July 1815

Written in the Summer of 1815
while living at Moors Town with
Dr. Stewart

AN

Essay

on

Life *by*

Samuel W. Pickering

Preliminary Words to the Reader

I discovered this essay in a drab, cloth-covered trunk, full of family treasures that had lain undisturbed for half-a-century in the basement of my parents' home. As my brother, Peter, and I began excavating this treasure-trove of family artifacts, this jewel of an essay came to light.

Samuel W. Pickering was born in 1791, on the cusp of the Age of Enlightenment when knowledge moved from a superstitious religious basis to a scientific basis. This Essay is a reflection of that transition and reflects the latest scientific thinking of the time. Scientific awakening, exploring the mysteries of life before the breakthrough invention of the microscope ….

The year 1791 is the same year Mozart died in Vienna, Austro-Hungarian Empire. It was 15 years after the American Revolution began, when United States was an infant country.

Samuel Pickering, my great-great grandfather, was born into a Quaker family with roots in the founding of the colonies. Both sides, Pickering and Gaskill had roots in the oppressed Quaker community in Salem, Massachusetts. Here ……. Was sentenced to be sold into slavery to pay the debts of her oppressively-taxed parents. The family subsequently fled to the safety of ……'s protection on Shelter Island.

This essay was written the summer of his 24th year, a year before he completed his medical training at the University of Pennsylvania and began the practice of medicine in Frankford, a separate town from Philadelphia in those days. He kept a record of every baby he delivered ….

References for Quotations

Definitions for Terms Used

He married Mary Anne Eddy in 1821. Their family ended tragically in 1822 when their only child, Lewis Eddy Pickering, died on January 30 and Mary Anne died shortly after her son on …. Interestingly enough, documentation for Samuel's first family was found in another old trunk which held their wedding certificate. Recorded on the back of this piece of parchment was first the joyful birth of Lewis, followed by his death and then the death of his mother.

Several years later on May 1, 1829 Samuel married Elizabeth Love Walton at the Walton's home in Frankford, Pennsylvania under the care of the Greene Street Monthly Meeting. Their first daughter was named Mary Anne, after his first wife, and their first son was named Lewis, after the son of his first marriage.

In this essay, Pickering delves into the difference between animate and inanimate objects, the difference between 'vegetable' and animal. Foreshadowing the modern knowledge of the close relationship, even arbitrary distinction between the 'vegetable' and animal kingdoms, he writes about 'brain fluids.' Further, he comments on the connection between God, the prime mover, as humanists of the time thought, and the natural world, concluding that God is not relevant. He touches on the scientific contributions of over 20 doctors and philosophers from 'the immortal Newton' to his contemporaries, Darwin, … and ….

The original manuscript was 30 handwritten pages. Several edits are evident in words or phrases that are lined out with improved wording added. Numerous annotations shed additional light on his thinking. In the few cases where it was not possible to easily read what he had written, a reasonable word is used to facilitate reading. The original spelling of words that current usage spells differently is retained to contribute to the sense of the period in time of the essay. For example, …….

Preface

"In beholding the human body the first thing that strikes us is its life; this of course should be the first object of our enquiries.

It is a most important subject; for the end of all the studies of a physician is to preserve life; this cannot be perfectly done, until we know in what it consists."

These observations of the immortal Rush cannot fail to impress most persons but more especially the physician. Indeed so forcibly have they impressed my mind that I have been led from them almost solely to consider very particularly its nature & properties.

Where is the man but would wish for the happiness of his fellow beings? When the physician to whose care are likely to be intrusted the life & happiness of thousands, but must forcibly feel it his duty to inquire after the best methods of preserving that power that principle by which "we move – feel & think"? – But "this cannot be perfectly done, until we know in what it consists."

These considerations have induced me to note the different opinions of

Home, built in 1796, in Frankford, Pennsylvania purchased by Samuel Pickering in 1824 for $2,500. Was the home of the Pickering family until Samuel's death in 1847. The buildig

St. Paul

Whytte—In AN ESSAY ON THE VITAL AND OTHER INVOLUNTARY MOTIONS OF ANIMALS, published in 1751, Robert Whytt (1714-1766) rejected Baglivi's theory of muscular action and contended that movement originates from an unconscious sentient principle, or soul. This idea brought him into disagreement with von Haller (French, 1969). Possibly Whytt may not have comprehended the principle that movement may originate as reflex reaction to external stimuli; however, it appears that he was cognizant of the stretch reflex and the fact that a given stimulus may be adequate to excite one nerve ending but not another. Their differences of opinion arose from the fact that von Haller thought in terms of isolated muscle, and Whytt in terms of the reflex control of the movements of an organism.

Names of scientists

Abby Hawys – (?)
Brutis (?) (p35)
Burns
Candillere
Darwin (p32)
Dr. Barton
Dr. Bastir – p38
Dr. Chapman
Dr. Hadley – p29
Dr. Wistar
Gautius

Gertanner (p32)
Haitley
Haller
Le Gallois
Locke
Malbrauch (?) (p33)
Mayow (p32)
Newton
Richmand

- p29
William Smellie, born Lanark, Scotland, died 1763 in Lanark, was a pre-
Smellie— obstetrician and has been
1697 in *father of British midwifery*.
March 5, He prac-
eminent ticed medicine before get-
called *the* ting a li-
cence, but enrolled later at
the Univer-
sity of Glasgow and re-
ceived his M.D. degree in 1745. After
training in obstetrics in London and Paris, he opened a practice in London and began teaching. He invented a "machine", an obstetrical manikin, for instructions. Smellie described the mechanism of labor, designed obstetrical forceps, devised a maneuver to deliver the head of a breech, and published his teachings. He is believed to have painted his own portrait.

the authors I have read upon this subject, and to draw my conclusions accordingly – an abstract of which is contained in the following essay.

