Understanding gains upon it as we advance in life, and balances and crops the exuberance of its branches. In the conduct of life, we should endeavour to prevent its gaining an independence.

on the Understanding. Dr. Johnson remarks, “ Perhaps if we speak with rigorous exactness, *no human mind is in its right state*. There is no man whose Imagination does not sometimes predominate over his reason, who can regulate his attention wholly by his will, and whose ideas will come and go at his command. No man will be found in whose mind airy notions do not sometimes tyrannize, and force him to hope or fear beyond the limits of sober probability. *All power of Fancy over Reason is a degree of Insanity.*”

But the rational, the moderate culture of this faculty, extends the sphere of our innocent enjoyments. The contemplation of the beauties of Nature and of Art, affords an inexhaustible fund of delightful occupation to the enquiring mind. The pleasing and instructing fictions which have been invented in all ages, have increased human happiness by adding to human morals. Sympathy, Benevolence, and all the social virtues, are much oftener the offspring of a warm Imagination than of a sound Understanding. Men of great intellect do not always possess a great share of this lively faculty; some remain mere depositaries of collected ideas and experiments, while others launch out into the bold regions of discovery, and display extraordinary efforts of invention—as Akenside says,

“ But some to higher hopes
“ Were destined ; some within a finer mould
“ She wrought, and tempered with a purer flame ;
“ To these the Sire Omnipotent unfolds
“ The world’s harmonious volume, there to read
“ The transcript of himself.”

Imagination usually presents us with some imagery of the future ; her prophetic visions seldom fail to be highly coloured with all the brilliant tints of good fortune and happiness ; this gives birth to *Hope*, the favourite and cheerful companion of Human Nature, without which the picture of Human Life affords but a dreary horizon ; it cheers and animates us on every occasion, excites to Labour and Industry, and promotes incessantly Health, Virtue, and Happiness ; and, if combined with a certain degree of sound judgment and discretion, it places us in a great measure beyond the reach of Fortune ; it blunts the edge of Evil, it forms the anchor of our Religion, and bears us upon its buoyant wings to a distant, but more kindred shore.

“ Hope springs eternal in the Human breast,
“ Man never *is*, but always *to be* blest.”

The Understanding, or the faculty by which we contemplate truth, and combine and compare ideas, is that which most materially distinguishes and elevates Man, above the rest of Animated

Nature. Knowledge is the subject matter of the Understanding; it is the perception of Truth, and the assemblage of associated ideas, combined with this perception.

Much discussion has taken place concerning the origin of Knowledge; some have contended that it is derived from certain inherent qualities in the mind itself, by which it possesses an innate perception of the coalescence or incongruity of particular ideas. Others suppose that all our Knowledge is acquired by experience, through the medium of the Senses; that no idea is innate, but that every truth is the result of an operation of the mind, in combining, separating, or comparing different ideas; that the Senses, therefore, are the inlets, and the mind a mere *Tabula rasa*, upon which is successively recorded, all the figures and circumstances, which the Senses announce at different periods. Mr. Locke compares it to a dark closet, with only a little opening to let in external resemblances; he says, “would the pictures, coming into such a dark room, but stay there, and lie so orderly as to be found upon occasion, it would very much resemble the Understanding of a Man, in reference to all objects of sight, and the ideas of them.” Sensible impressions are therefore the Keys of all our Knowledge. Had the mind any innate faculty of instituting the perception of truth,

then all human information would be an homogeneous uniform mass of intelligence universally distributed, and bearing a common stamp. Men would agree upon all the leading points, for, as I said before, *Universality and Uniformity, are inseparable attributes of all instinctive faculties*; whereas, on the contrary, we find the greatest diversity in the sentiments and opinions of men, upon the most common-place and familiar circumstances.

The child is fed by its mother, it associates pleasurable feelings with the person of the mother who feeds it; it does the same with the nurse, and, if fed by her, will prefer the nurse to the mother at first, but the fondness and attentions of the parent soon attract the child; it learns to associate pleasing sensations with her, and is early taught, that the parent is the chief source and instrument of all its happiness and comfort; its pains are soothed, and all its little wants relieved by the kindness of this constant protector; a degree of necessary authority to check the natural aberrations of its little mind becomes an additional stamp; and thus the filial affection is generated, a very complex feeling, compounded of love, gratitude, complacency, and fear. Fraternal, parental, and conjugal affections, all spring up in a similar manner. Friendships are the result of associated circumstances of dispo-

sition, habit, &c.; hence we find some of the strongest affections of the human mind are complex feelings, the necessary result of associated acquired sensations. Our knowledge of the most important truths have an acquired origin. The knowledge of a Supreme Being is a deliberative act of judgment; it is a conclusion drawn from the surrounding scene of Nature; it is not an innate truth, but a *Demonstratio a Posteriori*. The same reasoning extends to all the subjects and circumstances of surrounding life; the Immortality of the Soul, the doctrine of Future Retribution, are acquired truths, to which mankind are led by a regular train of reasoning. It must, therefore, be allowed, that all men are throughout life very much the sport of early impressions; we associate certain pleasant feelings with our first impressions, which serve much to retain and strengthen them, and from which they are seldom completely separated in after life. It is this which makes man so much a creature of time and place. His mind is in infancy a mere *Carte blanche*, upon which is to be gradually and successively imprinted all the ideas and truths of after life; consequently the future mental character has a reference to those sensations and impressions given to it in early life. He becomes the slave of local habits, and the creature of accidental circumstances.

The Moral character of Man is the result of accident and chance ; he is almost a factitious animal, like a block of Marble exposed to the varying chisel of the statuary. Education is the great Parent of Humanity—

“ As the twig is bent the tree is inclined.”

Man brings nothing with him into this world ; he is moulded and formed according to the artificial standard of that society, in which he happens accidentally to be situated. As I remarked before, the same soul that devoutly bends at Loretto, would have been a pious pilgrim at Mecca, or a fervent adorer on the banks of the Ganges. Every different shade of character is the result of education and early instruction ; whence the great importance of attention to the principles of Human Education, in order to divest it of those errors and imperfections, that generate so many absurdities, and pervert so amazingly the reasoning faculties. Implicit credulity on one hand, and unlimited scepticism on the other, are the extremes which every individual has to guard diligently against in the journey of life. Mr. Dugald Stewart observes, “ the great part of the life of a philosopher must necessarily be directed, not so much to the acquisition of new knowledge, as *to unlearn the errors* to which he had been taught to give an

implicit assent, before the dawn of reason and reflection.” So strong is the force of early impression on the mind, that although the understanding may, by great efforts disengage itself from the trammels, yet the imagination will often still remain entangled in the net-work of youthful instruction, and keep the mind unsettled and tossed about between the extremes of truth and error. This is often illustrated by a reference to the Catholic system, which is supposed to be more difficultly shaken off than any other, but which when once thrown aside, leaves behind it only unlimited scepticism. The many ceremonies and accessory circumstances which this system takes up, the romantic veil of superstition which envelopes it, seize all young minds with considerable force, and attach it strongly to their imaginations. Miss Owenson elegantly expresses herself in the following eulogy: “What a religion is this! how finely does it harmonize with the weakness of our Nature, how seducingly it speaks to the Senses, how forcibly it works on the Passions, how strongly it seizes the Imagination; how interesting its forms, how graceful its ceremonies, how awful its rites; what a captivating, what a picturesque Faith! Who would not become its proselyte, were it not for the stern opposition of Reason, the cold suggestions of Philosophy?”

This system artfully lays hold of the Imagination, and often retains its influence there, when the powers of the Understanding have long exploded it.

All Human Knowledge is the result of education, of habit, and circumstance of time and place. The ideas are the effects of sensible impressions on the external organs ; a succession of these ideas is continually passing through the mind during vigilance ; and it has been supposed this succession is equable, like the pulse in a state of health, and that as an acceleration of the pulse produces Fever, so an increase in the velocity of our ideas constitutes Insanity. It has been justly calculated that the duration of life bears no reference to, and ought not philosophically to be estimated by, the movements of the Celestial Bodies, but by this succession of ideas in the mind ; whence the life of man is to be measured by the number of ideas which pass through the mind in the course of his existence ; so that, as I had occasion to remark before, two men may continue the same number of years in the world, and yet one may have lived twice as long as the other, from having had twice the number of ideas passing through his mind in the time.

Absolute duration, it is contended, has no positive existence in Nature. To the all-perfect

Intelligence, successive duration cannot be applied ; it is an attribute of our minds, where the regular succession of our ideas gives us a sense of it.

It has been much argued whether Consciousness be ever interrupted. The Spiritualists maintain that the operation of the soul is uninterrupted, in as much as it exists perfectly distinct from Matter. The Materialists, on the contrary, contend that Thought is occasionally suspended, being only the result of a perfect organization of Matter.

Language is the great instrument of all Intellectual operation ; it facilitates reasoning, by presenting symbols of universal ideas. We learn to associate ideas with particular words, and at last come to use these words, almost without reference to the nature of the thing expressed. King, government, church, &c. are words which denote very aggregate and complex ideas ; hence these words are necessary symbols, without which the mind would find it very difficult to acquire or communicate knowledge. They serve to record our own ideas, which without some similar external sign to call them forth, would become shut up in the mind, and very difficult to be unfolded. Deaf and dumb persons may acquire certain ideas of the congruity or incongruity of particular objects ; but for want

of fixed signs of universals, are necessarily very slow in combining and comparing. It is the same as casting up a quantity without the assistance of arithmetical figures; a particular cypher denotes a whole quantity, the mind rests its imperfect knowledge of that quantity, upon the associated symbol, which this cypher presents. The letter M serves the mind in forming an idea of a number, of which, taken by itself, it cannot have any thing like a just comprehension; it rests on this associated sign, and easily goes on to larger quantities. We speak in common discourse confidently and justly of thousands and millions, without the possibility of comprehending a very small portion of those numbers. Savages who are deficient in the use of numbers cannot make the most trifling calculations. In America, some tribes could go no further than three or five, and expressed all beyond figuratively, as the hairs of their heads, or the sand on the shores. Without the use of words or signs, all our thoughts must have extended only to individuals, we never could have reached general terms or complex relations. By use, words at length affect our minds to the full extent of practical utility, without raising images of the things expressed; in conversation we seldom rest to analyze the meaning, or view the imagery of the many general terms we employ.

The Passions of the human mind have been supposed by many to be original emotions implanted in our nature, which grow out of some peculiarity in the constitution, and mark the individual character through life. This is however an opinion which seems to favour the doctrine of Fatalism and Necessity. It supposes the affections of the mind to be the result of mere mechanism; it would infer, that the Supreme Intelligence has prohibited the exercise of reason and choice, and left every thing to flow from the fixed and unalterable decrees of predetermined ordinances. It seems more philosophical and congenial to our sentiments of justice and moral right, to suppose that the Great First Cause has decreed our volition to be at large,

“ And binding Nature fast in fate,

“ Left free the Human will.”

