Thesis
On
The Correlation of Mind and Matter
and the
Physiological Consideration
of the
Nervous centres.
by
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1868.

Value of incense - Nithing
original. I applaud your
use of black in coffins and
snow for ornament. Here are
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SKETCH OF THE BASE OF THE BRAIN.
On the Correlation of Mind and Matter and the Physiological Consideration of the Nervous Centres.

Psychology is the science of mind. Physiology is the science of life, and all who recognize the former as a science, declare its aim to be the elucidation of the laws of thought, the nature of the soul, and its prerogatives. This science may seek important means of investigation in the laws of Physiology, just as Physiology itself, must seek important aids in Chemistry and Physics. But as an independent branch of inquiry, its results cannot be held amenable to physiological canons; their validity cannot be decided by agreement or disagreement with physiological laws. For example, Psychology, announces that the mind has different faculties, and that each of these faculties may have a temporary exaltation or temporary suspension. This fact seems established on
on ample evidence, and is valid in Psychology, although hitherto no corresponding fact in Physiology has been discovered, neither the anatomy of the brain, nor any knowledge of the brain's action, can be adduced as furnishing the evidence; and if Psychology were absolutely amenable to the conclusions of Physiology, we should have to doubt one of the most indisputable of Psychological facts. On the other hand, it is no less certain that the Physiology of the nervous system must be studied free from all control on the part of Psychologists.

The object of the Psychologist is very different from that of the anatomist or systematic naturalist. To the latter, a difference is everything. All that he wants by way of characteristic is some fact or feature in the object under investigation, which may be peculiar to that object, and hence he is content to give as the characteristic of man, the fact that he is a two-handed mammal, for this marks him off from Monkeys, which are four-handed, and from all other Mammals which are four-footed. The entire animal creation is as it were but a pre-existence of nature for the final introduction upon the stage of man, as
as the species who should resume and represent the whole animal kingdom, and while he should bear the image of the earthly, on the bodily aspect of his being, should bear also the image of the heavenly on its spiritual aspect.

Man is not a ripening organism, but a peculiar being, having relation both to the past and to the future, and an interest both in history and prophecy; because time, eternity, and man belong to God, who uses them all for the manifestation of himself. Hence there can be no bound to man's capacity, for intelligence, nor limit to his life.

We are justified in believing the statement that man was expressly created in relation to his Maker, rather than that he was developed from an inferior creature. We cannot, however, question the fact that Omniscience is at work in all the universe, diffusing life, and mind, amid innumerable beings; none of which stands alone, and among the minutest of which not a feeling is awakened that is indifferent to the heart of the creator. It is through man that the unity of nature is revealed, and the
loving Kindness of Omnipotence made manifest.

If we may judge from the more recently imported specimens of scientific surmise, concerning man's derivation, there appears to be no such great improvement in the theory of development, as will serve to account either for our hopes or our fears. The mere fact that we are conscious beings, that can think of the demands of Duty on our consciences, is however the only omission in the Scheme - Polarization and matter being given make a man, says the Physic theorist. There is the difficulty, the materials may suffice to form a body, all we want is the soul; in short the theory fails in its working, and gives us the man all but himself.

Some recent Philosophers ascribe the production of man from the Protogod, and as having passed through all the intermediate types of the animal Kingdom, from this, they assert all organized beings have originated, and by self elevation issued forth into higher organisms. Thus creative will is dispensed with, and man like all the rest of moving things grew up of his
his own accord from the Protozoa or Mollusca, but there stands the word, and there the fact, "Male and female created He them." If it could but be proved that there is no personal God, and that he did not create male and female, this thing would not be half so wonderful; but that with the definite mixture of heat, light, carbon and water in some certain time, and certain place, two of each kind, male and female, of all the myriads of animated beings should have sprung up as a natural matter of course, and that only once, is very marvellous indeed, since we can see no reason why what has emerged from the lowest types of animated creatures into man, cannot do so again. The Potrid mucus of the mighty deep is under as favorable circumstances for developing and forming man now as ever.

The first man, the man of earth, a terra terrens, was in his outward existence, fashioned and conformed with the materials of this objective world, in bodily keeping with the order of the elements, from which he was to derive the sustentation of his physical life, and those impresions which should excite in his soul ideas.
ideas and experience raised erect from the ground, as if by the hand that formed his body of the dust, he stood forth, mature and perfect, exquisitely organized to be the fit inhabitant of the Paradise prepared by the Almighty on purpose to prove the greatness of his goodness, to his most august and stupendous creature. The spirit of animation, the very breath of God, kindled every fibre of his frame. I constituted within it a distinct selfhood, a being of thought and will. Gradually the life within him opened the avenues of knowledge, and as he stirred and felt, motion and sensation seemed one with himself as a babe tenderly nestled by its mother's living heart, finds everything around it so thoroughly arranged, to meet the demands of its awakening mind, that nothing jars upon its senses, so man by degrees awoke to the presence of his prepared place, lapped in Paradise, with nothing wanting to the growth of his soul in knowledge and bliss. All things were so consistent with his nature, that surprise entered not admist the expanding harmony of his enjoyments. The light tempered in heaven, touched with the gentleness
gentleness of God's own finger, the fine sensitive nerves of vision, even through his sealed eyelids, so as to cause them with an involuntary action, to open of themselves like the petals of a flower, and to admit into the soul, as at one draught, the whole Paradise of Sight. Thus man seemed united to all he saw; and as one that dreams of peaceful glories, the scenes around him appeared but as if formed by his own spirit. Man began to reason, and then God met him, and that in such a manner, that he needed not to be told who was his Maker. The Almighty invested man with authority, and imparted to him power to hold dominion over all that moved on earth and air, and sea; because he understood by converse with divine intelligence, why and for what ends all were created. Thus the contemplations of his mind, in primeval Paradise was actively engaged in dividing and multiplying blessings, and therefore he felt that life was blessed—he loved to live, because he lived in love; but he still needed a reciprocity of affectionate intercourse, and a fellowship in worship and authority. From his own flesh a help was formed.
formed for him by the finger of his Maker, for God knew that man required more than to reign alone, over a dumb world, in order to the completion of his blessedness, since finite reason without a corresponding heart, would need no tempter to turn the Garden of Eden into a solitary waste. God in his goodness consummated his gifts, and brought to man a being that might lean upon his bosom, and with kindred love claim to speak with his heart. But human nature was intended to be the revelation of Omnipotence, and therefore with all its duties came also danger, and with every good the possibility of evil. Man choose to partake with woman of the vain hope of living independently of God, for knowledge and for wisdom. He loved the best creature that he could love, more than he loved the being who gave him that object of his heart, and woman wished to have something to confer on man besides herself and her love. He forgot that he was bound by the very terms of his existence to hold all his affections in the sanctity of obedience to the loftiest love, and so forgot that love was better than knowledge.
Knowledge and dearer than life. They were created under law, they felt, they thought, they desired, they acted, they reigned under law, and the happiness of their actions, proved that the law of this creation and well being was the benevolence and love of the creator towards them. As man, intelligent being there is much dispute about the words, spirit, and matter, but what we want is meaning. Probably all men understand by matter, something capable of impressing the senses, something to be estimated in physical principles. Now that which thinks and wills cannot be perceived by our senses, nor have its properties and forces tested by physical means. He cannot see thought with the eye, like light, He cannot cause it to travel by a wire like electricity. It is something more subtle than either, but yet it operates on matter and causes it to impress our senses, and thus presents a visible expression of the ideas in our mind.

Physical law is an ordinance that has nothing to do with obedience. It is irresistible and yet capable of being altered by Divine determination; so that the visible Universe
Universe might cease to be what it is, but
moral law is unalterable, because it expresses
the character of God himself; and therefore we
may infer that the beings to whom it applies
are also indestructible, but of course only because
Divine will constitutes them responsive with
respect to the Divine attributes. That which is
born of the spirit, is spirit. God is a spirit, not
the energy of a being, but energetic being itself. The
spirits of just men made perfect, are perfect
men, and so with regard to beings of every order,
to whom the word spirit is applied. Thus man is
proved to be a physical being by his mental faculties,
and these prove themselves by the mode of their
operation, and their motives to be essentially
spiritual, in distinction from physical.

The term soul again, as employed in
the New Testament is most peculiarly significant
of a conscious individuality. Though it is often
translated life, mind, and heart, in accommodation
to the English idiom, it has always a personal
property and power, and it is evident that it
was understood by the Apostolic Writers to mean
something besides bodily life, or anything pertaining

to existence, limited to earth, since it is mentioned in reference to a continuance of being, after the death of the body. Thus our Lord says "Fear not them which kill the body, but are not liable to kill the soul" and his disciple says these emphatic words "I saw under the altar, the souls of them that were slain for the word of God." (Rev. xi. 9) "I saw the souls of them that were beheaded." (Rev. xxi. 4). Hence we cannot mistake the intention of the writer, since whether the language be figurative or literal, it is clearly meant to state, that those spoken of were veritable men, notwithstanding they had died.

In insisting on the spiritual existence or mental nature of man, we would desire to guard against conveying the notion, that material existence is contemptible. That God is the maker of both souls and bodies, is sufficient to give dignity to both; and that the fact that every being, but the infinite must be localized, is sufficient to prove that human beings must be corporally accommodated with media of action and manifestation, in whatever sphere they may dwell. In whatever aspect we view it, we only realize that Mind with all its obtrusiveness is...
is as much beyond our comprehension, as the essential nature of the deity himself. We know however that the soul of man, is of a higher nature than the grosser elements that compose his body. It is that which preeminently distinguishes him from all other forms and orders of animated beings, places him on the highest vantage ground, as inhabiting one common earth, but possessing little or no community of mental nature with the beasts that perish. It is what renders him what he is in the Universe, the paragon of created beings, and accepted as a fit companion for his God.

The science of medicine cannot well pretend to cope with the mysteries of Psychology. Many of those mysteries will most probably remain unsolved. The contemplation of human nature may be fairly regarded as in a manner sacred, for its functions are the parents of all our social and domestic pleasures and enjoyments. It is the grand instrument of feeling to which life owes all its interest, it is, in a word, that which makes man what he is in the Universe, that by which we contemplate the
the existence of our very selves as rational and accountable beings — that by which the principles we embrace, and the use of that pious will of freedom which has been awarded to us by God, that renders us useful or useless — happy or miserable in time and in eternity.

We must consider man, not as an insulated individual, but in the relations in which he actually exists, for if we regard his mere power of believing, and his perceptivity as facts of relation, how much more must his reason and his reasoning powers, that of thinking and believing the facts of relation. Moreover of all the relations in which man stands, it is obvious that when we are seeking for an explanation of the higher endowments of human nature, we may look with most hope to man's relation to God. The physical and the moral worlds, acknowledge the wonder achieving mind of man, creating new forms of beauty and loveliness wherever he goes, strewing (as it were) new flowers in every path he treads. Look at the vast changes he has wrought on the face of external nature, the deserts he has reclaimed and cultivated.
to minister to his necessitites, the beautiful fabrics he has produced whereby to clothe himself, and the gorgeous mansions he has reared & decorated for his abode on earth; and not only does he exercise a control over the grosser and more passive materials of the earth, he also subjects the elements themselves, and makes them the slaves of his caprice and pleasure. The efforts of his mind, and the immensity of his genius can control the flashing elements of the Heavens and render them obedient to the prerogatives of his will, he has linked the nations of the earth together, and with a wise he has girt the hemisphere of the world in intelligent and marvellous communication, he has plunged the electricity into the depths of the mighty ocean, and has there rendered it the medium charged with the quickness of thought, of communicating with his fellow beings, thousands of miles apart, indeed all the mechanical arts, all the great achievements of science, in fact all those actions that have conferred benefit upon our common race, or brought evil and desolation upon the world, may be regarded
regarded as the manifestations of his mind. The impetuous torrent rolls its waters to the main but as it dashes o'er the mountain cliff, man's voluntary actions are capable of withdrawing it from its course, and rendering its powers subservient to his will. Ocean extends o'er half the globe, her liquid plain, in which no path appears, and the rude winds of heaven, oft lift her waters to the sky, but there the skilful man may launch the strong, swift, barque, spread forth the canvas to the gale, and make the boundless deep, a highway through the world. Witness also the changes he has brought on the moral scene; the laws he has established, the beautiful relations of social and domestic life, his attachment to the sublime and beautiful in religion, in nature and in art. Many distant lands unvisited by human foot he has explored, the wild inhumanity of his brother man, he has endeavoured to reclaim, tendering the kindest sympathies of his nature, and seeking to emulate Him who took the name of man, and thought it not beneath his dignity to call us brothers, the man Christ Jesus. Time and space have
have all but annihilated by the wonderful achievements of the human mind. We are whisked along with the speed of thought, by the agency of a weird, like power; and like an arrow pointed and strong, the lightenings convey his behests, with the power and certainty of God. In a word, the grand and characteristic birthright of man is thought, that power by which he finds "tongues in trees, books in running brooks, sermons in stones, and good in everything." That power by which he looks through Nature up to Nature's God, by which he can investigate his own marvellous nature, and study the miraculous connection existing between mind and matter.