Introduction

Difficult as the subject is upon which I am about to enter I am induced to think we make it the more so by not sufficiently attending to the grand basis upon whose existence that of life itself depends. I mean Matter.

Too often are the sensible properties of Matter mistaken for matter itself. Hence most persons will not admit any deductions – any effects that do not obviously & mechanically result from hardness, impenetrability, immobility etc to be dependent upon matter alone; and hence the introduction of a principle whose properties are different, & whose existence is independent of that of matter viz. Spirit.

If we know but little of matter we know less of this. If we know not the cause of the former we know not even the properties of the latter. I would pause here to ask whether it is not unphilosophical to introduce two difficulties to account for but one?

But to return. The obvious properties of matter – its general inertness compared with the activity, growth etc of the vegetable & animal has given rise to the opinion of its being dead. Comparatively speaking it certainly is. But absolutely it is not.

When we see a vegetable turn to the light or change its direction for nourishment we hesitate not to declare that it possesses a principle superior to that of mechanism & independent thereof. But when we observe matter equally sub-

ject to certain general as well as particular laws we hesitate not to declare it inert & dead.

When we view a seed or an egg which to all appearance is capable of producing a vegetable or an animal we hesitate not to assert that it possesses a principle of life. But when we examine the vast regularly formed rock which convulsive nature or persevering man has exposed to view – or the beautifully formed chrystal which we tread underfoot – steady to our purpose we brand them as necessary effects of the laws & properties of matter, tho' the union of the Abby Hawys integrant particles gives rise to his primitive forms; yet the first must equally have a cause of their peculiar mode of existence.

Thus each effect must have a cause. So all causes are but effects of an Almighty Cause, which of course must be independent, and the universe at large sufficiently proclaim its intelligence, power & benevolence. This cause of causes we denominate God who in his wisdom established certain effects which should be but causes of other effects. Hence we may with truth exclaim with Pope –

> "All nature is but art, unknown to thee;
> "All chance, direction, which thou canst not see;
> "All discord, harmony not understood;
> "All partial evil, universal good;
> "And, spite of Pride, in erring reason's spite,
> "Our truth is clear, - Whatever is, is right"[1]

Hence I consider God as the only immaterial moving principle – that the different phenomena of the universe arise from secondary causes of which he is the first "For in him all live all move, & have their being."

Burns in his treatise on ??? says "I consider animals, vegetables & what is called inanimate matter, as all possessing an immaterial principle differing greatly indeed in its nature & effects in these different classes but still deserving in all of them the name of life, being of equal value to

[1] Pope, Alexander; *Essay on Man, Epistle II.*

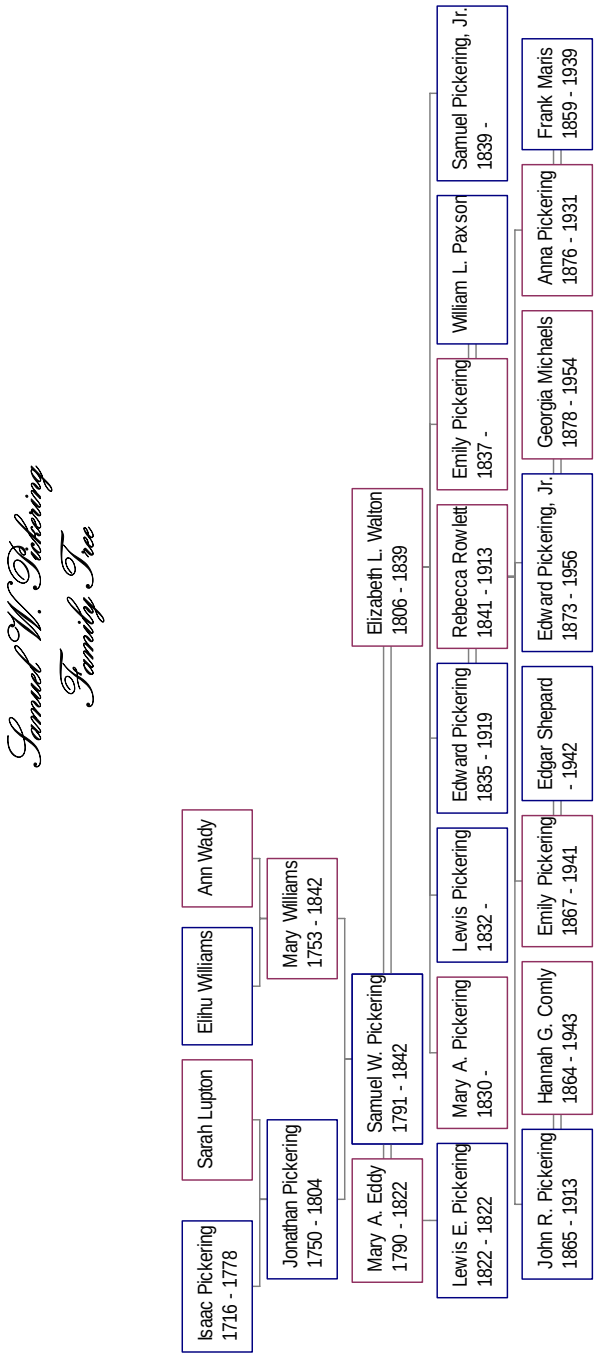
Notes

Old spellings

favour
Shew – keep original spelling
Fibres – keep original spelling (p22)
Colour – keep original spelling (p22)
Searves
Foetus (p24)
Chrystal
Shurely (p22)
Oeconomy (p32)
Vigour
Searving (p22)

Scientific terminology

Adanionia – p38
Amianthus
Aponeurosis – p21
arterial system
atheism (p40)
brain, medulla oblongata, medulla spinalis & nerves
contractility
deism (p40)
Dionea Muscipula
evenchyle (?)
foetus in utero
galvanism (p31)
Gemmiparous
great first cause (p40)
medulla spincilies(?)
medullary vibrations – p29
nervous fluid
nervous medulla
nucleus (p36)
oxygenize the blood
placenta
Platanus – p39
polypus
Pueuma – p34
pueuma (?)
Retina
secretion
sensovision (p24)
Siriodendron – p39
spinal marrow
sulphate of copper (p36)



each, & absolutely requisite for their preservation" And also that "the life of matter (which he calls attractions) gradually acquires new properties in the vegetable becoming "so far changed & perfected as to exhibit many other phenomena & new activity of which before this elevation it was incapable."

