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On Physical Man, or the Phenomena of Life, principally in relation to Nutrition.

When we look over the wide domain of Nature — the vast chain of beings or existences, with which our world is filled — the diversified modes of existence & modifications of matter — the thousands tens of thousands of forms or shapes of bodies of which it is susceptible — and the harmonious arrangement of the whole — we are struck with wonder & admiration at the wisdom & perfection of the Being who created them; it as moral, intelligent & dependent creatures, we ought to be penetrated with love & gratitude to Him as the moral governor of the world, & the beneficent disposer of all the blessings which we enjoy.

But, however varied & diversified, matter is susceptible of two grand divisions, one modification being called inorganic, the other organic. The first comprises all those substances that do not contain within themselves any elements of change.
either of growth or decay — have no particular or definite shape or size — have no power of reproduction or multiplication, but are acted on entirely by external agents. Of this form of matter, are the earth, metal, air, water &c., and in fact, all bodies that do not contain life.

The organized, on the contrary, is that form of matter which always presents to the eye a definite shape, has its powers of germification, growth, vigour, age & decay, contains within itself the organs, or apparatus for its full development, definite existence & final death.

This class of substances, comprises all those modifications of matter that have life, either vegetable or animal.

Inorganic matter may exist in the same state for an indefinite space of time — for ages, for centuries, or perhaps the "everlasting hills" may exist while the world shall last — while organized matter has its bounds of existence prescribed, beyond which it cannot go. Its periods of decay & death are ascertained, as those of its growth and...
development. The former belongs to the province of Natural Philosophy or Physics, which I shall not consider. The latter to physiology or anatomy, which, so far as it is connected with the general phenomena of life & nutrition, will be the subject of the following remarks.

Animal & vegetable life bear considerable analogy. They both have their periods of infancy, adolescence, youth, ripeness, & decay. Trees & vegetables have definite proportions, always identical, - have a covering analogous to the skin of animals - have tubes or vessels, corresponding to the blood vessels - have a fluid, similar in use to the blood, & from which are secreted or deposited the solid parts that contribute to the growth & maintenance of the tree. The leaves, like the lungs of breathing animals, are an apparatus for the secretion of the blood or sap. They have also organs for the reception of nourishment. This is furnished from the Earth - Fire, however, the analogy fails. The tree has no stomach; not does it apparently
receive any solid food — it shrinks with live a great for years in a flowerpot, without any diminution of the state. The exact mode, therefore, by which it receives nourishment is not demonstrated to a certainty.

As vegetables have no digestive organs properly so called, it is supposed, with great reason, that matter is taken up by the tendrils of the roots in its elementary forms, as in that of grasses. The simple elements of vegetable matter are very few in number; carbon, hydrogen, oxygen, nitrogen, in diversified proportions, forming the principal of all the various productions of the vegetable kingdom, so that the mildest consist in offensive fruit, vegetables, and the deadliest vegetable poisons are composed essentially of the same elementary substances, their offensiveness or insufficiency, depending upon the different proportions of the combination.

Animals, besides their digestive organs, are distinguished from vegetables by sensibility, locomotility, or
Locomotion—The power of judging of bodies by the various senses, as feeling, seeing, etc., and the capacity of motion or moving.

Under the former head I mean to comprehend, not only the senses proper, but also the higher order of animals, those manifestations, usually denominated the faculties of the mind—and under the second, all those motive impulses required by our wants, whether mental or corporeal. These sensations and impulses are the result of nervous influence, hereafter to be mentioned.

It cannot be expected that I should enter into a detail of all the phenomena of animal life in the short limits of a lecture—such details would require volumes.

I propose in this, only to give a brief description of the general form of operations of the animal organism concerned in nutrition, preparing to some subsequent remarks on alimentation &c., &c.