Our Passions all spring from simple sensations, of which they are aggregates, united by association; they are excited by the pleasures and pains and sensible objects of external life. - They are, therefore, only complex combinations of these simple impressions; and, according to the accidental union of particular sensations and associations in early life, is the character of the child moulded in one particular stamp. All associated

feelings and emotions soon become habitual, and in general take root prior to the era of Memory, before the mind begins to register its ideas. If it is contended, that the passions and affections of the mind, which constitute general character, are the necessary result of physical structure or original instinct, then it must inevitably follow, that education is superfluous and futile. No training or management can possibly overcome propensities, interwoven in the texture of our organization; they must necessarily be as arbitrary and fixed as the structure that gives them birth; and unless you can alter that structure, you cannot overcome these inborn qualities. Now we every day behold the advantages and blessings which Instruction, both religious and moral, produces in individuals and in multitudes. We see the active and malignant passions of our nature curbed and checked in their progress, and dispositions made up of all the gross propensities of the selfish principle, tamed and converted to the moderate and benign nature of rational and social happiness. If the stamp of fate is indelibly fixed on the physical organ of the mind, whence that immense pile of morals and maxims, and those huge masses of instructive precepts, that so abundantly occupy the religious, the moral, and the political world? But I fear you will think me treading on hal-

lowed ground ; I find myself on the confines of another province, into which I shall here abstain from entering.

Dr. Cogan has divided the Passions into those connected with Self-love, and those belonging to the Social Principle. Hartley divides them into the Grateful and Ungrateful: the Grateful are Love, Desire, Hope, Joy, and pleasing Recollection. The latter are Hatred, Aversion, Fear, Grief, and displeasing Recollection.

To balance the contending emotions of the Selfish and Social Principles, is the great task of life. Self-love is the primary impulse; that, if not regulated and checked by the power of Reason, absorbs the whole scope of the human faculties, and reduces Man to the savage state. To curb the activity of this principle, to generate a benevolence and sympathy towards others, to extend and divide the principle of Preservation with our fellow-creatures, to pursue good for ourselves and for all, unbiassed by Self-Interest, is the great dignity of elevated and noble minds. The consummation of perfect virtue consists in performing it without any view or regard to individual recompence; in fact, the Perfection of Virtue, supposes the Extinction of Self-Interest.

So vigilant and prompt seems the impulse of

this principle, that our sympathy in the distresses of others, is said to be always preceded by a degree of exultation and pleasurable feeling in the mind. It is said, we feel a considerable delight in the misfortunes and sufferings of our fellow-creatures; the pleasure we derive from tragic fictions, and narratives of real distress, seems to prove it. Mr. Burke observes, the nearer tragedy approaches reality, and the further it removes us from the idea of its being fictitious, the greater its influence on us. He puts the following case: "Choose a day on which to represent the most sublime and affecting tragedy we have, appoint the most favourite actors, spare no cost upon the scenes and decorations, unite the greatest efforts of poetry, painting, and music; and when you have collected your audience, just at the moment when their minds are erect with expectation, let it be reported, that a state criminal of high rank is on the point of being executed in the adjoining square; in a moment the emptiness of the theatre would demonstrate the comparative weakness of the imitative arts, and proclaim the triumph of the real sympathy."

Two different causes have been assigned for this apparent inconsistency in the human mind. One supposes this feeling to be the result of a degree of satisfaction and complacency in the

individual, at not being himself exposed to the same danger or calamity with his neighbour; the other considers it the effect of a natural feeling of pleasure in sympathizing with, and relieving the distresses of our fellow-creatures.

The emotion of Laughter, which is an expression of Joy, and supposed to be strongly engrafted on the selfish principle, is said to arise always from the view or consideration of some absurdity or inconsistency in our neighbour; it is said always to spring from Satire, and is a selfish emotion. It has been observed, that the great Author of our Religion, who formed a most exalted pattern of Human excellence, was never seen to laugh in the course of his existence here, although his countenance never was divested of a sublime, dignified smile, the indication of a mild, peaceful magnanimity.

The various combinations of these affections of the mind occasion considerable diversity in the character of individuals; one will eagerly pursue a particular object as the sole means of happiness, which another of equally sound intellect will regard with perfect indifference, or perhaps disgust. The predilections of individuals manifest a considerable variety; but when the number of external circumstances are well considered, which variously operate upon our minds, this diversity of character can be no

longer matter of astonishment. Let your mind dwell for a moment on the following catalogue, which are exercising a continual but unequal share of agency upon each individual, and you will no longer wonder to see such a variety of human characters. Sex, Temperament, Age, Habit, Education, Custom, Prejudice, Religion, Ethics, Politics, Philosophy, the Fine Arts; all these exert an uneven influence on the multitude, that occasions the most extensive variety. Many individuals of great latent genius pass unobserved, for want of the agency of particular circumstances.

The doctrine of the Passions, and their influence on the Happiness of Individuals, is a most important subject of philosophical enquiry. To trace the active energies as called up by particular circumstances in external life, and to discover the latent qualities that lie dormant for want of opportunities and causes, is a task requiring great talent and discrimination. The general influence of the Passions upon health is observable to the Physician, whose practice is often regulated by an attention to them. The character, the train of thinking, and the happiness of every man, is more or less involved in the government of the Passions, which, if suffered to operate unrestrained, affect the judgment and reasoning faculties. No man subject to

frequent and violent fits of anger, was ever a person of sound judgment ; such a man is seldom fit for an arduous undertaking. To calm the violence of Passion, to curb the Selfish Propensities, to Know Thyself, is the task for the employment of man in this transitory sphere, where he draws a temporary enjoyment, and is soon transferred to another state. To extinguish Self-Interest, or bring it down to its reasonable boundaries, to exercise the mild virtues of Benevolence, and cultivate the Understanding, constitute the true dignity and happiness of Man. All that contravene these great points are beneath the moral dignity of humanity. To conclude in the words of Mr. Burke, “ If a discourse on the use of the parts of the body may be considered as an hymn to the Creator, the use of the Passions, which are the organs of the mind, cannot be barren of praise to him, nor unproductive to ourselves, of that noble and uncommon union of science and admiration, which a contemplation of the works of infinite Wisdom, alone can afford to a rational mind. We may be admitted, if I may dare to say so, into the councils of the Almighty, by a consideration of his works.”

With these remarks I will here conclude, and remain,

Yours, &c.

L. S. B.

LETTER XIV.

DEAR FRIEND,

AFTER the cursory review we have taken in our former letters of the Corporeal and Mental Attributes of the Human System, it will be congenial to our plan, to take a short survey of the principal events, that form the leading features in the Historical developement of the Human Intellect.

The constant and impetuous emotions of Self-love in each individual, pursuing eagerly its own end, entrenched upon the rights and conveniences of the next neighbour; a succession of insults and hostilities were reciprocated, and Man became the greatest Enemy of Man. It was to alleviate the evils consequent on the easy and unbounded gratification of selfish passions, that a number of individuals united for mutual security, and each surrendering a part of that unlimited freedom nature furnishes Man at the beginning, the part so surrendered became the basis of a bond of common union. They secured to each other the tranquil enjoyment of the remainder, and thus each man's happiness became

blended and mixed up in the general good of his neighbour's, and the foundations of civil polity rested on the individual wants and fears of the crowd. The little band soon augmented its numbers, and in time became a formidable pillar of strength. Different societies settled in different quarters, and, according to situation and circumstance, took on peculiar and adventitious characters. But the common feature in all these Primitive confederacies was a Patriarchal mode of government. The Parent of a large family, or some Elder, conspicuous for prudence and wisdom, became invested with the supreme authority. As the society increased and became exposed to the hostilities and aggressions of neighbouring communities, a degree of Military spirit necessarily arose, and the sovereignty was in consequence removed from the Patriarch to some other member, whose personal qualifications were better adapted to lead them against the enemy. Thus a Military monarchy soon superseded the Patriarchal mode, and may justly be considered as the most ancient and universal form of government among all the Primitive Nations.

One of the first chiefs upon the Hebrew record was a mighty Hunter; his people soon advanced to the Pastoral state, and continued long a nation of Shepherds. The Egyptians and Indians

became Agricultural and Commercial. The Arts and Sciences were much cultivated among these different people; the splendid ruins to be met with in Egypt, are monuments of the lost greatness of a fallen people. It appears, however, that the human mind was very much depressed in all these nations. Their Astrology, their divinations, and absurd Mythologies are matters of astonishment to the moderns, who look back with veneration on the arts which were carried to such astonishing perfection in so superstitious an age. The Chaldeans worshiped the Celestial Bodies, and were much influenced by their absurd system of Judicial Astrology. The Persians worshiped the Sun and its active emblem, Fire. The Hebrews, whose records have been preserved to us, were a turbulent, an unsettled, and not very enlightened people. Among all these nations a small tribe settled on the coast; from their enterprising spirit acquired considerable notoriety and wealth, by becoming the Factors of all the world; these were the Phenicians who dwelt at Tyre and Sidon; these diffused wealth and arts along the shores of the Mediterranean, and explored the Western Coast of Europe, where their visits extended even to this island, in search of Tin.

On the further side of the great plains of Asia we find a nation boasting of great antiquity, and

who from geographical situation, and internal causes, present a community of very unique character. There are many circumstances in the Chinese History of singular complexion. After making a certain progress in the arts and sciences, and attaining a certain elevation in the scale of civilization, we find them remaining stationary at the same point for the last thousand years. During this period it does not appear that the Chinese have made any advance in science, or any great improvement in the arts of refinement. This is a singular circumstance in the history of a great nation. Various causes have been assigned for it, but the most feasible seems to be, the peculiar construction of their Language. Language is, under all circumstances, the great instrument of human improvement; where that is imperfect, the cultivation of intellectual power remains defective. The Chinese Language has these peculiarities in its structure; it has no alphabet of letters representing simple sounds, but each character stands for a particular idea, it denotes some express object, so that the number of their characters is equal to the number of ideas and objects in the whole range of their conversation. Each word is made to vary its meaning, by five distinct variations of tone. They have more than seventy thousand written characters; consequently, to learn these is the

business of a man's whole life. These characters bear some analogy to the figures we use in arithmetic, where each mark expresses a particular quantity. So complicated and unwieldy a Language must obviously check the diffusion of knowledge among the multitude, and form a great obstacle to the general improvement of the society.

Of all the discoveries and inventions which Human art can boast, of all the means which nature has furnished us, Speech is the instrument which has most powerfully developed the faculties of the Human mind, and carried its elaborate functions into practice. The Savage may retain lively pictures of things in his fancy, and may have an acute recollection and a prompt judgment, in short, considerable practical wisdom, but he cannot combine and compare his ideas, and contemplate the variegated page of Nature like the Philosopher in civilized life, who communicates motion to the understandings of all around him, and paves the way for the future improvement of his species. The understandings of men are cultured to perfection by means of this heavenly institution. Some writers have dwelt much upon the alloy inseparable from all human benefits, by remarking the superior physical powers of the savage, and the greater cunning and acuteness of all his mental

exertions, by reason of the constant exercise or invention he must necessarily employ for want of the help of Language. This, they say, strengthens the physical powers of his understanding, and gives him great acuteness of memory, fervour of imagination, and propriety of judgment, as far as it goes. But this is all mere sophistry; it is not the perfection of animal powers which constitutes the dignity of Man; the true glory of his nature resides, in the full maturity of that God-like faculty which Language brings to perfection. Surely Man is not deficient, because he wants the strength of the ox and the agility of the race-horse. It is the intellectual energy of his nature which stamps him the chief Tenant of this Ball.