How an immaterial principle can be changed & perfected is to me inconceivable. Matter which is the object of our senses cannot be conceived to be capable of either change or perfection in its nature. How much life then can we conceive that spirit – an immaterial principle should be changed & perfected.

If being admitted then, (as I think it necessarily must be) that matter is not inert & dead it will not be more difficult to account for the varied phenomena of animals & vegetables than that a chrystal should assume a determinate form or that a stone should fall to the earth –

"It was the discoveries of the immortal **Newton** which first paved the way for the ??? improvement of medical science; for he in one great branch of natural knowledge banished completely the mechanical interference of intelligent agents & taught the existence of a principle purely immaterial & which without wisdom or volition could act by being acted on." Had Burns? events a??? further "??/ ?Newton? had done & banished completely the mechanical interference of any immaterial principle whatever but God himself & taught that matter "could act by being acted on" I should have received much more satisfaction from reading his observations.

From the forgoing remarks I would not be understood to insinuate that I consider matter as possessing sensation. But it may be said that "life without some degree of sensation is an incomprehensible idea." This difficulty arises from our blending the phenomena of life with the capability of the exi???? – or (as some have called it), with the principle of life.

[2] equally incapable of being accounted for from any of the properties of materiality with which we are acquainted – or as the celebrated Dr. **Hadley** says, "If matter had no active power it would have no power of being passive(?)" 509

What I mean when I say that matter universally is equally alive as a vegetable or animal, is that it exhibits certain phenomena & motions[2]– and that it would equally exhibit all the phenomena of animated bodies without the addition of any other principle were it similarly organized & subjected to the same stimuli etc.

Thus an egg is said to be alive or in other words to possess a principle of life when by the proper application of heat, air, etc, it will produce a chick. But I very much doubt whether we can with propriety say that in its present state it possesses more sensation than a stone.

In concluding these preliminary observations, I shall but remark that in the following essay I hope to shew that the different phenomena peculiar to both the animal & vegetable kingdoms can be accounted for otherwise than by calling to

Biographical Sketch of Samuel W. Pickering

Samuel Pickering , son of Jonathan and Mary Williams Pickering, was born in Solebury Township on August 19, 1791. He was thirteen years old when his father died; it is assumed e was then sent to Philadelphia to live with relatives. In 1816 he was graduated from University of Pennsylvania Medical School and established himself in Frankford, in those days a twon separate from Philadelphia. There he not only conducted a general practice but also served as medical consultant to the personnel of the Frankford Arsenal.

Dr. Samuel began, on March 1, 1817 to keep a record of all his obstetrical cases, listing 1261 deliveries between that date and June 1842. The first entry was a black baby born to "Elizjah Moore's wife" for which he received a fee of four dollars. The final entry, dated June 29, 1842, was a white male born to John Adam Hibbler's wife. One "regular" patient was wife of the doctor's own brother George, Hannah Coates Pickering, for whom he delivered six babies.

life, are at least essentially necessary to bring the phenomena of life into view." Well may it be said that

"Full many a flower is born to blush unseen"

Similar observations are equally appropriate to the animal kingdom.

This doctrine of life is all harmony & beauty while any other appears to me all confusion with difficulty on difficulty like

—"alps on alps arise"[16]

It has been said that this doctrine of animal life leads to Deism if not to Atheism.

The latter I have sufficiently combated in the introduction in which I hint that creation at large sufficiently atest a Great First Cause – a God with certain necessary coexistent attributes – and upon whose existence that of matter itself depends.

Now as matter and all its different modes of existence are but effects, whose first cause is God; - He of course can at pleasure endue with, or communicate power or knowledge to any of His works, of which they would not naturally partake did He not; and we have good reason to believe that this has been the case as exemplified in Christ, the prophets etc.

Hence the Revolation, the miracles, the beauty & sublimity of the scriptures. – And hence the Necessity – the Reason for Faith .—

"Hope humbly then, with trembling pinions soar;
"Wait the great teacher Death, & God adore."[17]

[16] Pope, Alexander. "An Essay on Criticism."
[17] Pope, Alexander. "An Essay on Man."

our assistance (?) as I before hinted any other immaterial principle than that of God himself whose nature is incomprehensible & whose presence is not only necessary to their existence but to the existence of their being viz. matter itself.

Of Life

As "the term life is applied to an aggregate phenomena which manifest themselves in succession for a limited time in organized bodies." And as it is the vegetable & animal kingdom only that do exhibit such varied phenomena they only are said to possess life.

At first sight, it appears easy to distinguish these two grand kingdoms one from the other; but as **Smellie** very truly observes "when the productions of nature are closely examined, when they are scrutinized by the eye of philosophy the number of their relations & differences is discovered to be almost infinite; and then shades of discrimination are often so delicate, that no sense can perceive them. Nothing apparently, is more easy than to distinguish an animal from a plant; & yet the proper distinction has puzzled the most acute enquiries & perhaps exceeds the limits of human capacity."