The human body is composed of but very few simple or elementary principles—the chemist has been able to detect little else besides oxygen, hydrogen, azote & carbon, the same constituents of which vegetables are composed.
The form, in the animal, muscle, fat, blood, lymph, gastric juice, saliva, mucus, bone, cartilage, tendon, etc., by combinations in different proportions.

The human system has been divided into solids and fluids. The proportions have been variously estimated, at from six, nine, ten parts of fluid to one of solid.

The solid parts are the bones, tendons, muscles—the fluids, comprise the blood, lymph, mucus, and other secreted fluids, or those fluids which are separated from the blood by the different surfaces, glands, etc. The body contains at one time, more fluids than at another; the proportion in youth is much greater than in old age, in some states of health, than in others.

The human form has suffered less change in the lapse of time, than that of most other animals. The general contour of the frame is nearly what it was when first given from the hand of the Creator. There is considerable variety as regards size, colour, expression,
of the features. — The family of Noah, the stock from which all the nations of the Earth have sprung, were probably very alike. — The variety of the present human family, has probably been produced by gradual changes. The modes of living, the diet, the usages, the habits, the peculiarity of occupation, or even of thought, have probably subserved the end of producing a nationality in the appearance of different people. "Lands intersected by a narrow path" have not only their antipodes, but their peculiarities of features. The experienced eye can detect, at once, the North American from a Southern, and even in our own country, the descendants from the Pilgrims can generally be distinguished from others of their countrymen who claim a different paternity.

The modes of dressing children by different nations, have probably produced great effects in the appearance of the face and head. The infant's head is easily moulded into any shape during the first months of its life. The bones of the Cranium are not yet calcified — and we often see
The effects of position in the human head, which last for life. The fact that a tribe of Indians on our continent, to flatten their children's heads, is familiar to us all.

The bones of the face, indeed, of the whole body (which, however, in the last respect is slight) may have been gradually changed in the same way—peculiarity of dress, customs, etc., so that it might not to be a subject of great surprise that we observe so great a variety in the features of different nations.

The variety of colour in the human family has been the subject of much inquiry; but I believe it does not elicit a satisfactory conclusion. Why should two members of the same human family, descending from the same stock, original stock, be of different, directly opposite colours? This effect has been attributed to climate; a northern producing the light, a southern a dark colour of the skin. It is certain that...
exposure to the sun in a southern latitude has considerable effect on the white variety of the species; but it never produces a black, and if the subject retain his health, on return to a northern latitude, the light colour is restored.

And again, a northern latitude has no effect on the black variety. The unmixed African of the twentieth generation in this climate, maintains the same colour that his ancestors brought with him: besides, the Laplander, the Esquimaux, and the Indian of our own country, maintain a dark, or coffee-colour, though inhabiting a climate supposed to be favorable to the production of the white variety only. There is something inscrutable in this variety of colour, the reason of which we are most profoundly ignorant. He who created all things, knows best the uses of designs - and has not yet permitted us to look so far into the arcana of nature, as to penetrate all her mysteries. One thing we know - that black people can withstand the effect of heat much better than white.
and it is therefore a merciful provision that people inhab-
ing very warm climates, are generally dark coloured.

Some ingenious experiments, by Sir Everard Home, are
very satisfactory on this subject. By exposing the back of
both hands to the hot sun for some time, one naked and
the other covered with black, the naked hand was blistered, while the one covered with black was untouched, and
yet, as indicated by thermometers placed on the hands,
the black was three degrees warmer than the other.

The colour of the skin depends upon a pigment, or
colouring matter, separated from the blood, called the mel-
archin, which is deposited on the outside of the skin. The
true skin is a dense or outer transparent invisible
covering of the body. In the negro, it is black; in the Euro-
pean and European American, white, or nearly so, mixed in
others, giving the different shades observed in different people.

The frame of the human system is anatomically
called the skeleton. It is composed of bones.
The ground work, giving the body its fixation and structure.

The muscles are that particular formation of fibres, known in the edible animals, as the lean of the meat—It is generally of a reddish colour, though varying in different animals.