In various nations and stages of society we find Language has attained different degrees of progress. In America, the knotted cords of the Peruvians, and the historical pictures of the Mexicans, afford us the first forms of written language with which, perhaps, history is furnished. The Paintings of the latter people are the earliest kind of record, by which an uncultivated nation, would endeavour to perpetuate the great events of its history. Hieroglyphics naturally grew out of this mode; the pictures are in time abbreviated, and certain emblems established by analogy to represent certain objects. In the

progress of cultivation these emblems give way to arbitrary signs, possessing no analogy, but being more convenient, as the Chinese characters, our arithmetical figures, &c. Last of all were invented, characters which did not immediately represent things or ideas, but the sounds by which we express those ideas and things in speaking. A few written marks, therefore, become representatives of the sounds which compose our words. This is the furthest extent to which Written Language has hitherto gone. Whether it is susceptible of greater progress, is not for me to determine.

All Language is at first highly expressive of passion and feeling; it is accompanied with much gesture and motion, and considerable inflexions of the voice; these are necessary in the infancy of speech, when its general mode of expression is limited; it is also more poetical, and replete with metaphor and strong figures, and the collocation of its parts more irregular and fanciful. Dr. Blair observes, “ that in the changes which Language has undergone, as the world advanced, the understanding has gained ground on the fancy or imagination. The progress of Language, in this respect, resembles the progress of the age of man. The Imagination is most vigorous and predominant in youth; with advancing years the Imagination cools, and the

Understanding ripens.” Language in improved societies becomes at length more copious and expressive, but less warm and figurative.

It has been much questioned which mode of Language was most capable of conveying instruction, the oral or the written. The Written has the advantage of being more permanent and extensive, and of allowing the person to arrest his attention, to pause and resume, to peruse and reflect; it is therefore best adapted to deliberate didactic instruction. But Eloquence alone, perhaps, possesses the exalted faculty of calling up the passions and emotions of the soul. It is by Oratory that the sympathy, the resentment, the patriotism, and great virtues of the multitude are called into play. The Greeks and the Romans cultivated Eloquence, which is a necessary instrument for every leader in a democratic form of government, where the appeal to the passions often answers the speaker’s end better than the cool, deliberate *Argumentum ad Judicium*. There are many reasons why the higher oratory has declined in modern senates, and particularly in our own, but the consideration of these would be foreign to our purpose. Writing has a manifest advantage over Painting, in conveying descriptive information. The latter, by an exact delineation of character and figure, can express in the most lively colours the thing

intended, but it is only one point of time that is displayed to you, the preliminary and collateral circumstances which lead to, and accompany the transaction, and form, perhaps, the *denouement* of the story, are all hidden from view. Written History affords the only ample illustration, by the extent of its detail ; here the mind is progressively conducted from the commencement through all the windings and ramifications which the interesting narrative may take on. The Picture only sets before you one insulated period of time in the narrative ; this it strongly impresses upon your mind, by a lively imagery ; but then every point in the History will afford a different delineation. The imperfection of such Historical records I have before observed were manifest in the Mexican Paintings.

Language, as I have had occasion to remark, is the grand agent of the developement and progressive improvement of the Human mind ; the refinement and civilization of any people is in a direct ratio, to the culture and perfection of this great faculty, which distinguishes and elevates our species.

Writing is of course the offspring of Speech, and the easy diffusion and perpetuation of it is now established by the Art of Printing, the discovery of which forms a most important epoch in the history of Human Society. It is a matter

of no inconsiderable astonishment, that this useful art should have been unknown to the enlightened ancients. It is a modern invention, hit upon by some thoughtful Germans in the fourteenth century; and of all the inventions which have affected the interests and condition of mankind, this, perhaps, has had the most powerful influence. Prior to this mode of communicating written language, the multitude in each country were destitute of the means of acquiring any considerable share of general information. The chief branches of knowledge were confined to those classes, who by their privileges or fortunes, were enabled to procure them, while the bulk of the people, unable to afford the expense or the leisure, depended mostly upon oral and traditional communication from their leaders and priests, the latter of whom, were for many ages the depositaries of all the learning, and the oracles of all the science of the world. They exercised by this means a complete sovereignty over the human mind, and, by deluding the imaginations, and misleading the understandings of even princes as well as peasants, they engrossed to their own purposes the best interests of mankind, and erected a system of arbitrary power, which ages of enlightenment have not been able entirely to overthrow. But the art of Printing, by rendering the sources of

knowledge cheap, and easily obtainable, has disseminated every species of useful information among the crowd. The mystic juggle of monkish superstition was soon unveiled, and their whole system of mental usurpation completely undermined. A freedom of enquiry burst forth, that emancipated mankind from the errors of superstition, and established a rational mode of thinking among all ranks of the community. This useful art became, then, the death-warrant of the Monkish power, and terminated the dark age, and is now the great holdfast that will prevent mankind from ever moving retrograde in the scale of intelligence. Printing and Books are now so universally diffused, that it is not at all probable the civilized world will ever lose the use of them. The general knowledge of society must therefore, in spite of all obstacles, be progressive, and never can be expected to revert to that state of darkness antecedent to this great discovery. Among the Greeks and the Romans, and indeed in all other Ancient nations, the people derived all their information from their leaders, who alone had the means of acquiring proficiency in the sciences, whence eloquence, as well as arms, formed a great part of the education of every patrician, both in the field and the senate. With this powerful engine they obtained the mastership of the public mind, by

powerfully addressing themselves to the passions of the people, who, destitute of the sources of genuine information, were easily moved by the popular harangues of different demagogues and adventurers, who often elevated themselves upon the credulity of the unthinking, and after exciting the passions of the multitude, directed them to their own bondage and misery.

It is this art which has operated so powerfully as an auxiliary to Christianity, that it may be considered its handmaid. For ages the world knew only such portions of its sublime precepts as the cupidity and peculiar policy of the priesthood chose to reveal. But now the diffusion of light has rendered the purity and the beauty of Christianity sufficiently conspicuous; its great truths are now propagated through the earth, are offered upon the altar of reason, and extended for the amelioration and happiness of mankind. It may be said to have brought Christianity to perfection, by exhibiting it in its native simplicity and purity, disencumbered of that adventitious tissue of error, which enveloped and obscured its sacred doctrines from the eye of good sense and reason. In speaking of the events that have influenced the condition of man, what pen can do justice to this invaluable system, which shines superior to any thing ever thought upon by the sages and politicians of antiquity?

I mean not to speak in preference of any particular sect, but taking its doctrines in their genuine purity and simplicity, they display a code of ethics and a rational theory that eclipses every thing that preceded it, and is better calculated to promote the comfort, the happiness, and the perfection of Human intelligence, than all the systems which burdened and confused the misguided nations of the ancient world. The government of the passions, and the cultivation of those mild virtues that elevate and adorn humanity, are much better inculcated by this religion, and impart a greater share of social and domestic happiness, than ever fell to the lot of any community, living under the influence of any other system. Europe, the great theatre of Christianity, is also the field of civilization and refinement, where the arts and sciences, that embellish and dignify human life, have grown to maturity and perfection. It is in this quarter of the globe, the mind of man has reached its yet highest degree of progressive improvement, and in the accomplishment of this great object, the benign qualities of this religion have afforded very considerable assistance.

The diffusion of the blessings arising from the progressive improvement of the human condition on earth, is indebted to another very important source of external agency; the intercourse

between nations through the medium of Commerce. Before, however, Commerce could have been taken up, mankind must have made some progress in the arts of civil life. Man must have made some advances in civilization; he must have cultivated agriculture, and applied the produce of the soil to useful ends, before he ventured forth with his improved surplus, to supply the wants of neighbouring communities. As I have before observed, Commerce could have no existence in the infancy of social union, when the members of the compact explored the finny deep, or roamed the extended forest, in search of prey. This was the first step in social life; afterwards, ease and convenience taught men to fix themselves to a particular portion of soil, and from it, by their united exertions, to draw the means of their subsistence; this was the reign of Agriculture: in time, a surplus portion of produce remained, which the wants of their neighbours soon solicited, who offered, in exchange, the results of their labour, that might be equally suitable to them. Thus the foundation of Commerce was laid in the reciprocal wants, and mutual assistances of neighbouring societies. A complete interchange of all benefits and improvements took place; the advances made in one community were transported to another, and the comforts and felicities of Hu-

man amelioration flowed like the waters of a great river, by innumerable ramifications, over a great range of continent. The channels of communication once established, could not easily be closed; the more the wants of men were by this intercourse administered to, the more they multiplied, and commerce was soon extended to every region, where any thing subservient to their artificial desires was at all obtainable. Civilization was by this medium propagated from one country to another*; it explored the coast of the Mediterranean, the shores of which became the great Theatre of Human Action, where the arts of civil life were carried to a degree of astonishing perfection, and where all the great movements in the history of man have been dis-

* Montesquieu observes, "Commerce has every where diffused a knowledge of the manners of all nations; these are compared one with another, and from this comparison arise the greatest advantages." He goes on to remark, that "if the spirit of Commerce unites nations, it does not in the same manner unite individuals. We see that in countries where the people move only by the spirit of Commerce, they make a traffic of all the humane, all the moral virtues: the smallest dues of humanity are there to be obtained only for money. The spirit of trade produces in the mind of man a certain sense of Exact Justice, opposite, on the one hand, to *Robbery*, and on the other, to those *Moral Virtues*, which forbid our always adhering rigidly to our own private interest, and suffer us to neglect it for the advantage of others."

played with grandeur and effect. The Phenicians, the Egyptians, the Greeks, the Carthaginians, and the Romans, severally and successively occupied and took the lead. Upon the bosom of this sea were wafted all the improvements and embellishments as they sprang up. These sailed through the Straights of Gibraltar, and crept along the Western coast of Europe. The shores of another Mediterranean in the North, in time, followed in the same track, and teemed with adventurers and navigators, in spite of the rigour of the climate. But the woods and morasses of Germany, Poland, &c. internally situated, remained long but little known, except by the predatory excursions of their barbarous inhabitants. While the whole coast of Europe might be said to be civilized, and in a state of improvement and comfort, the Continental interior, unacquainted with the advantages of social life, knew no other art, and had little other occupation than War and Rapine. Every nation presented only an armed groupe,

“Man and steel, the soldier and his sword.”

Gibbon has elegantly described the character and manners of these Barbarians ; he says, “beyond the Rhine and the Danube, the countries of Europe were peopled by innumerable tribes of hardy Hunters, and voracious Shepherds.”

It is on the shores of the sea, or on the banks of great rivers, that the sciences and embellishments of Human life have in general first taken up their abode. In Africa, an extensive continent, full of deserts and sands, with but few large rivers, an impervious barrier is opposed to the progress of improvement; hence we find that no where in this quarter but on the banks of the Nile, and the south coast of the Mediterranean, has man attained any degree of Civilization. The same applies to Asia. China on the eastern coast, the banks of the Ganges, and the Indus, the Persian Gulph, the Tigris and Euphrates, have been the great theatres of civil grandeur, while the Tartars, occupying the extensive plains of the interior, have roamed for ages in a state of ignorance and barbarism. Thus the water is the medium that facilitates the diffusion of Civilization, and thus may be formed a sort of *Geographical illustration of the History of Man*.