Neither their phenomena nor their structure will serve for a distinctive characteristic. I do not here propose to say anything respecting the distinguishing marks of the mineral from the other two kingdoms. Such a discrimination is generally considered as easy. For the most part tis so; - The structure of minerals is simple; - These laws are few; - These effects of course are very limited.

Hence between the mineral & vegetable or animal there seems to be a great chasm. In vein [sic] do we call to our assistance, "those species of Amianthus which are called

mountain cork" as the connecting medium.

But between the vegetable and animal kingdom as I have before hinted then has never yet been found a distinctive characteristic. The long and anxious search after such a distinction sufficiently evinces the close alliance of the one to the other.

There are but two methods of discrimination now offered for acceptance both of which are evidently imperfect in my opinion.

1st ??? tis said "have alone a power of delivering nourishment though not indeed exclusively from inorganic matter, mere earth, ??? or air, substances certainly incapable of serving as food for any animals, the latter only feeding on what is or has been organized matter, either of a vegetable or animal nature. So that it should seem to be the office of vegetable life alone to transform dead matter into organized living bodies" (Smiley botany) But a moments consideration I think will convince most that this is not sufficient to serve in every case as a characteristic of distinction.

2ndly The presence of a stomach or alimentary canal has lately been urged as an essential characteristic of the animal.

But many of the zoophytes have no such canal. **Richmand** asks whether we should not "be warranted (?) in rejecting them by the want of the alimentary cavity the essential characteristic of animal existence!" I could ask in return whether this would be making a definition suit nature of making nature bend to a definition? Again is the polypus according to this def: an animal or vegetable?

It has no more an alimentary canal than the grain that grows in the field. The mode by which both are nourished are extremely similar. The polypus turned inside out still lives in the same manner as if it had received no injury. Hence tis evident we possess no essential characteristic to

beginning sufficient for the production of either the plant, the insect or the man? Is it more difficult to conceive this the case than to conceive his being constrained to exist a miraculous influence at the generation & production of every animal. What ideas does it give us of an almighty & all wise being to suppose him necessitated to breath the breath of life into every mans nostrils because he did into those of Adam? Shall we not have a more exhalted conception of his wisdom & power were we to suppose he established certain causes from which man should exist but as an effect? [15]

From these data we are not at a loss how to account for the circumstance of our finding all natural productions, all living beings peculiarly well adapted to the places in which they exist. – Thus we neither find the fishes existing upon the earth, the birds propagating in the sea, nor the seeds vegetation in a barren soil. And why? – Not because an almighty is ever watching this work, but because those laws which he established at first render it physically impossible that it should be otherwise; and thus I say again

—"Whatever is, is right" –

and thus we find the cocciunella? only on the Nopal (?) – The tobacco worm only on the tobacco plant for the simple reason of their being incapable of existing any where else.

By the wise superfluity above hinted at nature has secured their continuance. Thus to use the words of **Dr. Bastir** " what an infinity of plants, might be raised from some of the most stupendous trees, much as the adanionia of Africa, or the siriodendron (?), Platanus (?) & others of North America.' But the fertility of nature in the formation of birds, is infinitely greater than even philosophers themselves have in general, imagined. Millions of buds lie latent in the tree & never meet the light of the Day. The embryon ?????? is not evolved into notice from a deficiency of those stimulating agents, which, if they be not the sole cause of

[15] "The almighty cause
"acts not by partial, but by general laws"

1st from the proportional imperfection of their senses.

2ndly Their want of language that they might communicate etc their ideas

3rdly Their organization or structure not permitting to extensive a communication with surrounding objects. –

Lastly The size of their brain (compared with their bodies) being comparatively much less than that of mans.

A living being may be compared to the formation & perfection of a chrystal. – Th?? Having a nucleus in a solution of the sulphate of copper the formation of a chrystal will almost immediately commence ??? ??? ???? indeed, at first, but by rest & the addition of more of the salt it not only continues to grow but continues to increase in perfection. But if we omit to increase proportionally the addition of the salt, the chrystal again becomes irregular & by degrees returns to naught.

Thus on the introduction of the embryo the "primordium of entity into the uterus" it also is "rude & unsightly" but by the proper application of nourishment etc. it likewise increases in size & perfection till old age warns us of our gradual progress to earth again.

In both cases certain generalizations operate which the man in the one case is the effect & the chrystal in the other. One has as much a "principle of life" as the other, or why should we "see individual trees produce innumerable seeds & every individual fish innumerable spawn in such inconceivable abundance as would in a short space of time, crowd the earth & ocean with inhabitants; & there are much more perfect animals than the animal ???? in ???? can be supposed to be & yet perish in uncounted millions."

Does not this consideration alone go far to shew that both animate & inanimate matter are not formed but made by general laws? Is it not much more rational to believe that the common laws of Nature appointed by God himself in the

distinguish the one kingdom from the other – founded either upon their growth or organization.

Neither shall we be more successful when we check for such a distinction from the ones possessing a "living or sentient principle" of which the other is void.

If the one possesses such a principle so does the other as we may rationally infer if we are permitted to reason & judge analogically.

Thus similarity of motion, secretions, sleep, heat, continuation of their species etc. sufficiently prove the identity of the living principle. Vegetable physiology alone would prove the fact of their being sentient. Their diseases alone that of their being living beings were such a proof wanted. It would require a great stretch of the rational faculty to believe the polypus – oyster & myriads more of the animal kingdom endued with life & sensation and at the same time reject the different species of mimosa, the Dionea Muscipula & numberless other vegetables as being destitute of both or either.[3]

These & similar facts many endeavor to account for upon the principle of initabilty that they may not be necessitated to allow them sensibility.

The term initability was restricted by **Haller Gautius** etc to the animal fibre denoting that power which they possess of contracting upon the application of any stimulating substance even after their separation from the body.