In fact, Musicians think our souls are harmonies.
Physicians hold that they complexions be.
Epicures make them swarms of atomies
Which do by chance into our bodies flee.

One thinks the soul is air: another fire:
Another blood diffused about the heart:
Another saith the elements conspire.
And to her essence each doth yield a part.
Some think one general Soul fills every brain
As the bright Sun sheds light on every star,
And others think the Frame of Soul is hair
And that we only well-mixed bodies are

Thus these great clerks to their little Wisdom say,
While with their doctrines they at hazard play.

Having considered the aspects and definition
Mind, and the physical relations of matter,
We shall now consider those mental manifestations
Which distinguish the power of intellect
Or mind, over the corporeal body.

The living organism is then between objects and the soul; In this it is divisible into two principal parts. Actual enabling the soul to investigate object and to evince its feelings. If we will to put the foot for instance, it is done in the quickness of thought, and the impression ours. Such is the velocity and instantaneous nature of spiritual action, even through medium of matter. The motive power of this in its action on the limbs, and also the sensorial faculty.
faulty associated with this motive power are demonstrated by the physiologist to reside in the brain and the spinal cord, as the great centres of the nervous system; and therefore the ability of the human spirit to perceive and to act through the body must mainly depend upon the integrity with which these nervous centres fulfil their office. It is manifest that disorder of sensation and of muscular action must result from disease in the nerves, as in the progressive muscular atrophy of the hands, a case of which we saw recently under the care of Dr. Laycock. This disease was long held to be a muscular lesion, but Dr. Lockhart Blanke has clearly shown that it is due to a molecular degeneration of the cord, manifesting itself in the muscles of the thumb.

The mind operates with nerve-matter, the will causing currents of energy to be excited in different portions of that matter, according to the purpose of the mind in attending and acting, so as to induce a state of muscle and nerve in keeping with the state of feeling; and of course, therefore, disorder in the materials of
of mental manifestation disorders the manifestation itself. We are indebted to medical psychology for this knowledge; but reason, without the help of physiology, teaches us with sufficient clearness, that the personality of a human being does not consist of nerves and muscles subject to physical derangement, but that there is something superadded to this organism which through it perceives other things and expresses itself. This something is, as we have shown, the true man, the soul or self, and every influence, either from without the body or within it, affects him as a personal being related by creation to other beings; and, therefore, the most comprehensive method of studying the endowments and destiny of the mind, is to investigate its personal relationships, and their influence upon individual character and experience.

As regards the "doctrine of ideas," disputes are endless. We are quite content, however, to believe that thought is the soul thinking, and ideas are but states of mind, or soul at work under the impression either of present or remembered objects. Emotions in man
man are connected with ideas, and, in proportion to the vividness of thought, be the feeling associated with the thought, of course according to the state of the body and the habit of our affections. We will, however, involve ourselves in the most metaphysical disquisition concerning affect internal and external, and faculties definite and indefinite. With regard to the habit of viewing the mind as so many distinct parts, we may say, with Locke, "This way of speech has misled many into a confused notion of so many distinct agents in us, which their several provinces and authorities did command, obey, and perform several actions, as to many distinct beings; which has been no small occasion of wrong obscurity and uncertainty in questions relative to them." We would not quarrel with the who, in studying mental manifestations, divide these manifestations, as if distinct to the mind itself; things must have nomenclature to be scientifically considered, but may well object to a nomenclature that instead
instead of indicating the mere instrumentality of
organization, represents the organs as one with
the faculty evinced through them—and thus
not only divides a man into thirty or forty
imaginary cerebral sections, but makes him
nothing more than a piece of mechanism,
with about as much responsibility as a
locomotive or a mill. In discoursing of faculties
or susceptibilities, we only refer to objects of sense
or of thought, and to their effects upon us;
for all our experience, either intellectual or
emotional, depends on the nature of the mind
in relation to other beings. When for instance
the benevolent man sees another injured, it
is not a sentiment that is sympathetically
pained, but the man himself, who according
to his character, exerts his faculties, and, like
a good Samaritan, sets about relieving the
sufferer, for whom he feels, because constituted
with a nature in like manner susceptible
of injury and suffering. It can only be a
willing being that can respond to the will
of another. If a man obey the known commands
of God, it is not a faculty of conscientious
and
and veneration as powers operative of themselves, but a soul that is conscientious, and venerates and obeys.

A man acts either from instinct, which relates to some bodily necessity, or else from some purpose having respect only to the mind. The motive of organic sense is instinct; the motive of mind is reason. Man combines both in his present state; his organism supplies physical impulse, and his mind operates partly in obedience to bodily appetite, and partly for the attainment of some spiritual advantage, which he expects only because he has affections and faculties which cannot be satisfied without the interchange of thoughts with other minds.

All that man can really recognize as truth in the doctrines of metaphysics, he must know from the study of his own mind. "Know thyself" is however, a maxim too deep for men in general, and we are all apt to wander in a barren waste of speculation, and rather bewilder ourselves with the mirages of a weak imagination, than quietly draw water from the fountain of truth, or sit beneath the tree of life, and eat its fruit with a thankful heart.
A feeling of personal identity is, of course, dependent upon the will of the Almighty; but it must, in the nature of things, imply self-consciousness; for that which does not feel its own existence, cannot be aware of the existence of other beings. It must also imply successive impressions, or successive states of consciousness, and the power of recognizing the difference between them; so that memory and comparison are essential to conscious selfhood. All our passions, emotions, and reasonings arise from the consciousness of self, in relation to objects as remembered things. Hence knowledge, habit, and physical condition are the only causes which modify man's affections. On the affections is founded all we conceive of agreeable or disagreeable, and desire is but the state of the will with regard to what we know and feel, for we cannot desire, for its own sake, what is merely painful, nor avoid for its own sake, what is pleasant. If we look beyond immediate gratification, it must be from attachment to some other being, or for the sake of qualifying ourselves the better for companionship with what we love, or because we fear the consequences to ourselves.
ourselves in offending the being who has the right to command and to punish us.

There is an inherent relation of our souls to certain objects, for without any previous knowledge we are at once affected, either painfully or pleasantly, by their presence. Our natural attachments are born with us. The visible and audible expression of strong emotion, in any creature, affects our nerves in such a manner as to convey its own meaning. This susceptibility to emotion, irrespective of intelligence, is properly denominated affection; and as no training can have produced this, so its manifest it must be the especial ground of all the ideas which occupy man's mind. Whether true or false, good or bad, a man's ideas will be grouped and associated according to the qualities of his affections, or the adaptation of his soul to objects as capable of awakening like or dislike, love or hatred. These feelings express the intrinsic quality or condition of the mind, and therefore if we know a man who intellectually perceives the beauty of any truth, without being moved by the love of it, we at once see that the love of that man is engaged in a manner not approved by his reason; he is in a perverted and
and profane state of affection, and cannot be brought into an appropriate disposition of mind for seeking eternal fellowship with the intelligence that is one with goodness, until he has undergone a process of rectification by teachings and trials, in connection with whatever affection may have pre-dominat'd in his heart to the detriment of his conscience.

Man is so apt to overlook the unity of his being, that it is quite common for him to lose all feeling of responsibility, by supposing himself a compound of incongruous parts, over which he has no control. Heathens, giving form to their fancies, and outward expression to the state of their minds, have, in all ages, carved their own characters in marble or in wood, and have deified their own affections, desires, and ideas, by making them visible in all imaginable combinations of beauty and hideousness. Having thus rendered poetry into sculpture, and made feeling a permanent presence, they fall down to adore their own conceptions. They divide their divinity, by personifying their own lusts, and think they see a God, when they behold an image of themselves;
thy people theemporium with heroes that outrage humanity, and crowd their heaven with horrors that earth can scarcely tolerate.

Perhaps a disposition has always existed in human minds to represent their own feelings as different from themselves, and therefore it is no wonder that, in this respect, the philosopher but imitates the savage. A modeller of minds here and there demonstrates his natural status by presenting us with casts of his mental faculties and affections as distinct from himself, but resident in the molecular structure of his brain; while the savage, with equal ingenuity, evinces his mental condition, by attributing the powers of his own soul to insensate substances, which he calls gods, because he is not natural philosopher enough to know that bodies do not act without spirits residing in them. Philosophers of the more material kind settle their inconveniences by arranging them in opposite compartments, like prisoners in a penitentiary. There is, however, this difference in the cases; in the penitentiary each individual inspects many others, but the philosopher distributes himself in fragments through a multitude of darkened cells, and thus disposes of his faults and
and his faculties together, while the individual is lost, and the mind is nowhere. Others would
analyse intellect and volition, as they would the soil, and having separated its elements,
and set them aside, they wonder what we mean when we ask them what they have done with
the soul. The ego has been so complacently busy
in research as to forget itself; and the man believing
only as he works, through his eyes and his hands,
observes that, having submitted humanity to a
dry distillation, he finds no residuum, but a
caput mortuum of dust.

We are strangely taught, by some
of our best ethical writers, that desires and affections
exist without volition, but unless they mean more
than their words signify, we cannot understand
them; for where is the desire without will, and
where the affection that is neither pleasing or
displeasing? This must be excited in every manifesta-
tion of itself, for all we feel is but the result of
the correspondence between the sensitive soul and
its objects, and if these be so indifferent to us as not
to produce volition, we must soon lose sight of
them, and, falling asleep, enter the world of dreams.
God has given us all something for the exercise of whatever faculties we possess, leading us on in thought from the deficiencies of the past and the present to the fulness of the future, that we may be conscious that we hang upon His unfailing Providence for all we have and all we hope.

Let us not suffer ourselves to be beguiled out of our birthright as intelligent beings, by the vapoury modes of speech invented by the noisy order of metaphysicians, or the more mechanical surveyors of our brains; but let us remember, that whatever the peculiarities of our mental manifestation we are still individuals, and not complicated thinking machines. We hear, feel, see, taste, smell; we desire, hope, fear, confide, flatter, delude, we compare, reflect, reason; we exercise intellect and feel emotion; we sin; we suffer; we live for ever; and we need a Saviour, that knows our nature in all it is, and all it can be, and who is capable of providing for us according to the vastness of our necessities.