To Commerce, then, mankind are considerably indebted for much of their progress; it brings comforts and improvements, and is of inestimable value to every country by the interchange of every valuable; it brings "Convenience, Plenty, Elegance, and Arts," and gloomy is that nation destitute of its blessings. It must, however, not be concealed, that beyond a certain limit, this blessing becomes, like all other Human

benefits, mixed with a portion of alloy. Nations that cultivate a commercial spirit beyond a proper mark, have in general acquired a sordid character; Avarice has become the ruling passion of the state; they have looked with indifference on the arts and accomplishments of life; they have neglected those high sentiments that elevate our nature, and recognized no measure of merit, but the standard of gold. This has been the condition of those societies that have been eminently commercial, as Tyre, Carthage, Venice, Holland, &c. in the histories of which we shall not find the following picture of the effects of overgrown Commerce, drawn by a late celebrated author, too highly coloured. “ One of the most certain consequences of a very extended Commerce, and of what is called the most advanced state of society, is an universal passion for Riches, which corrupts every sentiment of Taste, Nature, and Virtue. This at length reduces Human Nature to the most unhappy state in which it can ever be beheld. In this state *Money* becomes the universal Idol, to which every knee bows, to which every principle of Virtue and Religion yields, and to which the health and lives of the greater part of the species are every day sacrificed; so totally does this passion pervert the Human heart, that it extinguishes or conquers the natural attachment

between the sexes, and, in defiance of every sentiment of Nature and sound policy, makes people look even upon their offspring as an incumbrance and oppression. Neither does Money in exchange for all this procure happiness or even pleasure; it yields only food for a restless, anxious, insatiable vanity, and abandons men to dissipation, languor, disgust and misery. In this situation Patriotism is not only extinguished, but the very pretension to it treated with ridicule. Public views do not regard the encouragement of Population, the promoting of Virtue, and the security of Liberty; they regard only the enlargement of Commerce and the extension of Conquest. When a nation arrives at this pitch of depravity, its duration as a free state must then be very short.” A moderate share of Commerce is of most material advantage to a state, but that overgrown extent pursued by many nations, is of necessity attended with all the evils above depicted. The history of all Commercial States sufficiently evince this. The *Punic faith*, the subtlety of the Jews, the corruption of morals at Venice and Marseilles, and perhaps above all the avarice of the Dutch, who, absorbed in traffic, have been distinguished for sordid and selfish principles; there, as the poet says,

“ At Gold’s superior charms all freedom flies,
“ The needy sell it, and the rich man buys.”

I will defer any further consideration of the
intercourse between Nations till my next, and
in the mean time remain,

Your’s, &c.

L. S. B.

LETTER XV.

DEAR FRIEND,

THE intercourse between the nations of the different parts of the Globe is indebted for its present astonishing perfection, to a discovery of the fourteenth century, the directive property of the Magnet, first observed by a Neopolitan. Before the knowledge of this fact, Navigation was very cramped and defective; the guidance of the stars, and the exploring head-lands, were the only safe-conducts to the mariner: vessels dared not venture far from the shore. The ancient Navigators were confined mostly to the Mediterranean; a few occasionally crept along the western shores of Spain and Gaul—consequently the geographical outline of the Earth was perfectly unknown to all the nations of antiquity. This surprising and unexpected discovery gave to Man the keys of the Ocean, by which he was enabled to enter upon its pathless bosom, and range the immense surface of this great ball: he acquired a complete knowledge of its general form, and the nature and extent of its various parts. The Portuguese, under the famous Vasco di Gama, explored the coast of Africa,

doubled the Cape of Good Hope, and found out the Western route to the Indies, which diverted the treasures of those regions from their old channels by the Red Sea and the Nile, and laid the foundation of the commercial greatness of Western Europe. This voyage is celebrated in one of the most striking epic poems in modern history. Soon after this, the lofty and daring genius of Columbus struck at a new and greater object, and effected the discovery of another great continent in another hemisphere: here a new world presented itself. A continent of immense extent, with many large rivers, and gigantic mountains, an intersected coast, and clusters of fertile islands—the whole inhabited by a race of people mostly in a state of infant society. This continent was ranged chiefly by tribes of hunters; only two societies had made any considerable advances in civil growth, and their progress was retarded, by the want of two very powerful auxiliaries to all the operations of man—the use of Iron and of Domestic Animals. It can hardly at first view strike the observer of what great and primary importance these two assistants are, to the power and perfection of our species. Man by himself is a feeble animal; his strength and power are derived chiefly from the materials, nature has furnished for the exercise of his ingenuity. The Americans, unacquainted

with these materials, were soon subjugated by the Spaniards, a handful of whom, by the formidable assistance of Horses and Iron, over-ran and subdued an immense tract, peopled by hordes of fierce and warlike savages. The superiority of their arms and equipments effected more in their favour, than the subtilty of their tactics, and address, or the pre-eminence of their physical strength. Aided by these advantages, the insatiety of their avarice, and their misguided enthusiasm, achieved the conquest and the slaughter of innumerable tribes, many of which, to gratify the thirst for gold, were offered upon the altars of Spanish cruelty and cupidity, and have vanished from the face of the earth, leaving scarce their names behind them. In scanning the page of history, the philosopher must naturally pause, when he considers the conduct of a great nation of modern Europe, with an enlightened government, inflicting such misery and injustice upon the guiltless and distant inhabitants of the New World, for no other reason, than because their native soil, contained within its bowels those metals, of which commerce has chosen to build her throne.

But this discovery has had a material influence on the condition of Modern Society. The true figure of the Earth has been ascertained, and

the beautiful and useful science of Geography has grown to a degree of perfection unknown to preceding ages. Man is now pretty accurately acquainted with the form and extent of that great stage, upon which the Drama of Human Life is destined to be performed; the intercourse between distant regions is become universal, and his luxuries, and artificial wants, in consequence multiplied and ministered to. Many articles, little known to the voluptuous ancients, now form part of our daily diet. Christianity has also been extended; it has been remarked, that the blow it sustained by the success of the Saracens in the East, has been compensated, by its extensive diffusion and propagation in the Western Hemisphere; but a prominent effect of the intercourse between the continents, consists in the great effects produced by the influx of such immense quantities of the precious metals. This extensive importation has had the natural effect of lessening the real value of gold and silver, and consequently raising the nominal price of most articles of use. This has effected a great change upon the surface of the Commercial World.

A wide field of traffic has presented itself in the Transatlantick Continent, and the Western Countries of Europe have, in consequence, cul-

tivated and taken on a commercial character, far beyond what they would have acquired without this important discovery.

It seems reasonable to suppose, that the American Continent will at no very distant period become an extended theatre of civilization and refinement: it is already making rapid strides towards this great change. The United States possess a population of eight millions. The extensive colonies of certain European powers have now become wealthy and populous, and are panting for that liberty and independence which has ever been the ultimatum of all colonization; indeed we may fairly suppose that all the independent states of the present day were originally colonies; that, as they grew in strength, they eventually effected their emancipation from the power of the Parent States, which, from the instability of all human concerns, declining in power, possessed not the means of retaining the sovereignty over their own offspring, who guided by the "Infallible instinct of Self-Interest," snatched from their Parents the rod of power, and from dependant tributaries, became formidable rivals. Such will be the ulterior destiny of the European colonies in America. The arts and sciences may one day be wafted across the Atlantic, and perhaps the "Solemn Temples, the Gorgeous Palaces," that

now adorn Europe, and pompously proclaim her superiority, may vanish from her surface, and "leave not a wreck behind." The embellishments and improvements of Human Life may take root and flourish in another soil, and civilized Europe remain a desert. Such has been the fate of preceding states; Babylon, Nineveh, Memphis, Athens and Carthage, alas! are gone from the face of the Earth. "Where now is Thebes with its hundred palaces, the progenitor of cities, the memento of Human Frailty? It was there that a people, since forgotten, discovered the elements of science and art, at a time when all other men were barbarous, and that a race now regarded as the refuse of society, because their hair is woolly and their skin dark, explored among the phenomena of nature those civil and religious systems, which have since held mankind in awe."

Among the various agencies which have influenced the condition of mankind, War has had no inconsiderable effects, and the degree of civilization in a community is often indicated by the improvement and refinement in this art, which seems to have been in some form or other coeval with Human association, and without perhaps any exception, universal in every age, and in every society. Man is a needy, restless, selfish animal, uniformly bent to pursue his own

good, whatever may be the risk, and whoever may be the sufferer. In the infancy of society, when the selfish propensities are very predominant, the duties of Humanity but imperfectly felt, and the nature of Property but little understood, Men engage in constant warfare against their neighbours for the most trifling objects, with a ferocity and rancour no time, no circumstance, can assuage, but the consummation of the most unqualified vengeance in the ruin of their enemies: they admit of no expiation for trespass or injury, but the annihilation of their adversaries. Nations of Hunters meet only to deluge the earth with blood, and to extend slaughter and devastation: they uniformly and deliberately devote the unhappy captive to torture, and feel no triumph accomplished but in the blood and torments of the miserable prisoner. As, however, the rights of property become better understood, the natural attachment to it, and the desire of tranquil enjoyment, by degrees soften in every breast the fierceness of animosity, and calm the spirit of vengeance. As Man comes into the enjoyment of nature's blessings, a mild and benevolent spirit begins to associate itself with all his feelings; possessing a degree of happiness in the contemplation of what surrounds him, he feels disposed to permit a share of this felicity to others. While serenely

meditating over his innocent and placid flocks, or musing under the refreshing shade of his fig-tree, the rudiments of sympathy and benevolence soon dawn upon his mind, and he experiences an involuntary impulse, to consider the species as his brethren, and to allow them that unmolested enjoyment, which is the *summum bonum* with himself. If Commerce has at all overtaken and improved his condition, the intercourse with men incident to this state, matures and refines these feelings into a system of general advantage, that softens the rigours of warfare, alleviates the horrors of human hostility, and lifts Human nature from barbarism and brutality. A full and secure enjoyment of the bounties of Nature has ever tamed mankind, and rendered them less warlike and savage. The fertile districts of the Earth's centre have always been subdued by the hardy and necessitous warriors of severer climates—and in the History of Mankind, conquest has generally proceeded from the North. Impelled by necessities and wants, the inhabitants of colder regions partake, in some degree, the severe nature of their climate; their energies are called into more frequent action; their invention, the offspring of their wants, keeps them on the alert, and they acquire the stern virtues of courage, activity, and independence. While the nations of the South, soothed by the profusions

of the Earth's abundance, and basking in the sunshine of Nature's bounty, have fewer wants, and sink into ease, effeminacy, and inactivity ; they exchange the fierce employments of contest for the arts of peace and social harmony, and thus become a prey to the bold adventurers of the North.

The mode of warfare has varied in different nations according to the varying genius, and each community has adopted and excelled in a favourite weapon. In all probability clubs and sticks were the first implements made use of, although some have contended for the priority of missile weapons, and considered the bow and the sling as the earliest instruments of offence. It would seem, however, more probable, that men fought in close contact at first, and that projectile weapons were a refinement in war, subsequent to the use of hand arms ; and this opinion is much strengthened by the circumstance of some hostile communities in America not being at all acquainted with any mode of annoying their enemies at a distance. Among the Greeks, the pike or spear was the favourite weapon ; with this the Macedonian Phalanx over-ran and conquered Asia. In a plain country, and in the hands of a body of men drawn up in dense order like the Phalanx, the pike seems a formidable and almost invincible weapon : but

in time the solid order of the Macedonian arrangement was doomed to yield, and be superseded by the more open line of the Roman method, where each soldier, expert in the use of a cut and thrust sword and buckler, penetrated the Grecian Phalanx, and broke the order and strength of that huge body, which depending upon its weight and massiveness, could never bend much to changes of situation and circumstance. It was to this dense order the Roman army of Crassus fell terrible victims in their memorable excursion against the Parthians: but it was at the celebrated battles of Cynocephalæ and Pydna that the comparative merits of the pike and sword were so remarkably put to the test, and the superiority of the latter made manifest. In the former battle, owing to the hilly nature of the country, the phalanx became somewhat separated and broken; and into these openings Flaminius poured his valorous swordsmen, who closing upon the phalanxmen, their long pikes were rather an incumbrance than of use, and thus the Roman legions overthrew this formidable arrangement, which, as an author says, was like an animal of enormous strength and stature, which, while it remained in compact order, was irresistible and impenetrable, and in which the force of each member depended, upon his being a part of the whole, and not on

his own individual or personal exertions; consequently, when from the unevenness of the country, or other causes, the close order was broken, the power of the phalanx was considerably reduced. At Pydna, the Consul Emilius drew the phalanx into an uneven track of country, where the same circumstances operating, he took similar advantage over them as had been done before, and gained a most complete victory.