It has been attributed successively to the nerves, the mind, elasticity. But many animals have no more nervous system than the vegetable; yet possess initability. Now can we with more reason, suppose a detached muscle embued with mind, than we can the vegetable that exhibits similar phenomena; yet both possess initability. Neither in the ani-

[3] "A plant," says Dr. Barton "is an organized & living body enbued with the attribute of initability. Many facts however conspire to render it highly probable that the attribute of feeling is not conceded to animals alone."

mal or vegetable will elasticity account for those motions which are called initable etc, etc.

Thus each has in its turn been found insufficient to account for the phenomena & has consequently been rejected.

I shall for the present drop the consideration of the initability of the muscular fibre & of vegetables sufficing it to say that let it depend for its existence upon what it may, it is evident that vegetable possess a similar power.

Hence if we are necessitated to allow the effects of both vegetable & animal existence similar – and to affirm with **Smellie** that the "similarity of plants & animals as well as the difficulty of fixing the precise boundaries by which these two great kingdoms of nature are limited, are direct consequences of the organization of vegetables" and that "nature has acted upon the same general plan in the formation of both." Surely we are warranted in concluding that the moving principle – the vis vitx of each are similar.

From the vegetable to the polypus – & from the polypus to the man we see a gradual ascension from the most simple organic structure to the most intricate & delicate we can imagine.

At the same time we are struck with a similar assension of life if I may be permitted to use the expression. "The gemmiparous animals enjoy, in a higher degree than plants, the faculties of feeling & self motion; their substance dilates & lengthens, & contracts according to the impressions they receive. Nevertheless these spontaneous movements do not suppose any more than those of the mimosa, the existence of reflection and will; like those of a muscle detached from the thigh of a frog & exposed to galvanic excitation, they spring from an impression which does not extend beyond the part that feels it & in which sensibility & contractility are blended & lost in each other."[4]

[4] "Also in the degree of composition nature appears to rise in graduating from the mineral to the vegetables & from the latter to the animal kingdom. ?????

By the ???? spirit of animation or ???? power (?) mean only "says he "that animal life which mankind possesses in common with ???, & in some degree even with vegetables, I leave the consideration of the immortal part of us, which is the object of religion, to those who treat of revelation."

But to return from this digression. – The opinion that the oxygen of the atmosphere constitutes a very essential part towards the formation of the nervous fluid is I think rendered somewhat probable by the phenomena. [14]

Again the only means by which the blood of the foetus in utero can become oxygenated is through the medium of placenta. Now it must be granted that it not probable it should by this means become so fully so, as it would be, were it presented more in medically to the atmosphere as it is after birth by means of its lungs. Consequently there is not so great a quantity of sensorial power secreted; and hence but before animal actions in the foetus exhausts this power; and hence also the raising of its passing most of its time in a state of inaction or sleep, as it also does for a considerable time after birth. To these considerations we might add, that from these data alone we are enabled to explain its ability to sustain the pressure etc. that it undergoes at the time of birth without injury.

It probably will be said by some that the preceding doctrine of animal life would (?) had us to believe ???? etc. reasonable creatures? --- That they are so I cannot think will be denied by those who will take the trouble of examining their actions & history but cursorily (?) – But that they are not equally so with ourselves is easily accounted for.

[14] exhibited upon breathing of the gaseous oxyd of nitrogen. Thus "when the nitrous oxyd is ???ed with atmospheric air, & then ????ed into the lungs, it generates highly pleasurable sensations: the effects it produces on the animal system are eminently distinguishable from every other chemical agent. It excites every fibre (?) to action ???? ?? faculties of the mind, inducing a state of great exhilaration, an in??? propensity to laughter, ????? flow of vivid ideas, & unusual vigour & ??? for ??? exentions (?), in some respects resembling those attendant on the pleasantest period of intoxication, without any subsequent ????, depression of nervous energy, or disagreeable feelings; but more generally followed by vigour, & a pleasurable disposition to exertion, which gradually subsides" ac???

It is very probably I think, that it at least, serves as an essential principle of it. **Darwin** remarks that "besides the supposed productions of phosphoric acid & change of colour of the blood & the production of carbonic acid, there would appear to be something of a more subtle nature perpetually acquired from the atmosphere; which is too fine to be long contained in animal vessels & therefore requires perpetual renovation; & without which life cannot continue longer than a minute or two; this ethereal fluid is probably secreted from the blood by the brain & perpetually depo??ated in the actions of the muscles & organs of sense."—

From this & other remarks of Darwin, (in Sec 14.2.4 vol. 1 of his *Zoonomia*) we would suppose that he considered this spirit of animation as having the common properties of matter & consequently material. But strange to tell he seems (?) discovery of considering it as naturally immaterial; However at "no two things can influence or affect each other, which have not some property common to both of the," he supposes the spirit of animation can ??? "this property of solidity or disprove itself (?) of it a????tionally as we are taught of spirits & of angel(?)."

How a substance can change not only its properties, but become material or immaterial at pleasure I cannot conceive. Nor do I at all see the necessity of the sen???? ??? being considered in any other light than simply as a secreted fluid, which of course can be affected by other substances, (having the properties of materiality in common with it,) according to circumstances. But he afterwards a?? that he does "not wish to dispute about ???? and is ready to allow, that the power/gravity specific attraction, electricity, magnetism, & even the spirit of animation, may consist of matter of a finer kind; & to believe with St. Paul & **Malbrauch** (?), that the ultimate cause of all motion is immaterial, that is God. St. Paul says "in him we live, & more ??? our being" and in the 15th Ch. of Corinthians, distinguishes between the psyche or living spirit & the pueuma (?) or reviving (?) spirit.

From such comparisons – such agreements which might be much farther extended we are forced to grant that plants as well as animals possess both sensibility & contractility.