Superinduced upon the vitality of his physical framework, man, in his present state, has two modes of psychical manifestation, which
which distinguish him from Animals. He is capable of living in an ideal world produced in his mind by the impression of exterior objects, and he is capable of enjoying thoughts which the material universe could not engender or suggest, unless to a reason enlightened by underived intelligence. Man is the prophet and the seer, the expositor of nature, the student of events, the only being on earth that concerns himself with the plans of Providence and the prospects of the future. And while he voluntarily dwells upon his own past for the renewal of its pleasures, or to indulge in the luxury of recollected sorrow, he feels called on to look further back, and forward, and around, not as if he were alone the subject of his own insight, but as if the inheritor in spirit of all that has been accomplished and all that is to come. It is true that he alone beholds the autobiography of the heart, and sees written in his memory, as in a book, the indelible record of his life. But his individual experience is but a small part of his treasury of facts; he glances in the retrospect of thought, to witness as in a moment of time, and as in a living panorama spread before the eye of
of his soul, the grand lessons of history, as the
special science of his race, in respect to the promises
and providence of God; he mingleth in imagination
with the generations that are gone; his heart glows
at the songs of bands two thousand years old;
his nerves thrill at the eloquence of men that
can never die; his spirit is kindled by thoughts
that have passed from soul to soul since souls
have been; he sympathises in the struggles of
human spirits valiantly labouring to be free, and,
while truth brings the liberty of knowledge and of
power, he seems to join the nations in their
welcome to the light; he weeps at their griefs, and
laughs when they are glad; every utterance of humanity
affects his own heart, like a familiar interest,
and he feels the touch of Kindred and of love
that vibrates through all time; he trembles in agony,
to behold mighty souls losing their way and
 groping in the darkness of tradition, and feeling
after God without finding him; and if a Christian,
he burns, perhaps, to speak of Jesus to Pythagoras,
to Plato, and to Socrates; and, to satisfy his
hopes, expects to find them learned in the word
of God and glorious in his Kingdom. Thus the
human
human soul can take its part in all the progress of its race, go back, as if with Milton, to the beginning, when "the heavens and the earth were out of chaos" associate in soul with the first Adam in his perishable Paradise, and then, deliberately looking through all the passages of a fallen and redeemed world, go forth in the strength of an unfailing faith to meet the second Adam, the Lord from heaven, returning to establish amongst men the immovable dominion of righteousness and love.

Man's character is formed by his ideas—those which he has in common with inferior creatures—the mere reflex of nervous impressions; those that are purely human, rational, reflective, but limited to natural or physical objects. Those that are revealed and divine, and tending to bear the soul onwards to futurity, in consequence of what it perceives as the moral necessity of its own existence.

Perhaps there is not a being in human form so unhappily associated or so miserably uninstructed as to live entirely in the lowest or brutish state, unless from necessity, as is the case of certain idiots, who can obtain no associate ideas, in consequence of
of some defect in the organisation of the brain through which the soul perceives. The relation between thoughts and things is lost in such cases, because the soul cannot rest upon sensation so as to make comparisons distinctly. Perfect idiots can attend to impressions only so far as to act instinctively; they are, therefore, removed beyond the pale of humanity, excepting as they serve to excerce our faith in Omnipotence, and lead us to look forward to the manifestation of his benevolence in the emancipation of souls from the imprisonment of incommodesious and impeding bodies.

It is manifest that when the mind has not the power or opportunity of working, whatever of the inferior cast belongs to human nature will then operate unrestrained. The history of idiots is a doleful illustration of this truth, but yet, like every evil, it points to good, and calls us to exercise faith in God, as the provider of means against misery. Idiots prove the debaseing influence of neglecting humanity. Even in its worst forms, it is still somewhat amenable to kindness and to skill. Whenever a human soul can be reached by another so as to feel a good intention, there is an imparable
improvable being. As long as the organisation of the senses and their associate brain are not so imperfect as to prevent connected attention to objects, it is in the power of one man to elicit the light hidden in another; and many men, seeing this, have set themselves with patience to the task of redeeming idiots from the hideousness of confused instincts, undirected and without aim. At the institution at Carberry for this class of unfortunate beings, we can realise the vast benefits derived from an excellent system of training of their intellect, however depraved it may be. By persevering efforts in attracting and fixing their attention steadily and sympathetically to the actions of their teachers—teachers, so to say, by contact multitudes of such forlorn beings have been brought into smiling association with humanity and reason; thus proving that those left to neglect and ill-treatment must be the pests and terrors of social and domestic life, until the unconquerable philanthropy and practical wisdom of the Physician is brought to bear upon them and bring them forth from degradation into rational relationships. If asylums in general and especially for idiots had done nothing more...
than teach us that gentle and affectionate nature may lie completely concealed under disgusting coverings, they had done much; but they have also taught us that the might of experience in mental science, with patience, sympathy, and kindness is greater far than the world yet knows. They have, moreover, indicated how much may in general be done to restore human nature to its right place, in guiding and controlling the diseased mind, and from a competent knowledge of the brain's functions, and duly exercising the wise experience of medical psychology, they show how mental and physical incapacity may be restrained and governed and remedied, as far as man may be remedied.

If the brain be not so diseased or deficient as to preclude the soul from attention, though it, moral education is probably always possible. A superior mind asserts its power, first by controlling its own impulses, and then by the orderly purpose of action in visible self-management, sympathetically governing the minds of others also. Thus by persevering determination in regulating muscular movements, by bringing the senses steadily into use, and by exercising the will intelligently in
in every action. M Sequin, and others on his plan, have succeeded in training the most unpromising idiots into conscientious agents. Science of medical psychology, and the philanthropy thus beautifully and wisely at work, opens to our view the vast benefits derived from mental discipline under judicious treatment; it has demonstrated that mind rules mind most effectually by asserting its right, and indicating its wrongs, so that none can be lost to improvement who can be brought into willing obedience, and that this obedience, or yielding of self, is induced by the visible and constant interest manifested of the Physician in governing the governed. Here coercion fails; even with an idiot; the mind is not brought out into intercourse, except by a strong will dominating over it by engaging it agreeably. The state of the body is a state of will, in as far as it tends either to pleasure or pain; and if the mind be perverted by an ill state of body, the only way to recover it from wrong desires is to command attention to other perceptions than those produced by the disorder or ill condition of the body or of any of its organs and functions.
a new state of will must be induced. This is exemplified to the full in the treatment of the perverted and disordered idiot. The first exercise is to govern the idiot's muscles for him, by the teacher putting himself completely in the idiot's way as, so to say, his only object—All the senses that poor imbecile may possess he confines to his own movements; he masters the forlorn being, by infusing a new will into his limbs; he takes hold of them gently and firmly, and slowly moves them, as he wishes, consecutively, and for the attainment of certain ends. Thus the mindless, purposeless pupil moves with his master, until his muscles are educated into associate action. In short the teacher adopts the only method of in such a case to obtain any degree of fellowship, and thus he draws out the idiot's mind into consistent action, as far as possible, with so inconveniences an organization of brain, nerve, and muscle, as an idiot existence implies. And all embodied minds must be reached and mild on the same principles—the will of one must be brought into relation to the other physical help; there must be cooperation until there is established
established sympathy; and then, where sympathy is established, if mental development & manifestation be not a physical impossibility, an order of kindred thoughts may be conducted through one mind to the other, and that moral intercourse will result for which reason exists and language is given.

The exercise of memory is generally the chief part of excessive education; but this is really the least important in itself, and we hold the system of cramming for examining Boards as futile in a great measure; for if memory alone be cultivated, a man may learn to have no thoughts of his own, although as full of words and facts as an encyclopedia, hence how so few voices are heard, but so many echoes. The intellect may be quickened into such intense activity, memory as to be ever busy with associations and comparisons, and even to be poetically and even mathematically insane, but yet make no progress in practical truth. The man of large remembrance may be not a whit the more superior in intellect or the more useful to society for all his crammed knowledge. He may be only
a man of semi-ideas after all - a mere psychological curiosity, unless he learn to regulate his mind and mode of studies to be useful in after life to mankind at large. Neither are religion or morality ideal things. We recognize, indeed, most fully the fact that man is a psychical being, a soul; for physical senses and frameworks would be useless if an operative and perceptive agent were not engaged through them in forming ideas - objects and sensations can never become thoughts but to a thinking being. But a man must perceive and understand his relation to objects before he can justly reflect or properly feel. Thought is altogether wide of its purpose, but as from an intuitive sense of the fitness of other created things to the individual mind - without this the symbols of thought are never interpreted, and the senses serve only to awaken impulses that have no meaning beyond those of the idiot and the brute. The human being must be taught to perceive and feel his relation to other intelligences before his moral nature can be developed. He must be drilled as well as disciplined. His will must be brought into coincidence with others; he must
move with them as well as reciprocate their affection, before there can arise a sense of duty or a disposition to act with respect to another claim upon his conduct. Free will does not begin to be evinced until the mind perceives this duty, and until then moral consciousness is not awakened. The distinctive attribute of man, plumb, until the mind is conscientiously cultivated by practical lessons, or by the embodiment of good thoughts in good actions. If a man have never seen any but malignant or evil passions at work, how can he have a good thought? Human minds must not be judged by the heavenly standard until they have been brought under Divine doctrines, and that not in abstract terms, not in words alone, but in words interpreted by the language of life, by example, by excellence made visible in deed, just as the Son of God taught the bewildered sons of men.

There are many among men so satisfied with the brutal kind of accommodation that they forget that blood, nerve, and muscle were placed in relation to the human soul only to subserve it with means of learning truth.
truth and of exercising evil, so as to prove that mind is eternal and irresistible when in the possession of ability from God to believe in divine goodness, and thus to conquer evil. These men have in their souls biased by depraved habit, proper what they call sense, and so modify their reason with the constancy of their search for pleasures of sight, sound, taste, and touch, as not to allow ideas of a higher order to remain before the eye of the mind, or even to enter on the field of their perceptions. Their Paradise is not merely one of fools, but of idiots, since to be quite fit for it men must content themselves with the grossest bodily sensations.

A third class are on earth, but are they comparatively few?—whose ideas are not all convertible into dreams and phantasms. There is a reality of life about their men as regards the purposes of their minds, which will not suffer them to limit their attention to images of objects merely. Men with these convictions and expectancies are, of course disposed to use this world without abusing it, and always aim at the subjection of the animal nature, both in sensation and idea, that their conduct may tend to demonstrate the excellence of
of reason by proving its power to rule on principles derived from Heaven, and from motives, that, as they arise from love to the creator of life, regulate the springs of thought and action for ever. If we are not capable of recognizing the power and wisdom of God in the objects of creation and in its ordinances of harmonious cooperation, we are not indeed, rational, and cannot discern right from wrong. The law of Heaven, and the revelations of earth are hid from our eyes, because we have not entered on the proper exercise of our higher faculties, since for these there can be occasion, except in the investigation of truth, as revealed to our understanding in the workings of the Almighty in matter and on minds.

The reason why many men really live a brutish kind of existence arises, as we have seen, from the circumstance that human beings are constituted in a great measure with relation to mere animal life—and too frequently seek only to gratify this. They possess bodies formed on natural or physical principles, and confining their attention, either from ignorance, or from indolence, too much to this body and its conveniences, they lose sight of the supernatural.
supernatural or spiritual relations of their minds, and satisfy themselves as well as they can with brutal comforts and bodily enjoyments.

In these days, when so much ingenuity is waxed in endeavouring to reduce man to the elements of nature, it is important clearly to see wherein the human mind, when permitted to be manifested, differs from that of mere animals. If a dog had a brain like a man's, say some physiologists, he would be reasonable and religious. This is the same as saying, if a dog were human he would not be a dog. All such fictions are simple impossibilities, because what is one thing cannot be another. A human brain belongs to a human being, and no other being ever had such a brain; and yet the brain no more makes the man, or the dog, than the man or the dog make the brain. God constitutes his creatures, and he has determined that no creature on earth but man should voluntarily control his impulses for moral purposes. Man can train himself by the apprehension of a will ever truer than his own, but animals cannot will otherwise than as their senses may impress them and excite desires, none can.
can believe in God as a Lawgiver, and he can wish to love his neighbour as himself, because he can perceive that it is essential to the well-being of all intelligences endowed with active powers, that they should mutually regard each other’s interests, or they would be mutually injurious. Where are the morals of beasts—and what are their charities? Can a brute reflect on the probable effect of his conduct on the feelings of another? Can it perceive any evil in its will? Is it capable of acting conscientiously? Can it put itself in relation to history? Can it arrange past facts into new pictures? Can it obey God, from love and gratitude? Can it trust to his hand? It can do nothing of the sort, and, therefore, until those expounders of natural history, who include Omnipotence only as a part of the theory of development, have brought forth for us some specimen of a quadrumanous or other mammal, not born of woman, but yet devout towards God, and consequently conscientious towards man, we must take the liberty of doubting that admission to the Counsel of the Almighty. But alas! it is easy to find men
men so far resembling brutes, that they neither
venerate the Author of their being nor justly
regard the claims of their fellow creatures. But
they are not forced to remain in such a state.
If they are not idiotic, they may so attend to
the doctrines of nature and revelation, as to see
that the Maker of beauty is a proper object of love,
and that he who harmonizes the universe by light
must be the source of blessedness to all who
obey his laws.