The small cut and thrust sword seems in the opinion of good military authorities as the best hand weapon. A skilful swordsman may be supposed surrounded by a sphere of points, which present against any approaching body, and expose a powerful front on every side. In the hands of an adept it forms a most eligible and superior weapon for close encounter; but then the soldier requires instruction and practice to attain a proficiency in its use.

About the fourteenth century, a very material and unexpected alteration in the whole art of war was brought about, by the discovery of the explosive properties of a chemical mixture, which generating an immense quantity of gas with a wonderful rapidity, exerts a violent mechanical force, equal to the projection of bullets, &c. to a considerable distance, and with an astonishing momentum. It is, as you well know, a law in

mechanics, that magnitude and motion are mutually exponent, and convertible in their effects; a large body, moving with a reduced velocity, will produce only the same effects as a small body moving with a velocity equal to the relative magnitude of the larger. Every projectile body, therefore, makes up by its increased motion what it wants in size. The ignition of Gunpowder instantaneously disengages an immense quantity of elastic gas, which exerting an immense pressure on all sides*, produces such tremendous effects. The violent and sudden expansion of this gas gives the ball its propulsive impetus, and projects it with such a forcible momentum, as renders it more than equal in its destructive effects, to the massive rams, and other battering instruments of the Ancients. A small ball of only 18 pounds will now, from the quantity of motion given it by the expansion of heated vapour, overcome greater resistance, and produce more formidable and terrific effects, than those bodies projected by the Catapulta, and other engines employed

* The elastic pressure of the flame of Gunpowder at the moment of ignition, is calculated at 1000 times the ordinary pressure of the atmosphere at the Earth's surface—consequently not less than about 15,000 lbs. or $7\frac{1}{2}$ tons upon every square inch.

among the ancients. The superior velocity* of the cannon ball compensates the greater weight of the bodies in former use. The invention of Gunpowder is attributed to a German Chemist of the name of Schwartz, although many have contended for its prior use among the Chinese and other Eastern nations. Its first use among the English is said to have been at the battle of Cressy.

Much discussion has arisen as to the merits of this invention, and much ingenuity has been exhausted in declamation against its baneful and destructive effects, and yet, after all that has been said, it has perhaps had a direct obvious tendency to lessen the degree of slaughter, and consequently alleviate the horrors of modern warfare. According to the ancient mode, if two such bodies as the phalanx came into conflict, the whole became immediately a

* That law in mechanics, by which a projected body is said to make up by its motion what it wants in weight, is exemplified in the increasing momentum of falling bodies. All bodies descend, by virtue of an inherent law which attracts them to the earth's centre, and is called Gravity. The *vis inertia* of a falling body occasions the velocity to increase every moment; a descending body, therefore, doubles its weight in falling one inch and a quarter, and its momentum is at all times according to the square root of the height it falls, whence a small pebble let fall from a steeple or any eminence has its weight multiplied many 100 times.

trial of physical strength, and a terrible and desolating scene of carnage and bloodshed inevitably ensued: the vanquished party were always closely pursued by the conquerors, and sustained during their retreat, perhaps, the greatest reduction of their numbers; hence, in modern battles we do not find the disparity of loss between two armies so great as is recorded in most of the ancient engagements. Previous to Gunpowder, most engagements terminated in close encounter, where almost every individual was personally exposed to the comparative adroitness of an armed antagonist. This invention, however, has established the superiority of projectile overhand weapons; and many battles in modern wars are for the most part decided by the distant attacks of artillery, and consequently with comparatively less slaughter than formerly. The ranks of an army are now so often thinned by the distant annoyance of the enemy, as to render the remainder satisfied of their inability, to withstand a further attack, and they secure themselves by a judicious and safe retreat, impracticable in the former mode of fighting; thus, then, Gunpowder has had a tendency to mitigate the horrors of modern battles.

But perhaps the greatest advantage mankind have derived from the discovery, is the great security the civilized world now feels from any

future irruptions or incursions of the Barbarous Nations. When the sword, the pike, or the battle-axe, were the weapons which every soldier carried in his hand, and when the force of an army chiefly depended on the sum total of individual strength, the Barbarians could easily procure these arms, and had considerably the advantage from their rough habits of life, in physical endowments. Their numbers and strength mostly, in the end, overcame the discipline of the Civilized Troops. But now the great expence of arms and ammunition puts it out of the power of the Barbarians to procure them, and the superiority of these being manifest, they are consequently inferior to the regular troops of modern cultivated nations. It was the remark of an ancient historian, that Asia and Europe could never withstand the united force of the Scythians, and the truth of this opinion has been amply confirmed in the histories of both these quarters. The expence of modern arms has, however, given the advantage to the Civilized Nations, who alone have the means of procuring them, and in consequence has added to the permanency and extension of Civilization. Individual strength and exertion is now less necessary than before, and the quantity of this expensive dust requisite to carry on any operations being far beyond the reach of the

Barbarians, they are no longer able to cope with the science and superiority of modern tactics. Mr. Gibbon remarks, “ the rude valour of the former Barbarians was seconded by personal strength, and an adamantine frame ; but this superiority is in a great measure destroyed by the change in the Military art, and the invention of Gunpowder. Mathematics, Chemistry, Mechanics, and Architecture, are all assiduously applied to the service of war, and Europe is secure from any future irruptions of the Barbarians, since before they can conquer, they must cease to be barbarous.” Had the Romans known the use of fire arms, the Gothic tribes would have remained within the confines of their native forests : for the future, therefore, the civilized communities of the world can never look forward to be over-run and desolated, by the ravages of such monsters as Attila, Genghis Khan, Tamerlane, and many others, who, for a time, by their desolations, almost blotted provinces and nations out of the general map of the earth’s surface.

A reduction in the slaughter of modern battles, and the security of civil society against the sword of the Barbarians, are the two leading advantages of modern improvement in the art of war.

But of all the circumstances which have in-

fluenced the condition of Human Nature, none has operated so powerfully in every point of view as Religion. A sense of Religion in some form is a universal feeling in every mind, soon succeeding the dawn of Reason. All nations and communities, (with but few exceptions,) in every age and in every quarter, have adopted some notions of it. All the Barbarians of Asia, who over-ran the civilized world, had settled systems of Religious Worship. The remote islanders of the Southern Ocean have obscure but fixed ideas of it, and throughout the whole extent of the New World there was not a single tribe, however detached or low in the scale, but what gave credit to one of the fundamental points of Religion, the being of God, and the Immortality of the Soul. Notwithstanding, therefore, the frailty and imperfection of our nature—notwithstanding the mixed character of our passions, and the compound fabric of humanity—yet Religion is the great theme of mankind. Man is a contemplative, a religious animal.

Various systems have been adopted, according to the varying genius of different societies; some have venerated blocks of wood and stone, as emblems of divinity; others have extended their adoration to the surrounding elements. All have surrendered themselves to its influence,

and in most nations it has been grafted upon, or mixed up with, their laws and political institutions.

To give but a brief sketch of the leading forms into which Divine worship has branched out among the various nations of the earth, would be a task of great magnitude; it would comprehend a vast variety—it would embrace an immense extent. All the ancient theologies had, for their end, the permanency of order, the extension of social virtue, the happiness, the preservation of society, both aggregately and individually. They were mostly political schemes grounded on the principle of self-preservation. Fear was the engine of Religion, and the Parent of Superstition; the disturbed imaginations of men distorted the beauty and simplicity of their natural feelings; every impulse, every emotion running to seed, the mind displayed a wilderness, where folly, error, and absurdity, like over-running weeds, choked and exhausted the soil. Human reason was hence held in check—it never ripened; but, entangled in the thicket of superstition and fanaticism, it either blossomed unseen, or prematurely withered to decay. Such were the nature and effects of all the ancient systems of Religion. But at length a scheme was unfolded, that accorded more with the simplicity of nature, harmonized

better with the feelings of humanity, and operated stronger in the production of happiness than any, or than all, that had ever gone before. The mist of error now began to clear-up; a radiance of divine light now shone forth, that dissipated the morning dew of ignorance and absurdity, and the condition of man promised to be cherished, to be improved, to be perfected, by the effulgence of Divine Revelation: but, alas! the hope was yet vain: the sky again clouded, the horizon grew dim, the glorious luminary was once more obscured, and for twelve centuries this ball was darkened, by the dense vapours of superstition, error, and mental despotism. Religion became the rod of power; mens' minds were held under the sway of spiritual bondage, and sacerdotal tyranny. Princes and priests exercised a mental usurpation, and mankind rather moved retrograde. Absurd dogmas, and injurious tenets, were propagated, which, "imposed by force and authority, inculcated by education, maintained by the influence of example, were perpetuated from age to age, and habit and inattention strengthened their empire." At length, however, reason and reflection set about investigating the errors and prejudices of a despotic system; a new light burst forth that exhibited the Christian system in its primitive splendour and brilliancy. Wick-

liffe, Huss, Knox, and many others, paved the way for an important change in the received opinions of mankind; till Luther, taking advantage of circumstances, with the aid of some of the German princes, accomplished the Reformation, which exposed and exploded the absurd points in Catholicism, promulgated a more consistent and reasonable creed, and emancipated the human mind from the trammels of superstition and error. The empire of Reason now commenced, and henceforth men became guided by the genuine precepts of Scripture philosophy. The gigantic tyranny of an overgrown system was now shaken and upset, and spiritual bondage gave way before freedom of enquiry. An easy, a rational theory, has been adopted, and the condition of man has been improved. In effecting this great, this important change, the art of Printing has been a powerful assistant. Knowledge has been disseminated and extended among the crowd, and every individual exerts his own reason, and thinks for himself; inconveniences, and even errors, may have sprang from this freedom of the press—but they are only the inconveniences incident to, and inseparable from, all human movements, and to inveigh against the press on these grounds would be to reason invertedly, it would be to run into that sophism which logicians call the *Fallacia*

Accidentis, or involving the essential in the accidental. Liberty is so active an agent, it has such elastic energy, and is so congenial with the feelings of Human Nature, that it is no wonder freedom in religious enquiry should have occasioned so many errors, and given birth to such fanaticism and absurdity. Liberty, beyond a certain limit, degenerates into Tyranny*. Weak understandings and warm imaginations, become soon moulded to the controul of bigotry and enthusiasm. The mind is narrowed in its conceptions, the comprehension is contracted to a limited boundary, and the sublime benevolence of the Almighty is confined to peculiar channels, and considered the birthright of a chosen few. It has been the error of most sectaries, to engross to themselves the favours and blessings of the Supreme, as if the whole scheme of creation was exclusively designed for the members of one particular flock; whence the numerous and extensive schisms that have divided the religious world, and so astonishingly perverted and distorted the purity and simplicity of genuine

* In the Physical world it is assumed, that where the sphere of Attraction ends, that of Repulsion begins; and in the Moral world it seems to hold, that excessive Liberty at last loses itself in Licentiousness and Disorder, and produces its own opposite. It may, therefore, by analogy be said, that where the influence of Liberty ends, that of Tyranny begins.

religion. The effects of the Reformation have, therefore, been of a mixed description, as is indeed the case with all the great movements which influence the condition of humanity. The situation of man on this earth is under the influence of conflicting elements, and contending agencies; every state and movement of our nature is compounded of mixed and opposing qualities; all the attributes which constitute humanity are mixed and various; and the great task of the enquirer, is to discriminate between the essential and the accidental, in the modes to be examined. It is a rule in logic, that, if in the investigation of truth, the minor proposition assumes more than the major affirms, the syllogism is distorted, and the truth is lost.