(I would not be understood to insinuate as I before mentioned that I consider matter as capable of possessing sensation. But I might add with Dr .**Hadley** that "It does indeed follow from this theory, that matter, if it could be endued with the most simple kinds of sensation, might also arrive at all that intelligence of which the human mind is possessed." But I do not at all see the necessity of allowing this as will hereafter be perceived.)

It is necessary that I should here say a few words this property of animal and I might add of vegetable existence viz. sensibility.

In the first place then every person who is not biased in favour of any preconceived opinion or doctrine must grant that sensation is a property of all animal matter at least. Similar actions or wreathings as from pain are common from the worm to the man upon the application of excessive or unnatural stimuli.

Who then but the most grossly prejudiced would assert that brutes etc "are only pieces of finely organized matter, capable of many subtle motions that come from objects without" or in other words that they possess no sensation.

Again the same arguments that would be used to prove the life of plants – or that would prove animals in general possess sensation would at the same time prove vegetables also evidenced with sensibility.

Darwin has went so far as to assert that they not only possess initability, sensibility, ideas etc. but likewise some of the passions as for instance that of love. And that

the anthers & stigmas of plants are real animals.

Tho this in my humble estimation is going too far yet it serves to shew that he was highly sensible of the great similarity of the one kingdom to that of the other. Hence I think it must be admitted that not only all animals are embued with sensibility but that the vegetable kingdom likewise enjoys this property in a greater of less degree.

Hence the question upon what does this power of sensibility depend?

The difficulty of this question I hope will be considered as a sufficient apology for any inaccuracies into which I may be hurried.

Matter or any of its modifications has so long been considered as incapable of exhibiting any of the phenomena of life that any opinion which militates against the doctrine of the organized system as serving only the office of a vehicle thro' which spirit – an immaterial principle acts, will be held by many not only as unfounded in truth but in detestation. However, be this as it may I shall follow what my reason assures me as the most probably regardless of the consequences.

I cannot see for may part how much plainer we make the question by calling to our assistance an immaterial principle.

It would be as easy to conceive sensation is a property of matter as it is to conceive it a property of spirit which by the by is nothing – or had we better adopt the reasonings of some metaphysicians and thus say as the only thing we know of the mind is that it <u>thinks</u> & therefore <u>thought</u> itself is the mind – or to vary it to suit the present occasion say as the only thing we know of <u>spirit</u> is that it <u>feels</u> – and therefore <u>sensibility</u> itself is spirit – as far be it from me to assent to such reasoning as to assert that matter possess sensation.

oblongata, medulla spinalis & nerves,) from the blood, which is so copiously determined to each of these parts.

As to the particular nature of this fluid I am at a loss to conjecture. However I am of opinion that it is a fluid <u>sui generis</u> & yet p???ing in a greater or less degree of the properties of electricity or Galvanism.

Might not <u>oxygen</u> serve some other purpose than merely as a stimulus, or to decarbonizes or (as others say) oxygenize the blood?

As a mere stimulus it certainly is not at all necessary, for if in the 1st place it were such (as is probable) habit would soon render it inert; again oxygenized blood or even-chyle (?) or water would serve this purpose equally well; Hence if the blood is in ????? oxygenized it must b for some other purpose.

As to it being solely employed to decarbonizes the blood, I can't think it accords altogether with the simplicity of nature, nor does it in my estimation answer all objections. But future experiments must determine this.[13]

Now as the blood appears to become in??????ation, to a certain degree oxygenated, & ??? becomes deoxygenated in the course of the circulation, we are curious to know what becomes of it. – what purpose it answers in the general oeconomy (sic) of life—

Mayow, **Gertanner** (?) etc suppose that oxygen alone constitutes the nervous fluid.

[13] again **Le Gallois** experiments go far towards proving the correctness of the above opinion even contrary to a preconceived opinion. Thus he says he "had thought that it was through the medium of the nervous principle that the brain ??? ??? ??????? ????? ????? ??????? upon the different parts (?) of the body, without a <u>circulation</u> of their principle but by a sort of a shock (?) upon that of the nerves, nearly as a sound is transmitted through the air." But he at the same time tells us that his experiments never answered his expectation; yet he says he does "not wholly give up this hypothesis". But his experiments and the above arguments I am convinced deserves to be considered conclusive, and ?????ting the adoption of the contrary of this expectation.

Burns also seems to be aware of the force of this doctrine when he says in a note that the nerves "seem to secrete the power whilst the extremities ex???ed it"

However the opinion that impressions produced on the senses are transmitted, to the brain by vibrations seems now pretty generally dropped and it is now asked whether the nerves "are only simple conductors or is there a secretion produced in them of a nature analogous to that which takes place n the brain or in the medulla spincilies(?)"?

For my part I would unite the two, and not only consider them as connectors of the secretion of the brain & spinal marrow, but of that which they themselves secrete. For I see no reason why they should not be capable of performing a similar office to that of the brain & especially as "They are neither more nor less than continuations of the brain"& receiving blood vessels as they proceed.

This renders it easy to account for the sudden starting, & the initability of paralytic limbs which is often known to increase in force as time elapses; for when its communication with the brain or spinal marrow is suddenly intercepted the muscles of those limbs are of course desiccated of their supply of nervous fluid, consequently they receive none except that which is secreted by their own nerves; but this is not sufficient in quantity to cause any sensible action in those limbs except at times when it ahs been considerably accumulated when it is apt to cause what is called a ??acting of the muscles, but after a time the muscles become more sensible to stimuli[11] & consequently more initable; yet these actions of the paralytic limbs are insensible or imperceptible to the person affected for though the limbs are sensible within themselves, yet their connection being cut off from the brain, they are not perceived.[12]

From what has been said it is sufficiently evident that the excitability, sensorial power, or by what other name it may be known is a secretion (of the brain, medulla

[11] or in other words they become reduced to their primitive state of susceptibility. Note Thus persons are easily affected by spirituous (?) liquors, tobacco, or other stimuli to which they have not been accustomed. – But their habitual use will soon render their power or effects less apparent except when (?) quantity is increased proportionally

[12] Note This would serve as a happy illucidation or example of what was said in a former part of this treatise ???