What natural similarity may exist between
the mental manifestation or instinct of brutes and
the actions of some men, there is still an
immeasurable and impassable gulf between the
human mind and the brutish. Which can be
accounted for only from the supposition that God
has imparted to the soul of man a power of desiring
and of acquiring ideas in infinite succession,
through which it may learn and live for eternity.
The human soul can be educated in every sphere
that is based on rational principles, because it is
constituted to reflect the mind of its Maker, as
winned in beauty and order, or law and government.
In short, man alone can acknowledge a creator, or
be
be instructed from his works and his word, to trust him, and to honour him. Reason is the
mirror of God, and reflects his image—and the
soul of man, perceiving in itself this reflex of
perfection, is able in some measure to appreciate
the love, and understand the power, which belong
to Him—who, as the one origin and end of being,
is the only object demanding his devotion and worthy
of his worship. Until we find animals equally
endowed, we shall have no reason to compare
man with them. When they begin to exercise free
will and conscience, we may talk of their morality,
and then consider their expectations of immortality—they cannot desire a spiritual life, or a conformity
with the Divine will, by its embodiment in person
or in action. The lower order of mind from physical
defect, or grumbling mismanagement and ignorance,
is humanly brutal; the next order is rationally
intelligent, so far as the use of this world's elements
of knowledge and advantage may serve the
purposes of thought and action. The third order
of minds is devoutly spiritual, from some degree
of Divine illumination in the understanding,
by the entrance of truths addressed directly
to the heart and intellect of man, as a being conscious of entire dependence on the All-wise for any endowment that shall qualify him for association with the intelligences that bow adoringly and hearken to the words of God.

The discoveries of modern science viewed in connection with the nervous system, are no less wonderful, but infinitely less definite. Our knowledge upon this important subject is negative in its character, but promising a rich and abundant harvest of positive results to future investigators. Viewed in a twofold light—character, man is possessed of a physical and psychical nature— the one to use the language of Scripture is, of the Earth, Earthly, the other immaterial and true incorruptible. The mode or manner in which the mind operates upon the complex instrument of its power is becoming more apparent, and the functions of the various nervous centres have of late become more successfully ascertained, and a new era may be said to have dawned upon this hitherto obscure but all important subject. Mind and its laws can only be known through the phenomena of life and its laws, therefore the mind separated from the consideration of physiology and anatomy of the nervous system, as we have already shown, must
must have remained hypothetical and unintelligible, serving no useful purpose; Kaye but the theorist
in Metaphysics, the science of which goes beyond observation, unlike psychology as a science
which is based upon observation. Such being the case, it is not to be wondered at, that Modern
writers upon mental science refer their conclusions what has been revealed by the science of
physiology, for the brain and the nervous system are the proper subject-matter of a true science
of mind, without a knowledge of which, there
can be no science whatsoever for mental science
is the chemistry of human nature. We hail
this with pleasure, because many obscure
points have been elucidated, and important
facts added to our meagre store of real
knowledge in this department of science.
Before the experimental or Inductive philosophy,
the Schoolmen debated as to whether an Angel
or spirit, or the soul of man, could pass from
one planet to another, without going through
the intervening space; say that it did not
pass, of the nature of matter, the debate
it will be perceived, was of necessity useless, becau
Indeed, because, although investigation has discovered some of the conditions of matter and its properties, their knowledge of the immaterial was impossible less than nothing. The nature of the soul is at the present time as far from being ascertained now as then, and if ever it should be proved, as it is not impossible that nerve force, so called, is something analogous (albeit not identical) to the electric fluid, still it by no means follows that mind, spirit, or the intelligent power, is identical with that force or fluid or whatever name it may be called, although some recent Continental physiologists try to make us believe that thought is nothing but a chemical change occurring in the brain—an assertion as it were—a theory too manifestly absurd to require consideration.

The hand that works a telegraph is as different from the electric fluid as the message sent is different from the telegraph, or a fish from the element in which it exists. Indeed, until we can fully understand that there is a limit beyond which human knowledge cannot go, and until we cease to try and fathom the incomprehensible, so long will it remain a mystery.
It is inexplicable how the mind and the brain are connected, but that they are connected is without doubt, the brain being one of the largest organs of the body and is better protected, are facts which show that nature designed it to serve very important purposes, and unless it is the organ by which mental operations are performed there is but little for it to do, and that little comparatively trifling. That it is the material organ of the mental faculties scarcely requires to be proved; for all causes which disturb the healthy condition of the brain produce corresponding derangements of the intellectual powers, modifying the laws of the association of ideas, introducing confusion in the perception, irregularity in the trains of thought, or incapacity of reasoning, and leading to the infinitely diversified forms of mental hallucination, delirium and insanity. Sir Astley Cooper published a remarkable case where a sailor got a wound in the skull, which caused a speck of bone to press upon the brain. For thirteen months this sailor lay unconsciously, drunk of the cup of leth, until the depressed bone was removed when consciousness.
Consciousness again returned. Many other organs in the body have already its allotted function, so that it is beyond a doubt that the brain is the seat of all changes of the mind, although some two years ago it was believed the Hypodermic was the seat of the soul, and that the suprarenal capsules had some connection with it. Had time permitted, we could quote abundance of cases of injuries to the brain, which clearly prove it to be the seat of the mind. Hippocrates, Galen, Fallopio, Nervi, and many other eminent names from the history of medicine, can be adduced to prove that the mind has its seat in the brain.

In the works of Antonio, Baccio, Vittorini, et al., it seems that many cases of amaurosis, scotoma, and other diseases of the eye have been recorded. In his De oculo enique, he relates the case of a man who lost his sight in one eye after a blow to the head. In another case, he describes a patient who had a sudden onset of blindness.

In addition to these cases, he also mentions the case of a man who recovered his sight after a long period of blindness. He concludes that the mind has its seat in the brain, and that its functions are controlled by the brain itself.

In his De oculo enique, he relates the case of a man who had a sudden onset of blindness. He describes the patient's symptoms and the progression of the condition. He concludes that the mind has its seat in the brain, and that its functions are controlled by the brain itself.
The Nervous System then is that of the frame which brings us into relation with the external world, by which man is able to receive impressions of external objects, and communicate them to the different organs of his body, all of which are united in close and harmonious cooperation. Without this agency, man would be completely isolated and could hold no intercourse with the world around him.

To its instrumentalities we are directly and entirely indebted for the forms of sensation, motion, and thought: while at the same time, it exerts a controlling or guiding influence over all these operations by which food is supplied to the body, and by which escape matters are cast off.

The great nervous centres consist of four distinct series or sets of organs, called respectively the cerebrum, the sensorium, the cerebellum, and the spinal cord. The whole of the first three series, and the upper portion of the cord, are contained within the skull; and the rest of the cord within the spinal canal. The centres consist in great part of grey matter, the essential structure of each, surrounded by or
including white tissue, which serves to maintain constant communication between the several centres. The large mass of white fibres leading from the convolutions of the striated body, and thence to the Crus of the brain, and the pyramidal body, from which all the voluntary nerves are said to arise, constitutes by far the largest portion of the whole brain. The fibres of the voluntary tract have a capability of activity, not amounting to motion like that of the muscles, but on being excited possess an energetic power, so that when a man’s face or figure is transformed the image, as a correct miniature and then conducted by continuous fibres, to join those about to pass through the striated body, and Crus of the brain, to the nerves and muscles of the tongue for speaking, or through the spinal cord and nerves, to the muscles of the hand for mechanical action, the brain is required for educating the powers of the body, as well as the faculties of the mind in everything that relates to the material world, and both together demand its special influence.

It may be devoted
devoted almost entirely to the uses of the body, and very little to those of the mind, or, on the contrary, the mind may suppress its entire powers, so as to leave those of the body in a considerable degree inactive and inefficient.

All the muscular powers are under the influence of the will, and this may direct them to waste their all the energy, but when the mind is directing the will, it restrains this vast activity, so that the more its powers are in the ascendancy, the more the muscular motions are subdued, so that they may be only partially exercised, as when the arms are employed in some intricate mechanical operations, that require much attention. As the brain ministers to the body, as well as the mind, it must be regarded in both these relations. It appears to be capable of being employed nearly altogether either in intellectual acquirements, or in promoting the activity of voluntary muscles. It may then be required whether the activity of the same part, when minister to the mental faculties, minister also to those of the muscles? It is not presumed that the same fibres are so engaged, unless there are mental
Mental qualities are combined with the muscular. For each part there are special fibres, whose powers are to be educated by repeated exercise. For co-operating, they are combined near the steepest body with those which excite the ordinary motions of the hand or other part. Besides the physical power generated in the brain, which would have kept the voluntary fibres in connection with the mental faculties in activity, is employed in the enactment of muscular motion, therefore they are weak for most of it, and it is no doubt the same want that does not allow muscular action during great activity of the mental faculties. For the brain has been occupied either in intellectual or mechanical purposes the parts for promoting each of these become habituated for continued exercise, and it may be a question whether the owners of the parts are not so employed to deteriorate by the age of manhood, or a little later, either condition may be in some degree changed; but after that period any alteration becomes very difficult, for although there are instances of mechanics becoming learned men, the change has been gradual commenced in the leisure hours of early manhood, still...
Still the probability is against it, and in favor of the presumption that the brain becomes less and less adapted for the uses it might have ceased in youth. It would seem that after the full growth of the body, there is a stationary period for some things, a gradual tendency to waste or decay.

The mind is manifested in two modes: the 1st those internal to the individual alone, as consciousness which is known only to the individual. Of these other, 2nd those external, manifestations to the individual, to others as adapted acts, and we have two portions of the brain corresponding to these conditions. 

Sensory and motor, the sensory tissue it lay well calls ideogenic, the motor tissue, he calls Kinectic — the cells differing in each, the cells of the cerebellum are very different from those of the cerebrum.

The mind is capable of acting by the nervous system, but the nervous system is capable of acting without the mind. As is seen in the functions of Digestion, Circulation, Absorption, Secretion, and all those included under the class of Nutritive or Vital functions, and which are carried on without these functions are not necessarily always usually attended with Sensation and
And are wholly removed from the control of wont, nature has not permitted processes, which are so important to the preservation of life, to be at any way interfered with by the will of the animal. We know that in ourselves these functions go on as well during sleep, as when we are awake, and whether our attention be directed to their worst, and though occasionally, influenced by strong emotions and other affections of the mind, they are in general quite independant of every intellectual process. In the natural and healthy condition of the system, all its internal operations proceed quietly, steadily, constantly, whether the mind be aware of or in thought.

Lulled in the countless chambers of the brain,
Where each is linked by many a hidden chain,
Awake but one, and lo! what myriads rise:
Each stamps its image as the other flies?—
Each as the various avenues of sense,
Delight or sorrow to the soul despose.
Brightness or shades, yet all with magic art,
Control the latent fibres of the heart.

In further illustration of the mind's action, we resolve to perform an action, but it may not be
he carried out, or they may be so necessity for its use. A man afflicted with paralysis may have his hands in contact with the fire, he may have the desire to move it, but he cannot in consequence of the affliction rendering him incapable.

The brain is always time, made up of an evolution of nerve cells: and life is but the issue of mind, the manifestation of adaptation kind. We have a vital phenomena as a contrast to knowledge as distinguished from mental. And when consciousness is called in we then despise them mental as distinguished from vital phenomena.

All voluntary actions originate in and are excited by an act of the mind. This voluntary act consists of two things, there requires the resolution to be made and this resolution must also be conveyed to the part which is to be moved by the agency of the nerves.