These are attached to the bones, generally arising on one and inserted into another—They are contracted by operating as pulleys to the bones, the levers of the body, they produce all the various motions of the system—Some of them, though not all, are subject to volition, on the dictates of the mind, conveyed through the influence of the nervous system. Some muscular motions are entirely dependent on the action of the mind—such as the actions of locomotion or moving about—of pretension, as those of the arms, hands, etc.—all those motions which are subservient to our wants or inclinations—some are of a mixed nature, such as an acting without the immediate cognizance of the will, but which can be checked through its influence for a time—these are the muscles of respiration or breathing.
from an action independent of the will, as the action of
the heart and arteries, the respiration or the motions of
the stomach and bowels. No muscle, however, obeys its
action may be, is however independent of the will, is ca-
able of performing its office when deprived of nervous
influence. By dividing the nerves going to the heart,
that organ ceases to beat. By destroying the in-
spiratory nerves, equally fatal results ensue. The
phrenic or other respiratory muscles cease to perform
their offices. But how do muscles contract?
This is a question which has not been satisfactorily
answered. Minute examinations in anatomy have
not been able to detect the mode in that they contract
or shorten by some organization of their fibers is certain.
When a limb is bent, the muscles on that side on
shortening become thicker in their middle portions.
They even contract for some time after an animal
has been dead, that is, in the ordinary accep-
of the term donation after an animal has ceased to breathe, contraction of muscular fibres will be found to take place. As a familiar example of this fact I refer you to the case of a recently slaughtered beef or other animal.

This power has been called vis inertia by some—contractility by others—and some fanciful hypothesis of the phenomena of animal life have been attempted to be built upon this principle.

The trunk of the body is divided into three great pleural cavities, aorta on each side, or cavities which contain what we call organs or apparatuses.

These are continuances which continue either directly or indirectly to nutrition, or to the growth and mainenance of integrity of the organism, as well as the mental and moral manifestations. There are the head, thorax, abdomen. The head comprises the face which contains some of the organs of the senses those of sight hearing smell taste. The cranium or skull
The thorax, chest, or breast, contains the lungs, which are the organs of respiration, and the heart, the center of the circulatory system. Connected with the arteries which carry the blood from the heart, the veins which return the blood to it, and the lymphatics, a fourth set of vessels, indirectly connected with the veins. These last take up the useless blood and part from different portions of the body to carry it to the veins, where they mix with the returning blood, just before it reaches the heart.

From some that system of vessels which produce nutrition, as distinguished from digestion. While one set of arteries are constantly depositing the solids of fluid secretions of the system, the veins are returning the decomposed blood.
of the lymphatics the useless devoured substances, either to be removed by aspiration through the lungs for purifica-
tion of the system, or to be thrown out by perspiration or otherwise.

I shall confine myself principally to the consideration of the circulation of the system, in its connection with nutrition, with some remarks on the influence of the nervous system.

The organs within the cavity of the abdomen will engage attention at some subsequent time. The circulating fluids are the principal factors, the only agents which are effecting the changes that are undergoing in the tissues of the animal organism. They contribute the growth, maintain the integrity, and carry off the wasted useless matter that encounters the system. A general description of the structures and functions of each will be need-
ful to a proper understanding of them.
The fluid called the blood, its revolutions in its vessels, will first engage our attention.

The quantity of blood in the human subject has been variously estimated. It does not come within the limits here prescribed to enter into a detail of all the opinions of authors on this or any other subject. When a fact is stated, it may be understood as giving the opinion of the best entitled to belief, or to the majority of evidence. The most correct, then, of the quantity of blood, is 20 or 30 pounds. or in the proportion of about one-fifth of the weight of the whole body.

The blood is in constant motion. It is sent from the centre or brain, to the circumference by means of the arteries; returns to the centre by the veins. It is therefore con-
stantly moving in a circle and consequently it notig
an called the circulation. But it has two
circulations: one which carries the venous blood
or the blood which has already passed the general-
circulation, does it re-as in the muscles and
and veins of the system, directly to the lungs, to be
changed and returned again to the heart
against the other, the general circulation.