But to return. How can immateriality affect materiality? Or vice versa. Does it make it the more comprehensible by supposing with **Haitley** that "an infinitesimal elementary body to be the intermedium between the soul & body."

But suppose for a moment that there does exist an immaterial principle of life – motion – sensation or thought other than God himself – That it alone possesses the power of sensation. Tis evident that abstractedly it possesses no power. That it is as inert as matter. That as far as we can conceive is not independent of matter for it can only act ??? by being on ?? it. & that the effects of its operations are proportionate to them acting on it through the medium of matter. But these very qualities be-speak nothing more than the known properties of matter.

Again every stimulus excites an action in the living body which of course can but communicate this action to the mind, spirit or whatever else it may be called. & thus constitute we say a sensation. Hence sensation is but motion be it either referred to matter or spirit.

Again what has been before said sufficiently proves sensation to be common to all animals as well as vegetables. Must we then suppose that all animated matter possesses a spiritual principle that it should be capable of sensation or life? Must we suppose the egg or the deed acquires this principle in order to live – to feel? Or do we suppose they already possess it? – If so I should hesitate not to assert that matter itself possesses sensation & life.

Again a muscle for some time after it is separated from the body shews every symptom of life – every action which it was capable of before its separation; - Are we to suppose this principle of life – of sensibility is divided in this case? Or that the soul extends to it as **Whytte** supposed.

From the forgoing arguments I think it is evi-

dent that neither life nor sensation can depend upon any immaterial principle for its existence. Nor indeed do any of the intellectual faculties as will hereafter be shew.

The question then returns, what is life –

All we know of sensation is that it consists of motion in some part of the system. Every fibre of the body that is capable of motion possess sensation when in motion. [5]

Most authors are inclined to believe that sensibility is inherent only in the nervous system. But I am more of **Darwin's** opinion that "sensation is an exertion or change of the central parts of the sensovisson(?), or of the whole of it beginning at some of those extreme parts of it, which reside in the muscles or organs of sense." (He includes under the term sensorium "the medullary part of the brain, spinal ????, nerves, organs of sense, of the muscles, also the spirit of animation.")

As many animals have no nervous system & yet we are induced to grant them sensibility and so also with many vegetables; we cannot with consistency believe that sensation is dependent upon the nervous system alone.

Again were it dependent upon the nervous power alone why should not pain immediately be experienced upon a tendon, artery, vein, bone, or aponeurosis, etc. being wounded? Or why should it afterwards be so excessively painful when inflammation comes on? Those parts which in their healthy state are the least sensible are when diseased the most so. Must we suppose that nerves are in such cases generated? Or would it not be more rational to suppose that sensation is but motion? Which habit renders imperceptible, but which in a greater or less degree constitutes pleasure or pain proportionally as the present action deviates in degree

5 Indeed sensation & motion are inseparable or as **Richmand** says "our sensations re nothing but modifications of our being."

6 "There is the greatest reason" says Dr. **Wistar** "to believe that the retina is the seat of vision: but it has been ascertained, most decisively, that the extreme of the optic nerve, from which the retina originates, is insensible to the rays of light." This probably may be accounted for from the above premises.

shall therefore confine my remarks principally to the latter opinion viz. that the power of <u>perception</u> & of volition is dependent upon a fluid secreted in the brain, spinal marrow etc.

Many of the arguments which Dr. **Chapman** uses to prove the urenstrical discharge a secretion and consequently the uterus a gland will very aptly apply in the present case to the brain

Viz 1 That the brain "in its villous & vascular structure, resembles a gland, & also in its diseases, being equally liable to ??????" etc.
That, like other secretory organs, blood is very copiously diffused through it.-
That, by the arrangement of its vessels, it is evidently designed that the circulation should be retained for the <u>purpose of secretion</u>. The arteries are not only exceedingly convoluted but they have thinner coats" than those of the other parts of the body not glandular. Etc. --

Though their arguments with that of the facility with which, by means of it, we are enabled to explain the various phenomena of health & disease, of the accumulation & exhaustion of excitability, are only analogical proof of its existence yet the doctrine of vibrations is as **Richmand** remarks "so absurd, that one cannot help wondering it should so long have been in vogue." Even **Hadley** the great contender for medullary vibrations was necessitated to grant the presence of a "subtle & elastic ether" that his vibrations should be transmitted from the extremities of the nerves to the brain & vice versa-

Hence it must at least be owned that "it is much more probably that the nerves act by means of a subtle, invisible, & in palpable fluid, to which the ancients gave the name of animas spirits; this fluid, unknown in its nature, and to be judged of only by its effects, must be wonderfully minute, since it eludes all our means of investigation."

The polypi, & some plants as the sensitive perform nevertheless certain spontaneous motions which seem to indicate the existence of volition & consequently perceptibility. But these motions are the result of an impression which does not extend beyond the part in which it is experienced & in which sensibility & contractility are blended."[10]

Again an unusual action in any essential part of the body either excites a corresponding action throughout the whole system or in some other organ with which it is said to sympathize-

By this I would not mean to insinuate that sympathy of remote parts depends upon nervous connection: It may & very probably does depend upon other circumstances; but it is equally evident that it could not exist were there no such connecting medium either directly or indirectly.

Thus also a local stimulus has a somewhat similar effect to an universal one either by diverting the excitement to parts comparatively of less importance (as for instance a blister will oftentimes direct preternatural excitement from the arterial system to the skin) or by increasing the actions of the system in general (as for instance brandy in tetanus etc).