Before we enter further into the physiological causes of the various nervous actions, whether that portion of it which connects the mind with things external to it, or whether that portion of it which connects the mind with the body, the body with the mind, we shallendeavour to illustrate the organs of special sense, and we cannot do better than take the
sense of sight for an example; and indeed we cannot but recognize in this a differentiation of the sense touch more than the other.

We receive all our knowledge and information through the organs of special sense namely, through the eye, ear, nose, tongue, etc., all of which act like so many telegraphs, bringing information or impressions to the mind from without of what exists, and is transmitted by the respective nerves. Having acquired this knowledge, the mind acts upon it again through the nervous system, and thus actions are performed according certain impressions received from without, and this through the power which the mind possesses over that part communicating from the mind to the body.

The general mechanism by which the impression made by external objects on an organ of sense is communicated through the nerve to the brain may be illustrated by an reference to the plan of the electric telegraph. Suppose a message by the electric telegraph from Edinburgh to Glasgow be taken for an example on the one hand, and the transmission of a visual impression to the brain for an example on the other. The wire extending from Edinburgh to Glasgow may be compared to the optic nerve. At the Edinburgh end of the wire there is an apparatus which may be
Compared to the eyeball; whilst at the Glasgow end, there is a different kind of apparatus with an indicator-needle, which may be compared to that part of the brain with which the central extremity of the optic nerve is connected. When the apparatus at the Edinburgh terminus is acted on, electricity is transmitted from it along the nerve, and deflections of the indicator-needle of the apparatus at Glasgow are thereby determined, according to the manner in which the apparatus at Edinburgh is acted on. The electricity transmitted is positive or negative, and according to this the indicator-needle at Glasgow is deflected to the right or left. From the deflections of the indicator-needle a person at Glasgow can interpret the information which the person at the Edinburgh terminus intends to communicate by the particular manner in which he acts on the apparatus under his direction. When the eye is impressed by light, a change in the state of the retina is induced, which determines the transmission of a certain influence along the optic nerve to the brain, in a manner let it be assumed, in some degree analogous to that in which when the apparatus at Edinburgh is acted on, the electrical influence is transmitted along the nerve to Glasgow.
As changes in the direction of the indicator-needle of the apparatus at Glasgow are induced by the electrical influence thus transmitted, so a change of state is induced in the brain by the influence transmitted from the retina but along the optic nerve. Of the change of state of the brain the mind is made conscious by the sensation of light or shade, and according to the modifications of the sensation it infers the nature of the impression made on the eye. In some such manner, let it be assumed, as the person at the Glasgow terminus interface from the pointing of the indicator-needle the meaning of the communication from Edin:

made by acting on the apparatus at the latter place. We all readily understand the ingenuity which designed the electric telegraph, and are delighted with the wonderful results of its operation—the almost instantaneous communication of intelligence from one place to another thousand miles apart, but although we and so few familiar with the still more admirable results of the operation of the senses few persons make them the subject of abstract contemplation and thus perceive fully the wisdom and beneficence of design, manifest in their general plan, here
More perfect than the electric telegraph, they are self-acting, no intermediate agent is required at the outset or organ of the sense to make an impression on it; the impressions are directly made, the phenomena thus telegraphed to the mind as they occur. By the impression of an external object on a sense we have seen that a certain change in the state of its nerve is induced; that by the communication of this change of state from the nerve to the brain, the mind is rendered conscious of a sensation.

Sensation then is all that we can perceive as an effect of the impression of an external object on a sense. Of the external object we can take no direct cognizance, but we indirectly judge of its qualities by the character of the sensation excited in us by its impression on the senses. It is on the nature of our optic nerves, and not on the nature of the agent which impresses them, that the sensation of light depends. What has now been said of the optic nerves and their sensations, is equally applicable to the other nerves of sense and their sensations. Take for example, the auditory nerves; the sensation excited...
excited in us by an impression on the ear we call sound, and the external agency, which commonly causes the impression we also call sound. But the sensation of sound, and the external agency which, by its impression on our auditory nerves, excites in us the sensation, are, as in the case of the sensation of light and heat, totally different things. Each nerve of these is thus capable of communicating to the mind, one particular kind of sensation the function of each acting respectively, as the stimulus to each organ. In short we cannot hear with the eye, nor see with the ear.

Notwithstanding this, the mind has been so beneficently hedged that it can, in some measure, make up for the loss of one sense by inferences from information it receives through the other senses to which it at the same time directs an increased attention. Thus persons deprived of hearing may learn to comprehend what is said by watching with the eye, the movements of the lips of the speaker. When, for instance, several words of the alphabet are taken up by the optic or auditory nerves of the sensory, and by
By a voluntary act of the mind, the voluntary
intention, are fixed or impressed by them, and by several
repetitions of this act, they become indelibly
implanted on the mind, as if an object has
been seen. When words and their meanings
have been thus learnt, one can be chosen
and adapted for another without pointing
to any familiar object; and when such
information has accumulated, one or more
words can be made to represent ideas, and
when ideas are multiplied the process of
thinking begins on a large scale, and thus
our stock of knowledge becomes enlarged.
Memory is instituted in this way; it is partly
the result of the retentive process of the brain,
and partly the result of care and perseverance
with which this information has been received
and implanted. It is an active condition
of the mind and brain, which allows a renewal
or return of the knowledge thus gathered, after
it is a repetition of the same process by
which knowledge was first implanted in the
mind and brain. In the case of
influence of the real sense, the relationship of
certain
Certain external agencies, the structure of the organs of sense have been all wisely designed. Thus the structure of the eyeball is in special adaptation to the physical nature of light and its ordinary stimulus, and so of the other organs of sense, the structure of each being in strict adaptation to the physical nature of the ordinary stimulus of its own; an adaptation manifesting benevolent design, guided by the most comprehensive wisdom, and unerringly carried into effect by power the most absolute.

As to sensation itself, Müller says it must be distinguished from attention and from the faculty of forming ideas from sensation, attention appears to be a function of the cerebral hemispheres: by their removal the animal is rendered stupid, but sensation remains. Among a certain number of simultaneous sensations we are able to direct our attention to a single one so as to perceive it not only more distinctly than the rest, but definitely in its whole intensity. We are convinced that attention does not create the sensation; all it can do is to isolate one sensation from the crowd of simultaneous sensations, it may be
asked however whether this attention itself be anything than that very isolation of one sensation from the crowd? The late Sir William Hamilton, whose multifarious learning induced him the reconcile questions of physiology among the law that a nervous point yields a sensation "locally distinct in proportion as it is isolated in its action from every other point." This law of local destruction must be extended to every distinction of sensations.

Dr. Latschell says "the proper function of the faculty of attention is to develop the vital processes of the organs involved in its action." Attention, he says, "may be said to consist of two processes, each distinct yet mutually dependent. 1. The organs of special sense by which the vague impressions are received, that vitally a vital condition that the influence of the impressions upon the recipient nerves is intensified — as where we try to hear more distinctly. 2. The nerves by which the impressions are received, the corresponding ganglia to which they are conveyed, are at the same time to modify in function that they also become more susceptible of the influence of the impressions thus more determinately receive in consequence of the state of it."
Without denying to these writers the privilege of defining their terms as they please, we would ask what advantage there can be in blending together the two words, sensation and perception. The distinction is specific, and its sensational character is visible in the effects produced by it for the sleeping man, thus excited perceiving no object, but he feels the sensation moves away his head from the light in consequence.

We are aware that some say unless a sensation is perceived its the same as if it did not exist. Yet closer scrutiny detects that we certainly must have many sensations which are not perceived at all. Thus if two sharp instruments be made to press gently on each arm, we shall have two distinct sensations both perceptible, whether these two sensations are simultaneous or successive matters not. The two impressions on the sensitive nerves excite two sensations in their centres. But now, while the left arm retains its sensibility, if the instrument be pressed so forcibly on the left arm as to cause pain, we become totally unaware of the sensation in the left arm. We can
Can no longer perceive the sensation caused by the instrument, which nevertheless is pressing as before. Is the sensibility in the left arm destroyed? Not at all. Does the sensation cease to exist during the period when we cease to be aware of it? No; the impression has continued. The relation of the sensitive nerve to its centre has been uninterrupted, and the sensation must consequently have continued, it will be perceived again so soon as the pain in the other arm abates. We are humbly of opinion therefore that such evidence proves the inadequacy of the current hypothesis that unless a sensation is perceived, it does not exist. The hypothesis here combated says explicitly or implicitly that a nerve-centre may receive a stimulus, but this stimulus will not awaken a sensation, unless it be transmitted from that centre to some other centre. Though why one centre should have the property of sensibility, which another centre, identically the same in substance, has not, no physiologist has attempted to explain.

We have endeavored to arrange in simple and convenient order the several actions to be considered under nervous influence.
Nervous actions

(1) Physical actions.  (2) Mental actions

1 Physical actions

(A) Automatic or Rhythmic
   (a) Those independent of the will
   (b) Those which can be controlled by the will to some extent

(B) Reflex or Diastaltic (Involuntary)

1 Mental actions

(a) Actions arising from emotions and passions
(b) Acts of the will of volitions
(c) Associate or consensual acts

Under the head of physical actions or those pertaining to the body, we include all those acts independent of the will or nearly so, and under the head of mental actions or those pertaining to the mind, we include all those acts under the control of the will. Of the physical actions, we have to consider, first, the Automatic or Rhythmic, which depend on the tendency which a sensation has to discharge itself through the readiest channel. For instance, learning to speak a new language, to play on a musical instrument, or to perform any more customary movements, poses difficulty, felt, because the channels through which each sensation has to pass have not become established but are sooner has frequent repetition cut a pathway.
pathway, than this difficulty vanishes: the actions become so automatic that they can be performed while the mind is otherwise engaged and sometimes, if once commenced, they must continue. Hence, all our tricks of phrase or gesture, which so effect can produce, matter meaningless epithets, phrases which originally cost no trouble to learn. It is in vain that people laugh at us for the iteration of these phrases; however ridiculously inappropriate they may be, they have become automatic—the paths of discharge have been established, and along these paths the sensation must discharge itself. The same thing is observable in the region of ideas: old associations, old beliefs, are not to be displaced. A man may be thoroughly convinced today by the logic of his opponent, and yet tomorrow he will be heard uttering his old convictions, as if we had never doubted them. His mind cannot move except on old paths; indeed, it may be noted as the peculiar characteristic of vigorous intellects, that their thoughts are but finding new pathways instead of using old associations, the vigorous thinker.
one who thinks for himself; the vigorous writer is one who expresses what he means, and does not suffer his phrase automatically to determine another. If he has a manner or mannerism, it is his own. Superior minds think the things of others, and write the phrases of others, because, as Goethe says, "there are so few voices and so many echoes." - due entirely to automatic habit. He has two kinds of these actions: 1. those over which the mind can exercise no control whatever, as may be seen in the action of the heart, over which we have no control, its movements are as active during sleep or in cataleptic states, as when we are awake. The motion of the bowels is of this description, like the heart governed by nervous influence. The second kind are those which are associated with the will, but are ultimately beyond its influence, such as respiration. This function is associated with the will in so far as we can suspend the movements of the lungs for a short time voluntarily. This is enjoyed in the highest degree by pearl divers, who can for a time remain under water, more than
than these macao-stomied breath exercises, in a mere act of volition we can suspend the action of breathing, but only for a very limited period of time, ultimately we losepower: i.e. overpower over it is not continuous, for overpowering action comes on mistake of resolution. These two kinds of actions are all necessary for the continued existence of the body, and during sleep they are constantly exercised, and here we recognize the will and hand of beneficent Providence, who has so ordered and established the laws that regulate our system, that without doing disharmony with nature, the functions should continue not only without an effort of will but even while we are totally unconscious of their action.