The heart is the main agent in all
the actions. It is situated in the center of the
chest, between the right and left lungs near
the center of the apex, and there and extending
into the left cavity. It is surrounded by the dia-
phragm, a muscle the muscular membrane
partition between the chest and abdomen, or lower-

It is separated from the lungs by being placed
between the doubling of the pleura, or lining
muscles of the chest, which comes up and
forms a division between the lungs. This mem-
brane is known anatomically as the mediasti-
mum. Besides this, the heart has another
membrane covering the pericardium, or
heart case; the office of which is supposed to
be to prevent too great distention or rupture
of the heart, and also, to contain a liquid to
facilitate the motions of that organ. A third
membrane, this provision to facilitate
motion, is not peculiar to the heart alone.
The jointed all parts of the body that are
subject to friction, are provided with a glutinous
deposition to facilitate their motions.

The heart is a strong muscular body.
Some parts, however, are thinner than others.
The arteries are thinner than the arterio-
bles, for a very obvious reason — they receive the
blood at every contraction, pass
it through the valves into the ventricles — while the ventricles send it through their respective systems, or at least, give it a powerful impulse at the common mouth. The heart has two ventricles; the atriales are the superior, & the ventricles the inferior parts of the heart. It is double; or, perhaps, to speak strictly correct, double, as well as the warm-blooded animals, has two hearts — a right, or pulmonary, or that heart which receives the blood from the veins and carries it to the lungs — and the left, or aortic heart or that which sends the whole column of blood into the large vessels, or aorta. The commencement of the great circulatory system.

Though the heart is apparently single — is enclosed in one membrane, to all outward appearances, is one organ; yet, it is in fact two offices two distinct organs — has no direct communication after birth, between the right & left sides.
is divided through its whole extent by a system or muscular & membranous expansion.

From the fact that the blood flows in a circle, it is obviously difficult to say when the commencing. We will, however, commence at the right auricle - the blood of the whole system is conveyed to the right auricle in its return from the ramifications of the vascular system, by means of the ascending & descending aorta. These are large trunks in which are collected all the venous blood of the system from all parts of the body. The blood is raised most black having mixed with its fluid colour in performing the various functions, and are extruded from it in its passage through every part of the animal circulation.

The right auricle is a vacated cavity, formed by a lateral enlargement of the two cavities. The right auricle is another cavity connected with
auricle by means of a foramen ovale. This foramen
is shut by a valve, which triangular
membranes drawn across the ventricular portion of
the hole. While the auricle is filling from the blood
received through the cavas, the ventricle is empty of
equivalent with its muscles, which are somewhat
flexed. As soon as the auricle becomes filled by
the stimulus of the blood, or some other cause
(perhaps the stimulus of distention) produces a con-
traction of its muscular fibres.—The resistance
of the column of blood from above below, as
well as a partial circular formation of the coats
of the lower cavas, which it is not necessary to par-
ticularize, prevent the auricle from being emptied
in either of these directions. The blood is consequently
forced upon the valve, which opens into the ventricle; it
is admitted into that cavity.—The stimulus of the blood
now ejects the ventricle—This contraction powerfully,
The blood is compressed, that is, the valves which shut off the auricle from the ventricle, meet with great force into the pulmonary artery, which carries it to the lungs. After minutely permeating through the lungs, being exposed in very small arteries to the air cells, its colour becomes changed from a dark purple to black, to a bright scarlet, when it is again collected into the pulmonary veins, reaches the left side of the heart, or rather the left heart, generally by four branches, and enters the left auricle to be renewed another course.