Hence health is not so liable to be injured by the preternatural excitement of any one part as it otherwise would be were this connection, this nervous system wanting.

For a long time there has existed a dispute among physiologists respecting the manner in which the impressions of external objects affect the brain. Some contending that it is by the vibration of the nerves as cords – others that it is by the vibrations of the nervous medulla itself - & others again attribute it to a fluid circulating in the nerves etc.

I shall not at present notice the doctrine of vibrations for I consider the other opinion as the most probable; I

[10] C???tility or initability is a consequence of the structure of the parts as well as that kind of sensibility which has been called latent – both exist in a part & yet is not perceived except by the part itself. But where it is unusually increased it causes an action in the brain & is ??? ??? perceptible or sensible in the common ???ceptation of the word.

etc from the accustomed one.[6] And hence "the sensibility of animals & vegetables depends on their initability which ???? ?? ?? ?????.

Hence the question: of what use are the nerves? For from what has been said before it would appear that not only life, initability etc. but sensation can & does exist where the nervous system is entirely wanting. I would answer that tho it is possible to live & possess sensation without a nervous system yet without such it is impossible to become reasonable creatures.

This system I consider as searving to collect the actions of the different parts of the system to a point that they may compare themselves;[7] 1st Then an action of any of our organs of sense may be said within itself to constitute a sensation, and the particular conformation of it to constitute an idea, or in Darwin's words the "contraction or motion or configuration of the fibres which constitute the immediate organ of sense" is on idea.[8] Were it not for the nerves to transmit this action to a centre or the brain where this idea may and necessarily must compare itself, as I before said with others, we shurely should never be reasonable creatures or at least we would have been but very confinedly so.[9]

7 and??? as serving to connect the different ???? of our very extensive & intricately organized system for without such a connection it could not exist as a whole.

8 Thus "(?) our ideas come to us only by the senses: there are none innate, as was imagined till the time of **Locke**. The child that opens its eyes to the light is prepared for the acquisition of ideas by this ???? that it has senses; that is, that it is susceptible of impressions from the objects that surround it."

9 Hence we see how the "superiority" of man has its origin in the "perfection of his organization" & how we are enabled to "feel, perceive examine, compare, judge & reason" on the different impressions (?) which we receive; and thus we see how "age, sex, temperament, health, disease, climate, and habit which modify our physical organization, must by a secondary effect "produce" diversity of knowing (?), of opinions, or characters & of genius." Did man possess but one sense "he would not yet possess an understanding (?) because as **Candillere** (?) has shown, the (?) impressions produced on this only sense (???), could (?) not admit of comparison; it would a??end in an??? Feeling, a perception of existence, the would believe the things which affected him to ??? ??? of his being." "So absolutely is sensation the source of all our knowledge that even the measure of understanding is according to the number & perfection of the organs of senses."

Hence also we understand why the vegetable & many of the animal kingdom can be sensible & yet not reasonable. Why an organ when exposed to one stimulus should be pained yet when to another it should not. E.g. a red colour tries the eye, while the green has no such effect, because the eye being habituated to the latter, is apparently unaffected, while in the former case, the reverse is the fact.- And thus it is that our first ideas are attended either with pain or pleasure, which by degrees become inert or unaffecting.

Also why each organ is affected by certain stimuli, while it is insensible to others. - Thus the eye is not affected by sound nor the ear by light; not because the optic nerve is insensible to sound more than the auditory, but because the organization or structure of the part would not transmit the undulations of the air to the optic nerve, nor will the ear permit the light to come in contact with the auditory or I hesitate not to say but that we would be equally sensible of light through the medium of the ear as of the eye – as it is we might as well expect the kidneys to secrete bile or the liver urine as to expect thus the effects should vary when the causes remain the same.—

Hence every organ may be said to be so modified that it is not affected but by peculiar stimuli but not that the "sensibility of every organ is so modified"etc. As there is no part of our system but what actions are peculiar to itself consequently there is no part but whole sensation is peculiar to itself.—

As it respects consciousness so much talked of by metaphysicians I shall but simply remark with Darwin that "we are only conscious of our existence when we think about it; as we only perceive the lapse of time when we attend to it, when we are busied about other objects, neither the lapse of the time, nor the consciousness of our own existence, can occupy our attention. Hence when we think of our own existence, we only excite abstracted or reflex ideas (as they are termed) of our principle pleasures or pains, or our desires or

aversions, or of the figure, society, colour, or other properties of our bodies, & call that act of the sensovision a consciousness of our existence," Thus the foetus probably has no more consciousness of its existence than a vegetable, because the stimuli uniformly being the same – or nearly so it cannot be said to possess this power more than a person who is asleep, but as soon as it is born the stimulus of air, of light cause more vivid sensations give it ideas & thus consciousness at which time it may be more correctly said to enjoy animal life. –

2ndy The nervous system serves as a connecting medium to the different parts of our system without which we could not exist as a whole.—

I do not hesitate to say that man & the more perfect animals could not exist were it not for the nervous system though life itself does not depend upon it more than upon any other part of our system. – But vegetables & some of the lowest grades of the animal kingdom are so simple in their structure, that it is not at all necessary there should be a connecting medium farther than that of their proper initiative vessels etc. –

But the more perfect animals by possessing a nervous system are not only capable of existing as a whole but of keeping up a "multi-farious intercourse with every thing that surrounds them"; and "thus they enjoy a very superior kind of sensibility by means of which the impressions which affect some of their organs are perceived, judged & compared. This mode of sensibility might be more properly called perceptibility, or the faculty of accounting to ones self for the emotions which we experience".~

"It requires a center to which the impressions may be referred, & therefore it exists only in the animals which like man, have a brain or some organ in its head; so that the zoophytes & vegetables, wanting that organ are equally destitute of this faculty.