The second division of the physical actions is termed the reflex, or perhaps better, diastaltic. These actions the will claims no control and they take place totally independent of it. We can restrain them, it even mistake them, but we have no control over them. They are principally useful in watching over the
to the cutaneous nerves of the body, an impression made on the skin, it is transmitted by the sensory nerve to the ganglion, and this ganglion, being excited, excites the motor nerve in connection with it, producing a muscular contraction, and what is called a reflex or diastolic action is produced. The stimulus of light, for instance, falling on the eye, causes the muscles of the iris to contract, but inasmuch as every ganglion is connected with other ganglia, and inasmuch as we have said that the nerve fibers which connect the two, have their sensitivity excited when one of these ganglia is excited, the sensation awakened in the first ganglion not only discharges itself in a muscular contraction, or reflex action, but also in another sensation. It plays on a muscle and its play on a center, we may call this secondary sensation. Reflex feeling, for the sake of making it resemble, as a physiological process, reflex action, this secondary feeling may in turn discharge itself in an action, or in another feeling, for example a fly settles on your hand while you are writing, the tickling
Illumination may either cause you to withdraw your hand by reflex action, without attracting any attention to it, without exciting any reflex feeling; or it may excite your attention without causing you to withdraw your hand, or it may cause you both to withdraw your hand and attend to it. In the first of these cases you would be said not to have felt the instinct; your attention was elsewhere. But if you had not felt it, if the sensation had not been excited, no withdrawal of the hand would have followed. All the sensations take place under the influence of a reflex action, and sometimes the sensation is a conscious sensation, at other times unconscious. Thus the salivary secretion, which takes place when an acid is introduced into the mouth, is a sensation which succeeds a conscious sensation. The secretion of the gastric juice is which takes place when food passes along the stomach and digestive tube. In the entity, succeed the sensations without consciousness. Now, physiologically, the process in each of these cases is identical: a stimulus is given to the neurility of a nerve, which excites the
the sensibility of a centre, and that, in turn, stimulating the sensibility of the nerve distributed to the gland, produces thereby a secretion. There is a difference between the organ of Taste stimulated by the acids, and the stomach or liver, stimulated by the food; there is a difference also in the sensations, but in each case the stimulus has first awakened sensation, and then secretion of the sensation of the one is to be called conscious, and the other unconscious, terms perhaps which are justifiable, although it may be better perhaps to have said that the sensation produced by the acids, being derived from a special cause (Taste) could be distinctly perceived (as special); whereas the sensations excited by the food, being derived from no special cause, must necessarily be unlike the taste of acids, and not being a special sensation is less recognizable. Coughing, retching, sighing, &c., are other examples. If we put a probe suddenly pointed at the eye, the lids will close to prevent its introduction and thus protect the tender organ from injury, even before the mind has had time, or at least before it has determined to act, and in certain
Cases before it has been distinguished the object at all. Muscle is endowed with an inherent property, called "Contractility," to say that it has an inherent property called "Sensibility," which causes various functions in various organs, however complex any one of the functions be. And could we analyze it, we might find it a complex of simple sensations, there is an incessant action and interaction of the various parts of the sensitive mechanism, sensations cross and re-cross, exciting and modifying each other, and the sum total is a feeling of existence. In lower animals, with a simple nervous system, the sensitive phenomena are simple. And as the organization increases in complexity, the sensitive phenomena necessarily become more complex. Indeed the whole process is one of evolution, a law we regard with as much certainty as the law of gravity in the physical world. There is a continuity of evolution in the structure of tissue as well, and any arrestment of this law of evolution in the development of man may result in imbecility, a fact in physiology hitherto to
much overlooked, but regarded by Professor Laycock as a law of perfect certainty.

The next set of actions are the Mental, of which we are conscious, but at the same time nothing of the nature of involuntary actions. These are essentially the result of passing ideas such as laughter, i.e., something ludicrous rather present itself to the mind through the imagination, or by an actual occurrence, or it may be communicated.

The benefit of laughter is brought on more or less in degree according to our appreciation of the ludicrous or the cause that excited the emotions. Over this, the mind has no control. Yawning is more particularly a contagious action. A whole company may be set yawning in this manner. We know of a Professor in England who was much subject, from the nearest cause; a dislocation of the jaw; the students both advantage of this on many occasions. One of them commenced yawning, the contagion of which, in a very short time, reached the Professor, invariably resulting in dislocating his jaw, so that he had to give up the lecture, the occurrence which the students aimed at.
Of the actions arising from emotions and passions, therefore, we have a flow of tears, and all the other secretions are acted upon in the same way, a person labouring under great fear or terror is liable to have an attack of Diaphany, as well as a copious flow of urine. Soldiers before engaging in battle are good examples in this respect. The anticipation of their death will call forth a copious flow of saliva, on the other hand, when a person is subjected to any severe ordeal, the flow of saliva is checked, and the mouth becomes dry and parched. It is upon a knowledge of these facts that several of the Indian tribes test the supposed guilty criminals. They cause them to take a mouthful of dry rice, then made to spit it out again, if it be dry, that mixed with saliva, he is held as the guilty one. Accordingly, of the acts of the will or volitions, we may have the mind conscious of external objects, and not act at all. To constitute a voluntary act, it is not only necessary that the mind be cognizant of a sensation, but that it
So through a process of intellecution, that is, it judges and forms a resolution or complete, an act of the will, which immediately precedes the action performed. And this act of will may exist in the mind, and so far as the body is concerned, the succeeding action is not performed, as in Paralysis. Hence a voluntary act requires that the mind be conscious of something or other some information communicated to it, and upon which the mind sits in judgment. It requires also that the mind must resolve, and that also there must be a medium of communication from the mind or the brain—its organ—to the other part of the body through which the mind manifests volition.

Voluntary acts may or may not manifest themselves by an external act of the body, because the intellectual faculties are as much under the control of the will as the powers of locomotion &c. and as we have seen the body is not always capable of responding to volition, even where the act of will is completed in the mind; therefore a voluntary act may be consummated without or rather independently.
Of the body, just as an involuntary action may take place without even the cognizance of the mind, of the Associate or Contextual Acts, we have two classes, which are companions in their nature. The first takes place during the performance of voluntary acts, and without any act of will; for example, the muscles act as if were consciously in moving the fingers in different directions, as in playing the Violin, Piano, etc. These are those that are associated in the mind and go on as a kind of byplay, being at the same time almost impossible to separate them from the act going on. Those actions may be controlled, but they generally take place without our knowledge. When the mind is particularly intent upon some other act, which is voluntary, such as when a little boy at school is drawing his early lessons on the slate, he may be seen moving his tongue, unconsciously imitating the sketch he is drawing, with his pencil. So also in cutting any tough substance, we are apt to move the tongue in such a hurried manner as if we were cutting the leather with it.
We have thus humorously endeavored to trace out the vast range of function injured by the mind, and we now come to consider physiologically that complex instrument through which it manifests all those actions of which we have been endeavoring to explain.

There are two kinds of nerve substance, different in function and structure, these are called the white and gray matter, terms that have been applied to them, from the difference of color presented by each. Without going into the minute analysis of brain substance which would be quite foreign to the subject of our treatise, it may not be considered malapropism, however, to place at the chief constituents found in its composition, in the infant, we find a large proportion of water, and a very small proportion of phosphorus as compared with the adult; and more especially the amount of phosphorus is greatly increased in the adult compared with the quantity found in the brain of a child, a not insignificant fact to remark. The phosphorus appears to be most intimately connected with mental function, and as the infant
grows towards adult age the brain becomes more solid and the Phosphorus is increased. We might almost say in a ratio to the development of the intellect. The Phosphorus also suffers a diminution in old age, and here we have a corresponding decline of nervous energy. In idiots it appears to exist in remarkably small proportions. In a healthy vigorous brain, it attains its maximum. Another instance of its being connected with nerve function is, that it is expended in intense study, or in severe mental discipline of any kind, phosphatic deposits being copiously produced in the brain in such cases.

White and they nerve substance are mutually dependent upon their connection with each other for the performance of nerve function, and each would totally incapacitate without the other. Without entering into the descriptive anatomy of the nerve structure, we consider it consonant with the text of the present thesis to place

Over however hurriedly, the arrangement of Ganglia as centres of nervous influence, Ganglia generally occur at the junction of two sets of nerve fibres.
Certain desicular matter, and hence reasonably infer that they are themselves centres of nervous power, although not to a great extent, and can originate nervous action independent of other centres of power. In their process towards their distribution in the body, nerves divide into branches, which as it were conjoin with other branches of separate nerves, mutually feed fibres the one with the other. Nerve fibres terminate also by free ends; it is not improbable that this mode of termination exists in several parts, it is best seen in the Pacinian Corpuscles (Fig. B) and in some of the papillae of the skin. These Corpuscles are little oval elongated bodies, situated in some of the Cerebro-spinal and Sympathetic Nerves, especially the cutaneous nerves of the hands and feet.

Nerves have been divided into two sets, called from their function Motor and Sensory - the former tissue has been called by Dr. Laycock, Kinetic, and the latter tissue he calls ideagenic when applied to the brain tissue representing these functions. The motor or different conducts
Fig A

Nerve Plexus.

Fig B

Paciniian Corpuscles.
Material stimulus, the sensory conduct impressions. All sensation and motion depend upon the connection that subsists between the brain and these internumcrine fluids. What that peculiar connection is has not yet been ascertained. Every part of the body has a vitality peculiar to itself, and upon which it depends as a separate organ, the life of nervous matter depends upon its molecular apperception. When a nerve or muscle is in action, a certain molecular change is produced. The result of molecular change in a muscle is visible to the eye, and may be felt by the hand. By an effort of the will we can produce this phenomenon. The muscle is seen to contract; it bulges. We cannot however distinguish this molecular change in nerve fibre. We can only know it in its effects on muscles. There can be no doubt but that this peculiar change does take place in the sensorium, when the mind is excited by its proper stimuli. And the irritation thus produced in the brain is
is communicated through the centrifugal nerves of the muscles to which it is distributed. We are not to suppose that the whole nerve is constantly impressed or thrown into this peculiar molecular state, the change is nevertheless propagated from one end to the other with the rapidity of lightning. This may be illustrated by observing a condition somewhat analogous, produced in a piece of iron attached to a voltaic battery. If the two ends be applied the iron is converted into a magnet and is capable of exhibiting its peculiar power of attraction, when another piece of iron is brought into opposition with it. If the wire at one end be detached, it instantly loses that power, but a certain time must have elapsed before the peculiar change is produced from one end to the other. In this manner a nerve by some stimuli is thrown into a state of impressibility, and this is communicated to or from, as the nerve is afferent or efferent, from the sensorium to its muscle, or from without carrying sensation to the centre, and the actions produced may be either voluntary or involuntary. If the nerve is thrown into a molecular state or condition
In some stimuli, this sensation may be communicated to the brain causing an impression, but the impression may be conveyed to some other centre of sensation, and the mind be entirely unconscious— a sensation not being produced, but the impression sent to another nerve; that is to say, it is reflected, and motion is produced in the muscle upon which it is distributed. For the manifestation of reflex actions three things are necessary—
1st. A centripetal nerve to convey the impression.
2nd. A nervous centre capable of originating nerve force.
3rd. A nerve centrifugal or effluent upon which the impression is reproduced or reflected. If we take a pair of forceps and lay hold of a nerve distributed to a muscle, a motion is produced, and this nerve the nerve is efficient, but if we continue to tear the nerve, the whole system is brought into a state of violent spasm. Two things have here been propagated, irritation has been propagated to the centre, and from that to other nerves, while at the same time the muscle is acted upon effusively. An effluent nerve being impressed, the sensation may or may not be felt at the part where the irritation.
is produced, if the little finger be compressed, sensation is referred by the mind to the part, and to it alone, but if the ulnar nerve be irritated, a sensation is felt in the parts to which its fibers are distributed, to the point of pressure or to different parts of the extremity of the nerve, and this explains why the pain of a stump, after amputation is referred to the tips of the fingers, showing that the term afferent is not altogether a correct one.