The object of the pulmonary circulation is, no doubt, to effect an important change in the blood. When sent into the lungs it has lost its high arterial colour has parted with some portions of its solid and fluid parts of the system, has become unfit for the purposes of nutrition. In addition to this, it has lost the chyle or nutritive principle of food. The lymph or the chromic, solid and liquid parts of the system; the former...
to be converted into blood, the latter to be regenerated by the action of the air in the lungs. In its passage through this process, it is exposed in small minute vesicles and through these coats to the air in the acts of respiration, and is changed from a dark to a bright red colour. How this change is affected, has been a subject of some dispute among physiologists. I shall not enter into this discussion—One thing is certain—the presence of oxygen is absolutely necessary. Experiments have been made with various other gases. The result has always been fatal to life. Nitrogen, Hydrogen, though they possess no direct deleterious effect, yet they will not support life. The colour of the blood is not affected when these are breathed; death supervenes from the want of the proper stimulant, oxygen. It is then for demonstrated, from these other facts, that oxygen is absolutely necessary to animal existence. Indeed no thing, either animal or vegetable, can long exist without
this supporting principle.

The blood, after receiving the nutriment principle
of aliment, by the great trunk of the absorbent, which
is united with the lymph, into the large veins, just before
they reach the heart, and after having undergone the process
of aeration, or oxygenation in the lungs, it is fitted for
the various offices, which it is called upon to fulfill.
The principal of which is nutrition, or operating
those changes which are constantly being effected in
the tissues of all parts of the whole organic system.

The left side of the heart is constituted essen-
tially like the right. The blood is supplied into the
left auricle from the pulmonary veins. The auricle
contracts, sends it into the left ventricle, when this
contracts, throws the blood into the aorta, or great
trunk of the arterial system. This soon divides
divides into innumerable vessels, which go to all
parts of the body.—The number of arteries other
Blood vessels are numerous, commencing with a trunk as large as the thumb, ending with minute vessels almost imperceptible to the view; they in fact pervade the whole body. A slight puncture with the finest needle, in any part of the body, will wound some of these vessels, as indicated by a discharge of blood.

When we add to this, the fact, that there are thousands of thousands of vessels which are too small to admit the red globules of blood, only the second portions; the vascularity of the system will appear, as it really is, astonishing — the attenuated extremities of the arterial system, is what is called by anatomists, the capillary system — and is that system which performs nearly all the operations of nutrition. It is in these extremely minute vessels that the whole process of the deposition of matter is performed. These vessels deposit bone, when bone is required, fat, muscles, tendon, &c., when these are wanted — all the solid parts of the body, as well as the fluids.
gastro-intestinal mucous, saliva, the peripherable fluid. The solid parts are deposited by the direct action of the capillary vessels. The fluids are generally secretions from glandular bodies. These glandular structures are the intermediate agents of the capillaries. Some of the organs which secrete fluids can be seen, but here the ultimate action of the capillaries is as much beyond our ken as it is in those that deposit the more solid parts of the body. We are certified of the fact that the solids of the parts of the system are separated from the blood. That it is from this deposition that the growth of the body is produced, its size maintained. But the machine is too minute for us to examine. Besides, the sanguineous system, the blood vessels, than any other vessels that are subservient to the process of nutrition. These are the general absorbents, or the lymphatic system, as distinguished from local absorbents, hereafter to be more particularly
noticed. They commence at the circumference and terminate in the center. Their office is to take up the useless or non-essent parts of the body by a process which is called absorption. When we say this, we may all suppose on the subject, this mode of action, cannot be seen, however. The certainty of the effect is not, therefore, at all invalided by our ignorance of the exact mode of operation.

But it may be asked, how can a vessel that is so very minute, that it cannot be detected, take up solid bones? We can only judge comparatively of the size of bodies. Matter is subject to division to an extent of which we cannot judge by any of our senses, or perhaps, comprehended by any operation of the mind. It is probable, however, that solid bone is not taken up by the absorbents, but that these vessels, by some mode inexplicable to us, alter its chemical and physical properties, by a species of elaboration, from it into a fluid called lymph.
would be no bounds to the growth of the system.