We are not, therefore, to infer, that the freedom of the human mind in modern times is an evil, because we behold many divergencies and aberrations in the opinions and conduct of mankind; these are all partial and accidental; the bulk of men will notwithstanding form correct judgments, if the necessary data and circumstances are not withheld, and I believe the reflecting part in all communities think nearly alike on all the points of humanity. I therefore presume that the best test of true Religion is the dictate of Human Reason*.

* I by no means wish to be understood as subscribing to the adage *Vox Populi, Vox Dei*. The minds of the multitude

While speaking of the superior advantages of the Reformed Religion, and glancing at the errors and absurdities of the Romish Church, an impartial enquirer will naturally take up the balance, and throw into each scale its respective weight of merit. We cannot turn from the Catholic system without recollecting beauties in its fabric, and doing justice to the many benefits it conferred on mankind. It formed a venerable pile of Gothic structure, that addressed itself powerfully and seducingly to the imagination; it was tinged with the romantic spirit of the times, and perhaps suited to the taste of the middle ages. If it has been accused of cruelty in extending the dominion of its doctrines, it must also be allowed the credit of having been charitable and assiduous in providing for the destitute; every religious house was an asylum, where the poor received their daily bread: a portion of the tithes were before the Reformation appropriated to maintain the poor. If they have

are so often under the controul of absurd and erroneous systems, their understandings so often from want of means, and other causes, kept out of play, and they are so usually under the influence of the Imagination and the Passions, that they are misled by every change, and become the sport of every gale. Public opinion and popular favour, have been at all times most fluctuating and unstable, from the days of The-
mistocles down to the present age.

been accused of keeping the multitude in ignorance, and withholding the blessings of instruction, it should also be remembered, that the means of diffusing knowledge were in those days cramped and restricted. At a time when a manuscript copy of the Bible was equal to the value of a flock of sheep, and many parishes were absolutely without an edition of the sacred volume, the opportunity of instructing the crowd must necessarily have been very limited, the stock of knowledge must have been small, and confined to the superior and privileged classes of society. They have been, perhaps, unjustly blamed for not doing that, which was then out of their power to accomplish. Since the establishment of the art of Printing, the means of instruction have come within the reach of a large portion of the community.

It may be considered no trifling advantage of the Romish system, (while it lasted,) that it united all the Christian kingdoms in one great spiritual commonwealth, that the inhabitants of Western Europe adopted one uniform creed, which acted under all circumstances of the usual diversity of opinion among men, as a bond of union, as a *vinculum* that held them together, and created a common cause. It was this uniformity of creed that gave occasion to the oblivion of differences and jealousies, and the union

of all parties in the heroic enterprizes of the Crusades ; and, perhaps, notwithstanding the refinements of Modern Policy, the balance of power was better regulated, and the encroachments of tyrants and usurpers kept under better controul in those days than in the present. But the principal advantage which mankind have derived from the Romish Hierarchy, the greatest claim they have upon the gratitude of after ages, is their preserving from destruction the remains of the literature of the Ancient world. For many successive ages, while the state of Human knowledge was at a very low ebb, and while the bulk of mankind were in a state of darkness, the Monasteries were the asylums of learning and science, the Monks were the depositaries of all the knowledge of the world. Had it not been for the taste and erudition of these Monks in the middle age, the reign of darkness must have been extended to the present time. Many of them were men of considerable industry and depth in literature ; the walls of their convents afforded a sanctuary, and a protection to arts, manufactures, and useful industry. The remains of ancient letters were here preserved, and the Catholic clergy, notwithstanding the opprobria of modern prejudice, have done much for science, and are for ever shrouded in the grateful remembrance of the learned world. The

Catholic church is gone, but it was a venerable pile, a Gothic structure, in the awful gloom of which the imagination so delights to wander; that no modern tale or romance can be completed, without calling up the imagery of its sacred ceremonies.

Subsequent to the downfall of the Roman power, the German nations introduced a peculiar code of laws and manners, that for many ages held a powerful influence over the human mind. All the Gothic institutions were of a warlike character. Military bands of vassals united under chiefs, and chiefs became dependent upon one common prince, whom they were accustomed to serve and obey, and whose fortunes they followed and shared in the field of battle. These people despised trade, and neglected agriculture, and presented only a nation of warriors, with whom arms and gallantry were the chief employments. Military achievements and gallant exploits were here the only road to fame, and in which every knight was obliged to give some indication of excelling before he was enrolled in the ranks of Chivalry. The interest of the prince combining with their spirit of discipline, instilled high sentiments of honour and magnanimity among them. They acquired early a noble generosity, a dignity of mind, that insured the probity of their conduct.

in all their intercourse, and which, in that romantic age, running to seed, gave birth to a species of Knight Errantry, the excess of which has often been the topic of modern sarcasm and censure. These high sentiments, however, served in a dark boisterous age to soften the manners, to temper the rudeness and barbarism of the mind, and to calm and curb all the selfish propensities of Human Nature. The National character took no tinge from Commerce; Avarice was not then the ruling passion of society. The springs of Human action were not then formed of Gold; they were fabricated of sterling Honour. The impulses of the mind were not in those days regulated by the science of figures; the movements of mankind were not reduced to cold calculations of pounds, shillings, and pence. The age was characterized by the stern martial virtues of Honour, Courage, and strict Justice. Such were the virtues, and such the character of a Military race in a rude age*, and although

* In Arabia, under the Saracen government, a romantic taste was generated, that branched out into a complete system of Knight Errantry: this, united to the Gothic spirit, carried Chivalry to a great height in Spain, which so long remained under the dominion of both those powers. This produced a loftiness of sentiment, a dignity of mind, that formerly rendered the honour of a Castilian proverbial throughout Europe. It was by attacking this system, through the medium of Ridicule, in a modern Romance, that Cervantes is said to have ruined Spain.

it had many imperfections that rendered it incompatible with the progress of exact knowledge, and the extension of pure reason, yet its uses and its beauties were great and manifold. The Imagination always delights in its splendid ruins. In speaking of the origin of this code, Montesquieu says, “a venerable oak raises its lofty head to the skies; the eye sees from afar its spreading leaves; upon drawing nearer it perceives the trunk, but does not discern the root; the ground must be dug up to discover it.” The substance of this system has long since been abolished in Western Europe, and the spirit is fast vanishing before the commercial taste of the present age. The profound and prophetic genius of Mr. Burke deplored the total extinction of the spirit of chivalry. He speaks of the “inbred sense of Honour, the cheap defence of Nations, the Nurse of Manly sentiment and Heroic enterprize,” being succeeded by the government of the selfish gratifications, the cold calculations of avarice and self-policy.

The spirit of Chivalry gave birth to the extraordinary enterprizes of the Crusades, which promoted the intercourse between Asia and Europe, and caused the arts and improvements of the Eastern world to flow to the Westward. It would be too extensive a task here, to glance

at the consequences arising from these remarkable expeditions, that for two centuries drained the Christian kingdoms of Europe of so much blood and treasure.

The progressive advance of ages, the gradual stream of time, the accidental combination of circumstances, the various issues of previous movements among men, lead eventually to a developement of new circumstances, and a display of fresh agencies, that slowly but inevitably induce, a new cast of outline in the features of society. The changes in Human life are all gradual and imperceptible in their accession; they flow like the waters of a still river, where the current is constant, and where the bark is gently glided down the quiet stream, till it reaches its destined port, or at length becomes launched into an open sea. All the various agencies and causes I have above enumerated, by degrees developed a new era of Human history; a new order of things was gradually introduced, and the Empire of Reason slowly and silently established. About the sixteenth century, the previous discoveries of many great men disseminated knowledge, and created a taste for science, that gave birth to a freedom of enquiry and a spirit of research, that opened a new scene in the Human Drama. The Catholic Religion, the Feudal System, the whole reign

of the Imagination gradually melted away, like the winter snow before the vernal sun, to the progressive advance of the Human understanding. The cultivation of science excited a new train of thinking; towns and cities became established, and were the seats of industry and learning, where many useful discoveries and inventions were made, that added considerably to the stock of Human comforts. The sciences have at length been prosecuted with freedom and ardour; a burst of new light in each branch has shone forth, and illuminated the sphere of Human knowledge. The mode of reasoning established by Bacon and Newton has powerfully assisted the operations of the mind, and man seems progressive in the growth of intelligence. As I have had occasion before to remark, in the progress of the age of the World, as in that of individual Man, the Understanding has gradually advanced upon the Imagination, and Reason has assumed her empire.

“ Thus then endowed the feeble creature Man,
“ The slave of hunger, and the prey of Death,
“ Even now, even here, in Earth’s dim prison bound,
“ The language of Intelligence Divine
“ Attains.”

Here for the present I will conclude, and remain,

Your’s, &c.

L. S. B.

LETTER XVI.

DEAR FRIEND,

IN our preceding correspondence, we have taken a transient survey of the Physical and Moral condition of Human Nature ; the cursory remarks in these letters form a rough sketch, an unfinished outline, of the History of our Species. We behold Man situated on this huge ball, projected in empty but immense space, linked by undeviating laws to other orbs, that, fixed in their movements, splendidly decorate his firmament, and display over his head a glittering canopy studded and spangled with golden fire. We contemplate that glorious luminary the Sun, placed as a common centre, around which numerous Planets, tenanted perhaps by myriads of rational beings, regularly revolve, and proclaim the Majesty of Supreme Power.

“ Thou, O Sun,
 “ Soul of surrounding Worlds ! in whom best seen,
 “ Shines out thy Maker ! may I sing of thee ?
 “ ’Tis by thy secret, strong, attractive force,
 “ As with a chain indissoluble bound,
 “ The system rolls entire.”

In looking up we perceive the universe before us, but only part of the scheme is exhibited to us ; we soon discern the extent of our powers. As an Infinite cannot be involved in a Finite, so the unbounded theatre of Creation cannot be compassed by the limited comprehension of Human faculties. The mind here roams in astonishment, and often wandering in a labyrinth, at length rests only in superstition. In looking down we behold man immersed in surrounding elements, exerting constantly their active energies upon his frame ; these unfold his dormant faculties, excite the latent powers of his complex machinery, and display the innate perfection of his ingenious structure. Every function of his body is composed of inherent attribute in the organ, and active stimulus in an external agent. Each sense requires, in addition to capacity in the organ, the union of a stimulating element before sensation is effected. The organ of his Voice, however perfect in structure, is of no avail, without the mechanical distension of an elastic fluid. The properties of his Blood are incessantly preserved by the absorption of Chemical elements in his Lungs. The waste and repairs, from all the violent actions going on throughout his complex organ, must be made up from the matters of surrounding Creation. Not only each particular function,

but Life itself, which consists in a totality of actions, in an aggregation of movements, is a compounded attribute, a *Tertium quid*, made up of inherent capability in the system, and stimulant energy in surrounding elements. Thus, then, we see Man is not a detached portion of the universe—he stands not on an insulated pillar; his structure is closely combined, his functions are intimately blended, with the active energies and agencies of all the elements of which this great ball is constituted. Without Light his eye sees not; the scene is for ever dark.