The capability of a nerve being thrown into action is called nervous irritability, the nerves employed to produce excitation or irritation, is called excitant or a stimulus, of which there are two kinds—mental and physical. Mental stimuli only throw the motor into this state of excitation, but the physical stimuli can throw both sensory and motor nerves into action, as we have already mentioned to explain my speaking of reflex actions. This condition into which the nerve is thrown, is called, it is nervossa, as it is called. What the nature of this force is, has not yet been definitely ascertained but probably never will. It has at various times been supposed to be salvariae in its nature,
As often as the idea been discarded, it is found that as the Galvanoscope is improved, certain phenomena exhibit themselves, but these have not as yet sufficient to enable us to decide. The probability is that they are not purely identical, although possessing properties having many points of resemblance to the other. This is proved by direct experiment. Until these difficulties be surmounted, it will be as well to consider the two forces essentially different, we can do nothing else, for since the earliest days of science there have been hypothesis explaining the nature of this force. The hypothesis of Animal Spirits reigned undisturbed for centuries. These Spirits were said to be secreted by the gray surface of the brain; then descending down the spinal cord to the nerves, they returned back the same way. When a nerve was tied or divided, the passage of the Animal Spirits was prevented. This hypothesis has been long since discredited, but let no one insist it; erroneous it may have been, but it served its purpose as an hypothesis, and helped to explain the observed facts quite as well as any succeeding hypothesis has done. The nervous fluid...
theory, which replaced it, was not a whit more scientific; and the hypothesis that electricity is the nerve force, although having more evidence in its favour, is often still more serious objections, because it inevitably tends to mislead both theory and practice. Whether nerve force be, or be not identical with electricity, must for the present be considered an open question; but we must bear in mind that if we should the evidence finally turn out in favour of the electrical hypothesis, the physiologist would still have to consider nerve force as something special; if it be electricity, it is electricity under certain special conditions, which give it a distinctive character, only found in the living nerve, it will always be nerve force for him: as light will always be light to the student of optics, although the philosopher may prove light to be correlated with heat and motion.

The two main divisions of the nervous system are respectively called the Cerebro-Spinal, and the Sympathetic Systems. Before proceeding however with the consideration of these subjects it may not be amiss to prefix a brief survey of the
NERVOUS SYSTEM.

Fig. A
Centiped.

Fig. B
Mollusca

Fig. C
Garden Beetle

Fig. D
Hydra Viridis

Fig. E
Mollusca

Fig. F
Star Fish

Fig. G

Fig. H

Fig. I

Fig. J

Fig. K

of the arrangement of the nervous system, and observe among the lower animals, for evolution of nervous activity is manifest throughout all the sub-kingdoms of the animal world, we observe this very strongly in the animal economy (manifest in Sociality) whose complexity of function displayed in many of the lower classes of animal life, especially in the Insecta type, that justify us in elevating these various classes, according to the evolution seen in the nervous system.

If we divide the animal world into its morphological types, and begin with the form of Hydras, the Cephalopods, and the lower, we find the appearance of a nervous system and arrangement for the first time in nature. If we trace the system of nerves into the higher, still higher type of the animal kingdom, we perceive the beautiful evolution progressing and evolving itself, as the requirements of the animal adapt their adaptation need it, but different in destination and development according as they are in a greater or less degree endowed with instinct or intelligence.

In the lower order of animals it is externally simple, the whole nervous system consisting of a few filaments, and two or three ganglia occurring at nearly equal distances, and connected...
with each other by a simple filament serving as a commissure between them. But even in this simple arrangement there is some analogy to higher and more complex systems for the nerves in this simple creature may be said to preside over sensation and motion respectively, there being two sets of fibres, corresponding to the anterior and posterior pleurae which we shall by and by consider. In the insects, the ganglia are more numerous and toward the anterior segment or head of the bee we find the general ganglia involving themselves in a sort of brain. In the vertebrates, we have a still higher resolution; the conus of the head and of the Pec, acting as not homologous in the structural sense, the nevertheless analogous organs moved by muscles under the stimulus of nerves, to act as a light expanded surface on the air and thus serve the same purposes of flight. Without the moving muscles, the wing would be no organ of flight; without the contractility of muscle fibre, the muscle would not move; without the stimulus and coordination of the nervous system, the muscle fibres could not contract harmoniously as to produce this flying movement. In the same way the brain is analogous to the
Brain of the Bird, there are no doubt many
important differences, but there are fundamental
resemblances of structure and connection of
property and function; in a word, the only
difference is one of evolution, a law as
certain and fixed in the Animal world as
the law of gravity is in the physical world.

We conceive, therefore, that Comparative
Anatomy irresistibly disproves the notion of the
brain or any other ganglionic mass being the sole
and exclusive seat of sensibility; we do not
mean that the brain is not one great centre
of sensation, &c. &c. the chief and eminent
organ of the whole physiological mechanism,
but we have already said it has the noblest
functions; but it does not exclude the other
ganglia from their share in the general consciousness
in all the sensations derived through the
nerves to are summed up, combined, modified,
and in some profoundly mysterious manner
elaborated into ideas. What would be the
condition of an animal endowed with the faculty
of sensation, without the power to move towards
objects it perceived to be beneficial, or from which
it appeared to be hurtful, or of an animal
Plan of Regular Nerves.
possessed of the means by which it move, without the faculty of perceiving that towards or from which its well being required it should move. In the one case sensation would have been a source of distress to the animal whilst in the other, the power to move would have been useless, beside the mere allocation of sensation and motion in animals we find, as we trace these faculties throughout the series, a cor relation in their development — we see that in respect to their degree of perfection, the faculties of sensation and motion have constantly a direct mutual relation. But it is not alone between the faculties of sensation and locomotion that a wise and beneficially designed correspondence is to be observed, each may be discovered also with respect to the other classes of motions and herein we see how that everything in nature is linked together in a chain — how that all things fit with each other, showing at once the unity of design and of the designed process stage by stage manifesting itself as instinct of higher intelligence, according as they approach that of Man. We know not indeed the limits of instinct, but we know full well
well, inductively, by natural religion, and assuredly
by revealed truth, alone supplies reason to
Consequence, as accountable being. Nothing
is more beautiful than this watch, instinct manif-
esting itself thought nature. The operations
of instinct may be said to limited to
Circumstances which tend to keep the species
in the same state of intelligence (as to speech)
in which it was born. There is no progressive
Advancement in succeeding generations, with
higher advance is made, either by the
Communication of experiences or the effects
of temple in higher animals. Each
Species has its own limited range; if there
its powers cease. The ox, which knew his
Master's crib, and followed the patriarchs
in their journeys four thousand years ago, was not
less intelligent than those of the present day; the
dogs of Chimrod were probably as far
Advanced in civilization as those possessed by
Modern hunters. The wild ass of Scripture,
which was probably the lebra, is still the same
Untameable inhabitant of the desert, and all
the efforts of man to make him obedient
to the curb, have been utterly futile. He has
does not discriminate between a real and an artificial egg: and the tunriks will still go on budding her nest in the same hole, after it has been destroyed many times. Man is guided by instinct, more or less, in every stage of his existence—from the moment when he turns to the maternal breast, to that at which he spits. The history of the world, unfortunately, exhibits too many instances of man—particularly among the Ancients—indeed, with the noblest development of the powers (of reason) who yet have given themselves up to the most gross and brutal licentiousness, thus exhibiting the animal propensities of the one faculty with most hideous force—since it was accompanied by a total prostration of the other;—one hour a Philosopher, the next a debauchee, but this abuse of reason is a very different thing from instinct. It is the giving away of one to the other. In the Hymenoptera class of the Insects, we have often wondered at the at the apparent reason displaying itself through the instinct. These tiny creatures, indeed, of all the Countless
Greatly being moving on the face of the earth, these little insects are those whose faculties and endowments are only excelled by those of Man, the last and best of the Creator's works. From time begore notion, which associates a high degree of perfection and intelligence with corporeal bulk, we feel no uncommon surprise at the capacity of the elephant, or any other animal whose instinct shows proportioned to its age, or whose structure like that of the monkey, assimilate in some degree to the structure of man; but to see in a tiny insect, a development of instinct which so closely resembles reason, when we find that this little creature practices all those moral qualities which Man is commended to perform for the good of society but which he perpetually violates, when we witness undeviating order of conduct, persevering industry, perfect subordination, harmony, and unity of purpose, and social affection all Conspicuous in the daily life of their society, we may blush for the great mass of mankind. We must confess, not only the omnipotence of the Almighty and his goodness in teaching
as wisdom by the toil of his hands, and we
must also acknowledge, that, did we imitate
these silent little creatures, in the peaceful
regularity of their lives, our days would be
happier, our lives more tranquil. All
nature is replete with instruction to the man
of reflection and understanding; her types
and symbols connect the material with
the immaterial worlds; and happy will
she be, who applies them to their destined use.

Besides the connection of the nerves
with the organs of sensation, the Nervous System
plays another important part, the powers by
which the muscles are enabled to act so as to
perform their allotted functions, and it is the
Teacher of motion, the Cerebellum, which has
asserted to it this function, although we think
it has other important functions as well.

If the Spinal Cord be cut across or injured
materially, the hinder part of the body becoms
powerless. Sensation is not destroyed, but the Nervous
Connection is, it no longer obey the dictates
of the will. As also maniaism afflicted
with paralysis of the lower extremities, depending
when amputation of the Cord, we doubt if such
change in the cerebellum also. As there are two similar and distinct sides of the body, so the nervous system presents a symmetrical arrangement on either side, the same in structure and function. If no communication existed between these halves, we should probably have two minds instead of one. It is therefore necessary that there should be a free communication between every part of the brain, and between it and the nerves that arise from it, hence we find another set of fibers acting as connecting links between parts that would otherwise be disconnected. These are commissures, they assist in combining the various impressions conveyed to the ganglia from the various sensory nerves. We have also commissural fibers connecting the convolutions with the ganglia of the impulse as well as with the motor ganglia. We have sketched roughly in the next page, an ideal nervous system, which we hope will the better enable us to understand this somewhat complex arrangement. Each ganglion with its commissural fiber is seen as representing the special sense, which conveys its stimulus for
Fig. A

Transverse section of spinal cord with nerve roots.

Fig. B


Fig. C

Ideal Nervous System.
Quite contrary, there is also a set of commissural fibers connecting ganglia with ganglia both afferent and efferent in their formation, which permit a free and mutual intercommunication between each part individually, and between each at the whole.

Before entering upon the consideration of the encephalon proper as the great center of the nervous system, it is necessary to observe that the best course of action would be to realize in clearly the function ascribed to the various parts of the encephalon. Longer stay on making a transverse division of the cord, the employing Galvanism to the segments of the different columns, he found the posterior columns were sensitive and centrifugal, that the anterior were motor + centrifugal, and that numerous of the gray matter appeared to produce neither sensation nor motion. It is held by many distinguished Physiologists the center of impressions from sensitive to motor nerve roots, 

Brown-Edward says the posterior columns are sensitive, that they
do not conduct directly to the brain; but convey impressions to the grey matter of the cord, which transmits them onwards. Not the conductors of sensitive impressions whatever they may be, on their entrance into the cord, for the most part pass downward and join the grey matter below their point of entrance, so that a few ascend and join the grey substance above their point of entrance; and that a still smaller number at once lose themselves in the centre of the cord. All these fibres effect their crossing from side to side in the spinal cord. The crossing of sensitive fibres takes place in the brain or medulla oblongata. The anterior and lateral columns are motor; the posterior, their fibres pass directly onwards from the cerebrum, effecting their crossing in the lower part of the medulla oblongata. The grey matter of the cord receiving sensitive impressions from the posterior roots of the nerves, conducts them onwards to the brain or reflects them to the motor nerves. It is itself insensible to mechanical or salivary stimuli; and the experiments of Romberg
prove that if a lateral half of the cord be divided at the tenth dorsal vertebrae in any mammalian animal, it is found that sensibility is increased in the posterior limb on the side of section, while sensuation is lost in the posterior extremity of the opposite side. If, instead of one transverse hemi-section two or three be made at different points on the same side, the same result will ensue. If two transverse hemi-sections, an inch apart on the side of the cord be joined by a longitudinal median section of the piece thus included be performed, the effect will be the same as in the previous experiment. In making a transverse section of a lateral half of the cord, if the incision deviate so as to divide part of the gray matter of the opposite side, sensuation will be impaired on the side of section, and will be lost on the opposite side. If, after a transverse section has been made on one lateral half of the cord, at the 11th dorsal vertebra, the opposite half be divided at the 6th dorsal, sensibility is lost in both posterior limbs, though there may be traces of sensibility on the side corresponding to
of the highest section of the Cord. If in a Rabbit, which we have frequently tried, after having divided a lateral half of the Cord at the level of the second pair of nerves, determined the sensitive nerves supplying the Ear, it will be found that the Ear on the side of section is abnormally sensitive, while the opposite one has lost nearly all sensation. From the many instances of experiments we have seen Dr. Rom Seguad perform, he has laboured well, and we think, satisfactorily, to establish the following facts:

1. The idea that the sensitive impressions are conducted to the neurophalan along the posterior columns is erroneous.

2. The gray matter of the Cord, although itself defined of sensibility, is an organ of transmission of the sensitive impressions.