Thus is, through the whole of life, a constant action of deposition & absorption, composition & decomposition. Upon these are grafted an action of both of these systems of vessels (the dangerous lymphatics) depend, in a great measure, a healthy state of the body.

If the deposition be disproportionate to the absorption, obesity, perhaps death, will ensue— if they are in a reverse ratio, emaciation or marasmus will take place. In youth the former predominates, in adult age an equilibrium is maintained, as well as in a healthy old age.

The lymphatic vessels, like the veins, gradually become less & less in number as they approach the center, until they empty into the veins near the heart, in two trunks. Thus the animal system is constantly undergoing changes. Some part of the machinery becomes worn out—carried away by the
absorbed, and rejected by some of the outlets, while they are replenished by new & fresh depositions. It has been calculated that the whole machine of man, undergoes a complete change in a few years. Some have estimated that every seven years a complete physical revolution in the human system—that every part of the human frame is carried away & replaced in that time.

Without contending for the correctness of the precise time that it takes for these revolutions, yet these general facts have been demonstrated by hundreds of experiments, & it is now a part of the known and certain truths of the science of physiology.

The blood sent from the right side of the heart, after having performed all its functional duties of deposition & secretion, is again taken up by the veins in small veins or capillaries, which are probably nearly as numerous as the capillary arteries. These by most physiologists are supposed to be continuous with the minute
minute arteries that convey red blood. The veins converge towards the heart and, from being small in size at first, become gradually larger and larger, until, finally, empty themselves by two large trunks, into the right auricle of the heart.

From having parted with a large portion of its substance, by means of its distributions and secretions, the blood in the veins, which reaches the heart, would, consequently, much reduced in quantity, were it not for provision to supply this deficiency. A little before it reaches the heart, it receives, by means of the trunks of the lymphatic vessels, not only the lymph, but the chyle, the nutrient principle of food. The duct of the chyliferous system, uniting with the lymphatic ducts, both being emptied together into the veins. In addition to this, the veins absorb watery bodily fluids from the stomach, ballotin, fecal cavities, and so on. Un enumerable experiments have proved that the
Veins, in addition to their office of returning the blood to the heart, are absorbers in a certain sense. I mean, that certain other fluids are received into the blood by absorption through the coats of the veins. It is in this manner, then, that liquids, water, and other substances, immediately introduced into the circulatory system when drunk, this accounts, in part, for the sudden rapid effects of stimulants upon the general system.

Having briefly noticed the principal organs connected with nutrition and life, I am now to examine those interior organs, which in connection with those organs of functions already described, give an impulse to all the necessary actions. So far, the animal system has appeared, as it certainly is, a curious and wonderful piece of mechanism; but without some other power within, inherent in itself, or applied externally, it must remain in action. It is evident that a watch or steam engine, or a hydraulic machine, will not...
In fact in motion, simply by the ingenuity of the perfection of its machinery. The springs, the steam, or the water is absolutely necessary for its motions. In looking at the human machine, we not only comprehend the intricate and beautiful machinery, but we also see the power that operates all its motions - this power (subordinate of course to the great First Cause of all things) is afforded by the brain and nerves, or by what is called the nervous system.

The brain is that large mass of medullary, or fatty matter, which fills the cranium, or skull. It is divided into two portions - the upper or anterior portion, which is greatly the largest, is called the cerebrum. The posterior and inferior portion, which is small, is called the cerebellum, or little brain. These are separated on the outer part,
by a strong septum or partition, but united and connected below. The cerebellum, or summit, and form what is called the medulla oblongata, this being the base of the brain. From this proceeds most of the vessels of the head and face of the brain.