“ Prime cheerer Light!

“ Of all material beings first and best!

“ Efflux Divine! Nature’s resplendent robe!

“ Without whose vesting beauty all were wrapt

“ In unessential gloom.”

Without the vibratory impulse of the Air, his Ear is passive, the whole is a lonely desert; without Oxygen, his blood is a dark corrupted mass; without Food, his solid fabric wastes; without Fire, he remains a solid immoveable stone.

Associated with Man on this stage, stand an infinite series of created forms, appointed as secondary performers to conduct, as it were, the underplot in the grand Drama of this Globe. Here a sportive variety of forms, a multiplied

diversity of functions are displayed, that make out the extensive scheme of organized Creation. These beings exhibit every variety and every change, from the simplest forms up to the most complex mechanism. As I had occasion before to remark, the point where organic existence commences, the *punctum saliens* of either vegetable or animal action is somewhat obscured from our view. The shades are so blended, the changes are so indeterminate, the gradations are so regular, that the limits of each kingdom of Nature remain uncertain and undefined. The lowest orders of organic structure form the base of a great pillar, which, gradually finishing as it rises, the Apex is at length crowned with the elaborate structure of Man, the chef d'œuvre of sublunary creation.

With the different orders of organized Nature, Man forms an intimate union: from the Vegetable Kingdom he derives a considerable portion of his nourishment, and derives infinite gratification in beholding the embellished scenery of vegetable beauty, with which his stage is so richly carpeted. With animals he forms a varied connection; with some he enters into close alliance; mutual friendships and reciprocal favours link them together, and produce a close fraternity. The passive innocence of the Sheep, the faithful friendship of the Dog, the active

services of the Horse, and the solid labour and products of the useful Ox, are Nature's best auxiliaries, to the perfection and happiness of our condition on earth. With others, he exercises an eternal warfare, and lives for ever estranged. A continual scene of mutual hostility is in action, and his most powerful energies are often called forth to defend himself, or to overcome the victims of his wants and his plunder. The Arab with his Camel, the Laplander with his Rein Deer, cultivate a close acquaintance. "That Monster of Matter and Miracle of Intelligence," the Elephant, administers to the Indian's necessities. Forests, oceans, and skies, are explored by human energies to exact plunder, to extort tribute from inferior orders, to satisfy the wants of necessitous Man. Man holds a middle rank in physical energy; the mechanic force of his limbs, the acuteness of his senses, the agility of his movements, the vigour of various functions, are all inferior to many species of animals; but in the endowment of mental capacity, in the grand attribute of intelligence, it is his high destiny to excel; here he rises above the material, and approaches the confines of another world. To accomplish his superior Nature on earth, he enjoys even some points of physical pre-eminence: he alone stands upright; he places his foot flat on the earth, with the heel

touching the ground; he walks erect, and directs his senses at once to heaven. The superior part of his body is fronted by a collection of features, that in Man form an index of the soul, a dial of the emotions and passions moving within. The forehead, the arched brows, the curved nose, and the square prominent chin, surmounted with a cresting of lips, form in Man the face, the intelligent aspect of which constitutes in him a dignified superiority. Here the sentiments of human feeling are often legible, and, notwithstanding the difficulty and obscurity of the subject, every one becomes involuntarily and *prima facie* a Physiognomist. But it is not reducible to a science; it is not amenable to the arbitrary determination of line and figure. He possesses an elaborate Brain of great relative magnitude, that, uniting Matter with Mind, discharges the lofty office of Thinking; by means of this Celestial faculty he compares and combines ideas, he comprehends the scene around him, he corresponds with material and spiritual essences, he communes with Angels, he approaches the Majesty of his Creator. Thus formed of an elaborate structure, clad in sublime attributes, he stands a model of Supreme architecture, an image of his Maker: he is gifted with an ingenious organ, the Hand, which enables him to exercise many energies to great practical

extent. - He searches the various kingdoms of nature, and, by the assistance of his digestive organs, renders all subservient to his daily wants. By the organization of his Glottis, he modulates the tones of his Voice, to which he attaches ideas, and acquires the faculty of Speech, which is a distinguishing prerogative, that elevates him above all others, and is the grand instrument of all the improvement and perfection of his nature. In close analogy with the lower orders of Nature, he has his sensations, his pleasures and his pains; he grows, continues his species, and is cut down like a flower that withers in the season. He is altogether of that mixed character, of that middle stamp, that although on one hand he rises above every analogy with those about him, and takes on elevated and superior energies, and displays attributes beyond material; yet on the other hand, he commences and ends his career, in debility, in privation, and in want; more feeble and destitute than the brute, and even in all his glory "not arrayed like one of the lillies of the field."

Man comes into this world without any thing instinctive or inbred; his body naked and feeble, his mind empty and vacant. During his long infancy he is more helpless than the young of any other species. The first seven years of his life are exposed to accidents and diseases, and hardly one half the number outlive this short

period. In the second period, till fourteen, his young mind gradually expands ; the foundation of his future strength is then laid. During the next seven years his constitution ripens, his animal powers mature, and at twenty-one he has reached the acmè of his physical evolution. He is now launched into life a free agent ; but notwithstanding the fulness of his physical maturity, the plenitude of his mental perfection is yet far from complete : the light of experience and observation has not yet dissipated the mist that envelopes the stage of life ; the movements of humanity are yet shrouded in a maze of intricacy and uncertainty. This is the reign of the Passions, when the Physical are ever rebelling, and encroaching upon the dominion of the Mental powers of his nature. He is now exposed to the balancing influence of contending emotions ; the physical impulses of his frame mature and strong, vibrating with force and elasticity ; but the controuling faculties of Reason, yet cold, immature, and distant. The reasoning powers not yet sufficiently unfolded, and the youthful mind tossed about by every gust, the sport of every gale, like a ship without a rudder, like a mariner without a compass. This is the season of danger ; now the after-character of life often takes its tinge ; and the young man either pursues the safe course, and like the vessel of the

judicious pilot, reaches the desired haven in safety ; or is driven off to sea to encounter the storm, and founders in a vortex of error. After thirty the mind rapidly expands ; experience and observation are constantly bringing in their treasures ; the judgment gradually ripens ; and before forty, *cæteris paribus*, the Mind of Man is in the zenith of its vigour ; it here passes the meridian of its perfection, and for some time appears nearly stationary ; habit, situation, circumstance, mould it, and give it its peculiar form ; the ruling passion, the fruit of that blossom that budded in youth, now ripens, and fixes the character of the individual : the faculties are hardly any longer progressive. As we approach fifty, both corporeal and mental exertions slacken ; the mind rests on its past labours ; the judgment has long since taken its stand ; past experience now affords a lengthened, an instructive retrospect ; the measure of intuition is nearly full, and Man henceforth retains but little docility or capability of instruction. The gilded clouds, the brilliant horizon, that constituted the lively cheering picture of Hope, are now fast vanishing. Here is placed the *ne plus ultra* of advancement in the individual ; the period of his mental progress is here rounded with a full stop. After fifty, Man descends with a quick-

ened pace the eminence he had previously climbed. The autumn of life here intervenes ; the enlivening verdure of preceding seasons is now succeeded by the fading brown ; the whole scene acquires a somewhat gloomy tinge, till sixty gradually accedes, and as gradually introduces the winter of our days. Morbid predispositions are now called into action, diseases and debility ensue, old age is arrived, and as Seneca says, *Sencetus insanabilis morbus est*. At length seventy supervenes, all beyond which is " Labour and Sorrow." Threescore years and ten constitute the duration of human faculties, at least such has been the measure for the last three thousand years, since the time of David : but how few of the number reach this extent ! Out of a thousand children born, not more than 60 perhaps reach seventy : indeed the average of aggregate duration is estimated at something less than half that sum. Mankind do not share 34 years of existence ; such is the fleeting nature of time, such the rapid brevity of human existence. At length Death overtakes him ; the principle that pervaded and exercised a sovereignty over the material frame is now fled ; the *Vinculum* that held together the elements that compose his frame is now broken ; the fabric of his structure is now decomposed, and the ele-

ments of his composition return to their former inert condition. Such is the course—such the brief history of Human Movements.

But we have hitherto kept out of our view the superior, the immortal part of Man; here we approach the essence of his nature, the *Res Altissima* of our research into the history of his Being. While our bodies decay, and the matter of which they are formed is doomed to destruction, the “Soul still flourishes in Immortal Youth;” it moves in a circle of eternal duration; it takes leave of time, and dwells in the endless regions of eternity. The Soul is Immaterial and Immortal. Many ingenious arguments have been advanced to prove the immortality as a natural consequence of the immateriality of the soul. But although it may appear very clear to us that the soul is immaterial, that its faculties possess no analogy with any of the physical properties of matter, such as Extension, Resistance, Solidity, &c.; that common matter is inert and impercipient; that Matter is divisible and Mind indivisible; that therefore the ultimate particles into which body may be divided are incapable of percipiency; and consequently that no combination or union of insensible particles can produce Thought, the properties of the whole being in any body only the aggregate of the properties of the parts; yet, notwithstand-

ing, I say, all this may convince us, the Soul is not material, yet immateriality does not suppose immortality as a necessary consequence. All our knowledge of the attributes of an immaterial essence is negative and obscure : for aught we know, mortality and decay may be necessary attributes of Spirit as of Body ; it may form part of the Divine plan, to annihilate and extinguish immaterial as well as material substance. We are not to assume a possible hypothesis as the basis of certain knowledge on any subject. To infer, therefore, the soul's immortality, as growing out of its immateriality, is a mere *Petitio Principii*, and contrary to every rule of logic. As Dr. Johnson says, “ the Being who made it surely can destroy it ; since, however unperishable, it receives from a superior nature its power of duration. That it will not perish by any inherent cause of decay ; or principle of corruption, may be shown by Philosophy ; but Philosophy can tell no more. That it will not be annihilated by Him that made it, *we must learn from higher authority.*”

All the reasonings which have been advanced to establish the Immortality of the Soul by the light of nature seem to fall short of establishing their object. The Love of Life and the dread of Annihilation, the energetic expressions of the Poet, “ the pleasing hope,” “ the fond desire,”

“ the longing after immortality,” “ the shrinking of the Soul back on itself,” “ the startling at destruction,” “ the stirring of the Divinity within us,” although so emphatically dwelt upon, amount to little or nothing. My hopes or fears on this subject no more prove the fact, than my hopes of a long life and my dread of a speedy death will ensure the one, and parry off the other. My desire of health and happiness is as strong and as lively as my longing after Immortality, and no more likely on that account to be realized. Conscience is an arbitrary standard, and therefore no criterion or assurance of future existence. The justice of God may seem to require it; but this may even be an insufficient proof*. The compatibility of this hypothesis with the moral government of the world is perhaps the strongest argument, but yet it falls short of demonstration. The ancients entertained a variety of opinions, and great