3. There are two kinds of sensitive fibres in the posterior columns of the Cord, some going up towards the neurophalan, some going in the opposite direction.

4. There are also ascending and descending fibres in the posterior grey horns, very likely in the posterior parts of the lateral columns.
(5) The ascending and descending fibers in the posterior columns, come mostly, if not entirely, from the posterior roots of the spinal nerves.
(6) The posterior roots send also fibers to the posterior horns, very likely to the posterior part of the lateral columns.
(7) All these fibers soon leave the posterior columns, homo to order to join the central gray matter.
(8) All these sensory fibers decussate very near their entrance into the spinal cord from posterior roots.
(9) There are some transverse fibers in the spinal cord coming from the posterior roots which do not seem to transmit sensory impressions.
(10) The motor nerves remain, after their entrance into spinal cord on the same side, until they reach the lower part of the medulla oblongata, where they decussate. The spinal nerves are connected with the cord by two sets of filaments—the anterior, posterior roots. And perhaps it would be better to say that the anterior filaments commenced with or rather in the cord, and that the posterior roots terminate in it, each
A spinal ganglion, with its two roots anterior and posterior, showing the arrangement of nerve fibres throughout the mass.
Each has a double connection with the spinal cord, as well as being composed of white and gray matter respectively, and it is probable that through the cord can excite, and the anterior that the impulses resident at 98th page as sketch of the manner in which they inter or leave the end will be seen.

In disease of spinal cord, why is it that pain maybe first felt at vertex of head? Then referred to sole of foot. And nowhere else? Because of the lesion, if he had entirely lost sensation, no such pain would have been felt, but then the case would be much more serious. In most cases it is confined to the motor contents. But whereas, posterior or sensory are affected, there are no sensory symptoms.

The Wallerian law is that if degeneration of a nerve occurs the impression is conveyed straight upwards to have near to surrounding tissue, a diseased action will not manifest itself by going up sensory, but comes down their post the brain, so that a descending, fibre of the posterior root will go up to the brain without degeneration, and then manifest pain.

The spinal cord after entering the skull, though forms Narcomagus, becomes considerably increased in size, presents important kinds of difference,
The Medulla Oblongata consists of a set of strands, the only separation between these being the fourth ventricle. Among the fibres however are certain collections of vesicular matter which serve as the ganglionic centres for the movements of respiration and deglutition. Under the term "sensory ganglia" we understand that assemblage of ganglionic masses lying along the base of the skull and partly included in the Medulla Oblongata, in which the nerves of the special senses, as well as have their central terminations, with these may probably be associated the two pairs of ganglionic bodies—the Corpora Striata and Nuclei Optici, into which may be traced the greater proportion of fibres that compose the strands of the Medulla Oblongata, and which, seen to stand in the same kind of relation to nerves of touch and common sensation, that the olfactory, optic to hear their several nerve trunks. Carpenter says it is important to note that no sensory nerves terminate directly in Cerebrum, nor do any motor nerves issue from it; and it
it is questionable if there is a direct continuity between all or even any of the nerve fibres distributed to the body and the medullary substance of cerebrum. as whilst the nerves of special sense have their own ganglionic centres, it cannot be shown that the nerve fibres of general sense, which either enter the cranium at part of the cephalic nerves or which has up from the spinal cord, have any higher destination than the thalami optici, and we cannot prove that the motor nerves which come from the cranium either by cephalic nerve trunks or by motor columns of spinal cord, have a higher origin than corpora striata. indeed we have good grounds for believing says carpenter, that physiologically as well as anatomically, the cerebrum has no communication with the external world, otherwise than by its sensori-motor apparatus. it is the centre of respiration to the cerebellum is perhaps the most important division of the brain, it is a differentiation of the medulla oblongata, it is in relation to the entire body, of the social
divisions of the cerebellum. It is much more than a mere ganglion of motion, it may be regarded as the controller or regulator of all the natural process of the entire animal economy. It has been looked upon as a somewhat sacred part of the brain, for no doubt it has intimate relations to social and domestic instincts, if it is not the absolute Centre of the social instincts, we are convinced that something very important to do with sexual feelings, Dr. Laycock has long held this conviction. The relations of this organ to the other parts of the brain are somewhat peculiar, but it was only recently that our attention was drawn to the subject by Professor Laycock in one of his lectures at the Class of Medical Psychology. There is no denying the fact that Dr. Laycock's statement is correct, in that the cerebellum derives its supply of blood from a different source than the other parts of the brain receive nourishment; and while there may be nothing particular in the mere blood, it
it indicates that nature had designed it to take very important purposes in the nervous economy. It receives its supply of blood from the \underline{Ventricular} artery, whereas the anterior and middle lobes get their supply from the \underline{Carotid}. From the \underline{Commissure} arrangement the Cerebellum has action with the hemispheres. And Sir James \underline{Simpson} quotes the case of a woman in whom he found the left \underline{tactile} very imperfectly developed with considerable diminution of \underline{Cerebral} substance on the right side or opposite side of the \underline{Brain}, \underline{Brown-Sequard} says the \underline{Cerebellum} and middle peduncle have a distinct influence on the nutrition of the brain. We fear much that the \underline{Commissural} connections in the brains are as yet very imperfectly understood, Dr. \underline{Carpenter} says the optic lobes are more reflex lobes, whereas Dr. \underline{Laycock} maintains that they are \underline{Regulation ganglia}, as well reflex in their function, for in locomotor ataxia, we find the eyes always looking downward to the limbs when any attempt is made to move them; and it is inferred they exercise a guiding or regulation influence over locomotion. We find the \underline{Auditory ganglia} in intimate connection with the \underline{Restiform body}, then with the \underline{Cerebellum}. May not then the
the other cerebral nerves have similar connexions. The olivary bodies are said to be the ganglia of speech, and of motions acting on vasomotor nerves. The natural instinctive language of animals is said to emanate from these bodies. The connections between the hemispheres and cerebellum have not been explained by anatomists, but that an intimate connection exists between them is entertain no doubt. The olfactory lobes has no connection with cerebellum, although it has been demonstrated that they have a connection with medulla oblongata, epilepsy is no doubt a lesion of the medulla oblongata, and is also, we think, is intimately connected with insane states of the mind. Dr. Macintosh of Inebroy Asylum, had a case recently, where a diseased arm in a patient was associated with melancholy state of the mind, and on amputating the diseased arm, thereby removing the tumor is sympatly from the brain, it cured the patient of the melancholy state under which he laboured. The late Mr. Graham Brown, surgeon, mentioned a case to a Layman where he opened an abscess in the vagina of an insane patient.
Nude sketch showing the Communion Connection of the Cerebellum with the other parts of the Brain.
And no sooner had he done so, than the woman became calm again and cheerful. The opening of the abscess removed the morbid sympathies sent to the brain. In this way cured the mental affection. How these morbid influences act on the brain we are as yet ignorant, but some change must be going on, as Laycock suggests that it is one of temperature, being in increase over other parts which thus causes mental derangement. In many cases, it is not improbable, for the several parts of the brain are as liable to increased temperature from exciting causes as any other part of the body, and in this case we account for frequent sudden mental manifestations.

The Pons Varoli is a very important part also. It forms a circulos protuberance bridging over the Medulla and entering the substance of the Cerebellum. It is a commissure, in the Cerebellum it separates into a number of fibres forming a means of communication between one side of the Cerebellum and the other, as well as through the mass. This of it is formed by four small bodies the Corpora Quadrigemina. And
forms the boundary behind. Its fibres plunge into the cerebellum dividing it into a number of small stalks like that of a shirt, these again subdivide into branches which are surrounded by grey matter. The second layer of the mesencephalon consists of the prolongation of the anterior pyramids of the columns. They can be traced upwards through the tons, the divergence of which forms part of the crura cerebri. It changes into the ganglia of the motor tract, the corpus striatum, a radiate bundle of fibres which pass forward and outward to the convolutions of the brain. Tracing up the olivary columns through the pons, they find their way into the thalamus. The anterior continuation of the last mentioned columns form what is known as the crura cerebri. The functions of the corpus striatum consist of motor fibres, and that which connects the thalamus and the olivary columns is made up of sensory fibres. It is inferred therefore that these ganglia correspond in function to the motor and sensory tract which passes with them, and they are known as the motor and sensory ganglia of the brain. The Restiform body
of fibres that mingle in an intricate manner from both the anterolateral and posterior columns, enters the cerebellum as the crus cerebelli; the间隙 of the crura, or rather, the space formed by them is called the locus niger. A portion of the olivary column goes into the corpora quadrigemina, and a small part communicates with the motor tract of thepons. Another process is sent from the corpora quadrigemina to the cerebellum, the processes of the cerebello ad tectum. The two processes are covered over by the valve of Meissner, forming the floor of the fourth ventricle, and the passage between the third and fourth ventricles is the aqueduct of Sylvius. In thus describing the intricate and intimate parts related to the cerebellum, we fear we diverged too far into these anatomical in place of their physiological relations.

We now come to the consideration of the convolutions of the hemisphere—a subject which has received a large share of attention from anatomists and physiologists. Sumner, Fall, Payr, von Baer, and many others distinguished physiologists have their names associated with the inquiry. Our esteemed and eminent professor of anatomy, Dr. Turner, has also lent the pens...
of the results of his research, Théodore de Larue in his Mémoire sur les Cerveaux de l'Homme et des Primates, deserves equal praise for the able researches he has made on this subject and through the combined labours of these distinguished men, our knowledge of the form and relations of the great subdivisions of the hemispheres, as well as the topography of the individual convolutions have greatly advanced so much as to say Professor Turner that we can now localize the different gyri and name each its appropriate name. The convolutions of the brain, from the time of Burq d'Igri and all subsequent observers have been found not to be absolutely symmetrical in the two hemispheres of the brain. Cerebrum, Wagner of Tübingen who had the opportunity of examining the brain of several men of great intellectual power says that the more really convoluted brains co-exist with a high state of intelligence. We are equally of opinion that this is the case, and during a recent series of lectures (Dr. Alexander Monson) delivered in the Hall of the Royal College of Physicians by an esteemed and accomplished physician, Dr. Stellar, he laid it down as an axiom...
fact that grey matter is presumably the most active which contains the greatest amount of nerve cells in any given area, but what the
comparative quantity of nerve cells may be in a given extent of convolutions from corresponding parts of the brain in individuals of different sexes or of different races, or even in convolutions taken from different parts of the brain of the same individual?
we have at present no definite information. Structurally, therefore, one may say, that Cerebrum
presents the most complex organization in which with a large proportion of nerve cells in its grey matter, the foldings of the surface are
complex, the sulci are numerous and deep. And the grey substance possesses relatively considerable thickness (Luny).

We must now bring our somewhat
lengthened paper to a close. Throughout we
have humbly endeavored to bring before
our Professors, the results of what little
reading and observation we have been
able, (in the leisure of our more important hours of serious study.) The view of this highly important subject—a subject delectable
with interest, and one which requires an
And invites fresh investigation. Is the physian it is one of much moment, especially in its relation to insanity and other nervous lesions, and whatever is to himself seriously to the task, cannot fail to struck with the wonderful machinery necessary for the proper performance of the nervous system beneficial in design and carried into effect by love, the most absolute manifest at once the Omniscience of the Almighty as the Creator of all that moves than its being.

David Gibb