The medulla oblongata becomes smaller, passed through a foramen or hole in the base of the skull, descends into the spine of the neck, and passes through the whole length of the spinal column. Throughout the whole course, the prolongations of the two parts of the brain are kept separate, the cerebrum occupying the anterior or front part, and the cerebellum the posterior or back part. From the brain to spinal marrow proceed that system called nerves. The nerves are white cords, deriving...
their origin either from the brain proper, or the spinal marrow. The nerves are composed of the same substance as the brain itself, but they are covered with strong membranous or coats, called their neurilemae. They are large where they originate, but divide and subdivide in this course, until their extremities become too small to be seen. They were at one time supposed to be tubular, to contain within them a very subtle fluid, called the nervous fluid. As their tubular structure has not been discovered, and no fluid has ever been detected, this hypothesis has, pretty much abandoned. The function of the nerves is that of sensation, or of communicating to the sense organs, or the brain, the common center of the nervous system, those impressions which we call sensations; and also, of collecting
into action those motions which are dictated by this mind.

The large brain, or cerebrum, is supposed to be the organ of the intellectual faculties, or mental manifestations; while the cerebellum is that of the moral manifestations. From the former proceed the nerves which give the power of locomotion, perception, and all those acts which proceed from sensation, either physical or intellective, as well as the Senses proper—from the latter, sensibility, or the impression of given to the mind, of pain, pleasure, &c. &c. &c. As a sensible thing is between these two sets of nerves an intimate connexion—a chain of cause & effect—as an example, hunger is a sensation felt in the stomach—the nerves of sensation convey the impression to the brain.
The brain perceives the impressions through the motion nerves; commands the organs of precaution, as they have been called, as the hand. No doubt be to supply the wants. These comprise the simple operations of the mind. The nerves of motion and sensation are, however, united in their course generally in the brain, where they enter so that there is no part of the system that is not intimately supplied with both kinds. They are, however, distinct in their origin and separation in their office. These facts are recent developments. For them we are indebted to that veteran physiologist, Sir Charles Bell, who, for nearly half a century, has been a conspicuous contributor to science. He ascertained that knowing by dividing the posterior root of the spinal...
serves, that sensibility was entirely destroyed in
the parts to which they were distributed, while
the power of motion was preserved. By dividing
the anterior roots in other animals, sensibility
was retained, but the power of motion lost.

Besides the general nerves already mention
ed, there is a great system, called the sympathetic
intercostal, or spinal nerves. These are situated
within the abdomen—two principal lying on
each side of the vertebra, or back bone, with
frequent variations, by which are called ganglions.
They are connected with the vertebral nerves
by trunks from each, and with slight connections
with some of the nerves of the head. They
give out branches to the vessels of the chest and
abdomen, or to the parts contained within them,
carrying with them fibers having connections with
their functions, to the respiratory muscles, heart,
and the stomach, intestines to contain the cavity of the abdomen. They are, undoubtedly, the source of those obscure motions, which are called involuntary, of which have been before referred to. That the brain moves, are, some how, the organs of the mind, appears to be evident. But how a certain combination and arrangement of matter should produce all the higher operations of the intellect - in what store-house should be laid up all that train of events and circumstances which have occurred for years, with their dates or comparative nearness to the present time - how transactions which have never been presented to our outward senses, should be perceived by the brain and mind - how the brain should pursue a train of reasoning.
duction. Though theories have engaged the attention of metaphysicians for centuries, I yet venture to say, that the facts are now, as to any useful discovery, more totally involved in obscurity, as they ever were. And although physiologists may, in the pride of that intellect, the operations of which they cannot comprehend, propose to defend their favorite hypotheses, yet it better becomes us to acknowledge our ignorance of that which it is not important for us to know, or to submit to the bounds prescribed by him who best knows our true interests. Of the particular opinions advanced by the various metaphysicians on the operations of the mind, it is a sufficient refutation of them all, that they are perfectly contradictory. Of the different opinions of the sages in which the donation of the taste imparts
are conducted by the nerves, no hypothesis seems as well grounded as that which supposes it to be analogous to electricity or galvanism.

But when we admit this, we are as much in the dark as we were before—the electric or galvanic influence is as little understood as the nerves. Some ingenious experiments have been tried to prove its identity.