* It has been advanced, that no idea of injustice could attach to the Creator were it within the scope of his design to annihilate all existence at death, as the bringing into this world a race of beings to accomplish certain ends, and placing them in a situation where, taken aggregately, happiness predominates over misery, and virtue preponderates over vice, would effectively satisfy all the ends of substantial justice, and be perfectly consistent with superior Wisdom, exclusive of any mode of future existence.

obscurity of notions on this head, although it is very certain that all schemes of morality not built upon an assurance of future retribution, must be very incomplete. Upon the whole I am disposed to infer, that Natural knowledge throws but little light, and goes but little distance, in establishing the doctrine of the Soul's immortality, and the authority of Revelation is the best demonstration, and the only conclusive assurance of the existence of man in a future state. All his information comes from the *Dicta* of Scripture. It may be said, perhaps, that some idea of future existence has operated on the human mind even in the lowest stage of Savage life, as we are well assured, that throughout the whole extent of the American Continent an opinion invariably prevailed of the Immortality of the Soul. The elegant historian of the New World has attributed this to a "secret consciousness of our own dignity, an instinctive longing after Immortality." I should, however, be disposed to consider this opinion among the American tribes as springing from the activity of the imagination, which in savage life we know to be so vigorous and predominant. As I have had occasion to remark before, universality and uniformity seem necessary and inseparable attributes of all instincts: we know, however, that a diversity of opinion on this subject has pre-

vailed among men, and I should moreover view that Instinct as lame and imperfect, which teaches an American savage the knowledge of a future state, and at the same time leaves him in perfect ignorance of the being of a God, or the existence of any great Supreme Cause. The above historian tells us, that several tribes had no idea of a Supreme Being, no rites of religious worship, and no name in their language to express the Deity: they were perfectly unacquainted with the existence of God. The idea of the Soul's future continuance could therefore only arise from the activity of their fancy; it was a mere phantom of Hope, with which they solaced themselves in the hardships and sufferings of savage life. The privations and fatigues of a savage state, or of slavery, would no doubt be much mitigated by fancying

“ Behind the cloud-top’t hill some humbler Heaven,
“ Some safer world, in depth of woods embraced,
“ Some happier island in the watery waste,
“ Where slaves once more their native land behold,
“ No fiends torment, no Christians thirst for Gold.”

Man, as he emerges from savage life, becomes universally a contemplative, a religious animal; his religion, however, is not innate; he brings it not with him into the world. When his powers of reflection begin to unfold themselves,

his judgment is exercised in combining and comparing his sensations, and he arrives by regular induction at some knowledge of the most sublime truths. His religious notions, therefore, proceed from acquired ideas; they are moulded by accidental associations, and take on a variety of form from external and adventitious causes. Religion is never the result of Instinct; it is always the offspring of Reason.

The various and contradictory systems of Ethics that have prevailed in different ages, and in different communities of men, confirm our position, that no religious sentiments are instinctive. The standard of right has been as various as the different societies have been numerous. Moral error in one place has been religious and political expediency in another. Crimes that incur the full penalty of the law in one country, have been tolerated in others. The Murder of Infants, and of aged and deformed Persons, Polygamy, Incest, Adultery, and Theft, have all been variously construed and interpreted, admitted in one place, and reprobated in another. The notions of moral obligation have been so diversified, so various, and so complicated, that many have been disposed to consider Religion as perfectly climatic, and taking its model from the local situation and circumstances of the community. It has hence been observed,

that the Metempsychosis might have been politically expedient in a country where the flocks are but thin, from the pasture being soon burnt up. The frequent bathings inculcated by the Orientals were necessary and salubrious in that climate. The prohibition of pork, as having a tendency to induce cutaneous diseases, might be equally salutary. Montesquieu observes, that the Northern countries of Europe embraced the Reformation, because a religion without a head was more agreeable to their notions of liberty, and the independency of their climate. The Catholic system was more compatible with the taste of monarchs, and therefore better suited to the arbitrary governments of the South. He remarks, that Lutheranism is more adapted to princely governments than Calvinism, which is purely democratical. The changes in religious sentiments, however, which have so often taken place in the same country, without effecting any material alteration, refute the opinion of any particular form being necessary or indigenous in any particular latitude; and we require nothing to convince us, that Christianity is adapted to every climate, and has the capability of ameliorating the condition of humanity in every region of the globe.

The weight and value of the Christian revelation is in nothing more conspicuous than in

this, that no perfect system of morals can be established without it. The ingenuity and reasoning of philosophers in all ages have been exercised to erect a code of Ethics suited to the condition of man, and yet the task has been difficult to establish any system upon a solid base. Even in this enlightened age, our greatest characters are at issue as to precise definition of virtue. Dr. Reid supposes, the sense of moral obligation to be instinctive; this I presume, for reasons before stated, to be fallacious. Dr. Price is partly of the same opinion. Cumberland places it more reasonably in Benevolence, stimulated by Self-Interest, to produce our own happiness. Adam Smith supposes it the perception of the fitness or unfitness of rules of action to accomplish their ends. Mr. Hume places Virtue in Utility. Gisborne and Paley ground it on Expediency; the latter defines Virtue "as the doing good to mankind, in obedience to the will of God, and for the sake of everlasting happiness. The good of mankind is the subject, the will of God the rule, and everlasting happiness the motive of human virtue." Mr. Belsham says, Virtue is "the tendency of an action, affection, habit, or character, to the ultimate happiness of the agent." Thus we see human opinion has branched out into considerable variety concerning a definition of

Virtue, and it seems after all, that an assurance of future reward for virtuous conduct in this life, is the *only solid basis* upon which any system of ethics can be built, and we now feel that such assurance is only to be obtained under the Christian dispensation, which rests its whole weight of remedy or remuneration, on a retributive administration in a state of future being. This idea is the soul of the Moral world, and amply demonstrates the transcending superiority of the Christian Revelation.

It is on this ground the Christian system so strongly recommends itself to the notice of the world; it inculcates so elevated, so disinterested, and benevolent a system of Morality*, that it

* In the savage breast, Revenge is a primary and active impulse; it is an emotion so insatiable, that it stimulates men to most astonishing exertions to attain its gratification; and even in many enlightened nations has been sophistically indulged and cherished. It would however seem that it exists, inversely to the quantum of elevation and genuine refinement in the mind, and gradually diminishes as the human condition emerges from the lowest state of barbarism, till it ceases altogether, in that approach towards superior nature, which man is at length capable of attaining. A mind perfected with the spirit of Christianity obliterates these feelings, and ceases to be the abode of Revenge. The Christian system enjoins its subjugation in the soul; and he who entertains a lively feeling of it, is an *imperfect Christian*. What a contrast between that system that dictated to the Carthaginian General to lead his son to the altar, and engraft this mean

promotes the comfort and happiness of mankind in a greater degree than any system ever invented by Human ingenuity. If it teaches the purest, the most exalted virtue, it must necessarily promote the happiness of our species. Happiness is a theme ever in our mouths—it is a phantom ever in our thoughts—it is a goal ever in our pursuits ; it excites our best energies—it stimulates us to action—it is the end and aim of our being, and yet it is a something subject to no governance—amenable to no standard—reducible to no definition : who can describe this quality, of which all Mankind are in full chace, which constitutes the *summum bonum* of all human desires ? no standard, no rule of happiness is identical, perhaps, in any two individuals ; it is an arbitrary and accidental association of circumstances and feelings adopted in each individual breast. Every man has the standard of his own happiness in himself ; he bears about the form to which he is fashioned ; his individual feelings, circumstances, and habits, form a sphere

passion upon the sacred stock of Religious theory, and stamp it with the value of its sacred rites and ceremonies ; and that benign, that heaven-born system, which forbids its votary to approach the altar, till he has extinguished the base, the selfish propensity. How transcendent and superior does that Religion soar aloft, and prove its Divine origin, which gives this precept, “ Leave there thy gift and go thy way ; *first be reconciled to thy brother, and then come and offer thy gift.*”

around him, within which his happiness is confined. If Happiness, then, is an internal sensation; if it is the result of a certain modification of feeling in each individual, then every man's mind is his own kingdom, and Nature has diffused it equally among all human beings. It would be no difficult task to show that it belongs not exclusively to any state or condition, or to any age or country, but is a common boon, of which all Nature's children equally partake. As an author says, "Ye men of all the quarters of the globe, who have perished in the lapse of ages, ye have not lived and enriched the earth with your ashes, that at the end of time, your Posterity should be made happy by European civilization." Dr. Paley makes Happiness consist in the exercise of the social affections; of the faculties in pursuit of some engaging end; and in *the prudent constitution of the habits*. After all the volumes that have been written to define and illustrate Human Happiness, it may perhaps be best summed up in the words of the Poet, at least, no axiom in Physics, is more self-evident than this in Ethics,

"Remember this, (enough for Man to know,)

"*Virtue alone is Happiness below.*"

The cursory remarks that compose this correspondence now draw to a conclusion. We

have hastily run round the circle of Human Movements; we have glimpsed at the Stage and the Performers. We have seen Man the chief tenant of this Ball holding a middle rank; in physical attribute inferior to many, but in mental energy superior to all: a being compounded of Two Natures; chained to the Earth as an Animal—connected with Heaven as a Spirit: born solely with animal powers, possessing only the capacity of learning his nature, and his end: in great measure the child of accident, the sport of agency, the creature of circumstance; and of all animated beings, the only one that reaches not his destiny here, that fulfils not the final end of his existence below. In dissecting his structure, in analyzing his functions, we discover new wonders at every step; in unravelling the compound texture of his fabric, we soon approach the limits of our research: as the Eye cannot see itself, so the Mind cannot loosen the gordian knot of its own complexity; we are obliged to exclaim with Young,

“What a Miracle to Man is Man!”

Through the haze, however, we perceive a path that leads elsewhere, that carries us from the confines of a material, to the frontiers of a spiritual world. Man is only here a bud, de-

signed to blossom and ripen in a future season. The drama of Humanity is only a prelude to another performance, in another and more exalted state. We find Man placed as the Link between two worlds, compounded of animal organic structure, of supreme mechanism, and of spiritual essence of celestial quality: we see in him much to astonish us, much to admire, and more to adore. In pursuing his Anatomy, we soon reach the *ne plus ultra* of all our enquiry. We perceive him a compound of mixed characters and passions, prompted to action by Self-Love, tempered by Benevolence, regulated by Reason; blending opposite qualities, uniting attributes apparently incongruous and incompatible; feebleness with strength, darkness with wisdom, paucity with plenitude. He displays in his journey here, elevation of thought, with parvitude of action; dignity of sentiment, with imbecility of conduct; and in all the majesty of mind, and the sublimity of thought, still wavering and inconsistent. Tied to the earth by some faculties, rising above the clouds by others, soaring to another sphere, viewing the blest abodes, presuming as it were into the councils of the Deity, and writing laws to govern the universe; and yet looking down upon himself *ignorant of the means by which he moves his pen, unconscious of the nature of one simple movement*

of *his frame*. We will conclude with the description given by the Poet,

“ A Beam ethereal! sully’d and absorpt,
“ Tho’ sully’d and dishonoured, still divine,
“ Dim Miniature of greatness absolute !
“ An Heir of Glory, a frail Child of Dust!
“ *Helpless* Immortal! Insect *Infinite* !
“ A Worm ! a God !”

Your’s truly,

L. S. B

THE END.