When a nerve, going to a particular organ, has been divided, the function of that organ has been destroyed—By connecting the two portions of the nerve, by means of a galvanic circle, the function has been restored—Thus indicating that the nervous principle has been conducted by means of galvanic influence. Even in the recently dead body, the effects of galvanisation are wonderful, producing, when applied, to the nerves of the foot,
most violent contractions of the muscles. Some interesting cases of that kind are detailed by Dr. C. M. may be found in Dangeois physics. Vol. 2: page 315 & 316—Strong & laborious breathing was induced on one subject, and on others violent contractions of muscles of the side, large vessels of the face. In one case rage, horror, despair, anguish & ghastly smile united these. Horrible expressions in the sufferer’s face & the end of the operator’s arm forced to leave the room. Others—painting.

Having examined those organs & muscles which unite form the animal organism & give to it sensibility & motion, I shall inquire very briefly, what life is, or rather in what part of the system does it exist? To say that it is the result of organization, or the effect of a certain arrangement if
matter does not give a satisfactory explanation, for the circumstances frequently exist without rendering the presence of life as, for instance, in the recently dead body. It is the declaration of the Scriptures. The older Physiologists say that the life of the animal is in the blood. The Jews were required to offer blood as a sacrifice, to abstain from eating it. Under the Institutions of the Jewish Church, the life of the animal was taken away by bleeding it to death, and this life, which existed in the blood, was offered as a sacrifice for them done instead of their own, which they had forfeited by their transgressions.

It will be recollected, however, that the doctrines of the life of the blood was only incidentally referred to by the Divine Lawgiver
with the view of inculcating the necessity of abstaining from its use, as an article of diet.

The great truth that "without the shedding of blood there is no remission of debt" was
one strongly enforced. But I was perfectly willing to take this, as well as every other declaration of Scripture, in its broadest sense, to say that the life of the animal does exist in the blood, and that without it life could not be sustained.

I contend, however, that it is not the whole cause of vitality—else, I should deny the divine agency of the maker, himself, for it is by him that every moment of our being is sustained.

It is certain that a large abstraction of blood will destroy life—be with the abstraction
of caloric, oxygen, or nervous influence.

If vitality exists alone in the blood, it strikes me as being necessary for the advocates of
this doctrine, that they prove life to exist
under every circumstance, when the blood
is detained in the system. This they cannot
be, for such is not the fact—death more
frequently occurs from other causes than
from the loss of blood. This is too evident
to require argument. We are daily
surrounded by proof. Besides, death
frequently takes place from too much blood
from effusion, apoplexy, etc. Here, ac-
con- ding to this theory, death is produced by
too much life. How common is it that
the whole phenomena of life are elevated
by the loss of a quantity of blood—and ar-
we then to be told that the abstraction of life
from the system is to promote the life of
the system? Blood, in itself alone, is in-
capable of preserving its own life. It
depends upon other influence to preserve its fluid state—probably the nerves. A sudden impression upon the nerves of this system, will destroy life more quickly than the most rapid abstraction of blood, even when not a particle of that is lost. The division of the Spinal marrow, that great prolongation of the brain in the neck, will produce instantaneous death. The truth is, the nerves of the blood vessels mutually sustain each other. Without the nervous system, the heart could not make a single pulsation; it without the circulation of the blood, the nervous influence could not exist.

But I will not pursue this subject any farther at present; but say, in conclusion, that I am willing to take the word of work of Him, who can neither lie nor err, and
Who has declared that he "breathed into
man, the breath of life"—it is in him we
live, and move, and have our being. That body
is a machine, susceptible of a variety of
motions and actions, and endowed with power
from on high to perform these motions and
actions. The difficulty in accounting
for the higher operations of the intellect,
as distinguished from the mere animal
instinct, induces me, in addition to the
more certain aids of the Scriptures,
to conclude that man is a combination
of matter & mind, or, if you please,
of body & spirit.